

# DEVELOPMENTS IN FOOD USES OF PALM OIL : A BRIEF REVIEW\*

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## INTRODUCTION

The use of palm oil in food dates back 5 000 years. At present 90% of palm oil is used in food preparation or food manufacture worldwide. The remaining 10% of the palm oil and its products are used for non-edible applications, mainly in the soap industry and the manufacture of oleochemicals.

## TRADITIONAL USES

The liquid fraction of palm oil, palm olein, is widely used for frying. In fact, in Malaysia, it is now the main cooking oil used in most households. Its longer frying life, and its reduced tendency to foam and polymerize, makes it a better frying oil than corn or soya bean oils (Augustine *et al.*, 1988). For industrial frying, *e.g.* of instant noodles, palm oil is very suitable (Masashi *et al.*, 1985). Palm oil owes its good oxidative stability to its composition: it contains only a trace of the unstable linolenic acid but a moderate amount of the more stable linoleic acid (10%-12%). The tocopherol (380 - 890 ppm) acts as an effective natural antioxidant (Gapor, 1990a).

As a semi-solid fat, palm oil is used as a major component in shortenings, margarines and vanaspati. According to Matz (1972), the term shortening comes from the word 'short' meaning tender. Originally shortening referred to fat, primarily lard,



which was used to shorten baked products (Chrysam, 1985). Shortenings originated from the United States and were produced as a substitute for lard (Bennion and Bamford, 1973).

Unlike margarine, which is an emulsion of oil and water, shortening is pure (100%) oil and fat (Bennion and Bamford, 1973). There are many types of shortenings, each tailor-made for a particular application. There are also general purpose shortenings which are used for several applications. Shortenings are used in the preparation of many foods: among their applications, they are used in cooking and frying, and in the manufacture of bakery products such as cakes, cookies, rusks, wafers, pastries and bread (Albanese, 1983; Okkyung and Pomeranz, 1983; Nielson *et al.*, 1984; Bimbo, 1989; Nor Aini, 1992). Other related bakery products include cream fillings and icing. At 20°C palm oil



has a 22% to 25% solid fat content and is a valuable ingredient for shortening formulations. Palm oil can be blended with butterfat for use as a biscuit shortening, or alternatively diacetyl flavouring can be added to palm oil shortening to give the desirable buttery taste (Nor Aini *et al.*, 1991). A study on some shortening formulations based on palm products in combination with other vegetable oils has been published by Nor Aini *et al.*, (1989). They reported that a high palmitic acid content was good for aeration of fat/sugar mixtures. The results of the study indicated that palm stearin-cottonseed oil (3:2) shortening was best for aerated cream filling and that a blend of palm stearin and low erucic acid rapeseed oil was very economical and performed excellently in cakes. For application both in cream fillings and baking, interesterified palm olein was the most suitable material.

Margarine is a type of emulsion consisting of fat and water. Although the original purpose in developing margarine was to imitate butter, there has since been a considerable diversification of margarine products, which now include:

- Table margarine in tubs
- Table margarine in block form
- Cream/cake margarine
- Margarine for tropical climates
- Puff pastry margarine

There are also low-calorie spreads which are similar to margarine in their physical behaviour but have a much higher water content. The physical properties of margarines are largely determined by the fat component and these properties vary with the type of product. Thus tub margarine are soft and are spreadable straight from the refrigerator. Table margarines in packets are not as soft but are spreadable at room temperature, whilst cake or cream margarines are a little firmer than table margarines. At the extreme end, pastry margarines are much firmer, in order to give the flaky texture to the end product. Palm olein is suitable as the liquid component of margarine blends, while palm stearin or hardened palm oil can be used as the solid component (Berger, 1981). Ward (1988) recommended that at least 10% of palm oil be incorporated in canola-based margarines. Palm oil and palm oil products have also been found to be very good



ingredients for puff pastry margarine (Teah and Ong, 1986).

Vanaspati or vegetable ghee is a major commodity in countries such as India, Pakistan, Egypt, Saudi Arabia, Iraq and Iran. In India and Pakistan, consumers prefer a product with a granular texture. On the other hand, in Iraq and Iran, a smooth texture is preferred. Kheiri (1982a) reported that vanaspati from India contained between 5% and 20% of palm oil products. A higher percentage, of up to 50% of palm oil products, has been reported in Pakistan vanaspati formulations (Kheiri, 1982a).

Palm oil and palm kernel oil are also ideal raw materials for confectionery fats. Confectionery fats include cocoa butter equivalent (CBE), cocoa butter substitute (CBS), coating fat and toffee fat. An important function of a fat in chocolate and confections is to hold the other ingredients together in an acceptable form before they are eaten. The fat content of chocolate or of a coating is approximately 33% (Haumann, 1984). In the EEC countries, cocoa butter equivalent (CBE) based on 2-oleo disaturated fats can legally be added up to 5% in chocolate products (Kheiri, 1982b).

Cocoa butter has a desirable sharp melting property as a result of its unique chemical composition: it is high in POS triglycerides. On the other hand, palm mid-fraction (PMF) is high in POP. In order to bring out the desirable sharp melting characteristic, PMF can be blended with fractions from Sal, Shea or Illipe which are rich in SOS triglycerides (Berger, 1981). Cocoa butter equivalent can be used in chocolate-type and non chocolate-type confections, in coating and moulded products as centre fats, or as an extra coating layer to protect the centre fats from migrating to the surface.

Cocoa butter substitutes (CBS), which are mainly used to produce imitation products, can be divided into lauric and non-lauric types. Lauric-based cocoa butter substitutes are made from palm kernel oil, while the non-lauric based ones are made from palm oil in combination with other vegetable oils.

### CURRENT USES

The newer applications of palm oil in foods include its use in emulsion-based, powdered and convenience food products. The desirable quality in emulsion-based products such as mayonnaise, ice cream, coffee creamer and filled milk depends on the fats they contain.

Mayonnaise is a combination of oil (80%), water, acid and egg yolk. The oil is not stable unless it has been winterized (Berger, 1985). Butterfat has been traditionally used in ice-cream, but palm oil and palm kernel oil are now used commercially to replace it. The fat content in ice-cream is 9%-12% (Berger, 1989). Ice-cream made from palm kernel oil has desirable properties. It melts quickly and does not leave any greasy residue on the palate.

An important function of a coffee creamer is to produce a desirable colour change in drink. Coffee creamers are available in three forms; namely powdered, liquid and frozen. The non-dairy creamers are used as substitutes for cream or milk in coffee, tea or cocoa drinks. Hydrogenated palm kernel oil is an excellent raw material for coffee creamer because of its good palatability and high resistance to oxidation.

Butterfat is used in full-cream sweetened condensed milk, but it can be replaced with a vegetable oil, for example palm oil, to give a product known as 'filled milk'. Palm oil is used because it is more economical than other oils and is easily available. In addition, it is more stable to oxidation than butterfat. Filled-milk powder can be made from skimmed-milk powder recombined with refined palm oil.

Another use of a palm oil product is in infant food formulations. The low-melting olein has been found very suitable for use in infant food formulations when blended with other vegetable oils. Low-melting olein contains 10%-15% palmitic acid in the 2-

position of the glycerol chain. This contributes to the high digestibility of the product (Trautler *et al.*, 1985).

Apart from the products mentioned above, there are many other foods which contain palm oil and palm kernel oil products. These include soup mixes, cake and dessert mixes, *rendang* or curry mixes, sardines, baked beans, breakfast cereals, shrimp-paste powder, bouillon, peanut butter and beverages. Palm oil products have also been used as a spray oil on biscuits.

### FUTURE USES

An important future application of palm oil in food is the use of red palm oil or red palm olein in cooking. Red palm oil is a highly nutritious oil rich in vitamin E and  $\beta$ -carotene. The deep red colour of the oil blends well with ingredients such as chilly and curry, making the dishes more attractive and appealing (Nor Aini, 1990). The use of red palm oil is a possible alternative means of combatting vitamin A deficiency, which is prevalent in many countries. In addition, nutritional studies have indicated that  $\beta$ -carotene and vitamin E have anti-cancer properties, enhance the body's defence mechanisms against infections, and increase fertility, and that vitamin E in particular delays the process of ageing. Palm vitamin E, particularly its tocotrienol component, is a good antioxidant and is a promising therapeutic agent for human health (Gapor, 1990b).

Another promising application of a palm oil product is the use of refined, bleached and deodorized (RBD) palm olein of high iodine value (IV) as salad oil. The use of palm olein as salad oil can be made possible by blending it with other vegetable oils. Studies on the cold stability of such oils are in progress. Yet another potential use of RBD palm oil is as a barbecue oil. Its high stability and bland taste makes it a good choice for this application. The oil acts as a flavour carrier and it also prevents the barbecued meat from drying out, so that one gets a juicy and tasty end product.

### CONCLUSION

Palm oil is indeed a versatile oil. Its applications are varied and it can be used in almost any food. Thanks

to modern technology, palm oil products can be tailor-made to suit any particular application. Not only versatile, palm oil is also very nutritious.

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