Palm Oil for Frying II

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Palm oil – endowed by nature with versatility so that it is suitable for various applications – is in common use for deep fat frying world-wide. The stability of palm oil in frying is due to its inherent fatty acid composition as well as to some minor components present in it.

The good frying performance of palm oil and palm olein (the more liquid fraction of palm oil) in comparison with other vegetable oils has been extensively investigated in many independent studies overseas. Some of the results may be summarized as follows:–

Authors	Country	Conclusion
1. Von Zoddelman and Wurziger (1973)	Germany	Hydrogenated groundnut oil and palm oil products bests.
2. Herendi and Bethice (1982)	Germany	Palm olein similar to groundnut oil.
3. Faur (1975)	France	Palm olein and palm oil excellent for catering.
4. Toregard and Eriksson (1979)	Sweden	Palm oil and palm olein superior to hydrogenated soyabean oil.
5. Bracco *et* al. (1981)	Switzerland	Palm olein performs as well as groundnut oil.

A comparison of the frying performances of palm olein with that of other vegetable oils in PORIM led to findings similar to those of the studies overseas: a series of frying tests were carried out with RBD palm olein in comparison with other vegetable oils such as corn oil and cottonseed oil.

Oils high in polyunsaturated fatty acid are liquid at room temperature and drain well from foods but will quickly oxidize. Use of polyunsaturated oil in deep frying is not recommended at all, especially if the product is to be stored; such oils also undergo rapid break-down at frying temperature to form gums and polymers. Thus it is common experience that the surfaces of friers charged with rapeseed oil, corn oil or soyabean oil rapidly develop a varnish – like polymer which is difficult to clean and is accompanied by a fishy, painty odour.

Comparison of frying parameters indicated that the performance of palm olein was superior to that of other vegetable oils in terms of polymers, shelf-stability, polar components, dielectric constant and oxidation.

Table 1 shows the induction period of RBD palm olein in comparison with those of corn oil and soyabean oil. The longer induction period of RBD palm olein implies that it will have a long shelf-life before the oil is used or consumed.

TABLE 1.

Oil	Induction Period
RBD palm olein	44.0 hours
Corn oil	9.0 hours
Rapeseed oil	11.5 hours
Soyabean oil	16.0 hours
Cottonseed oil	11.1 hours

Frying studies under standard conditions in PORIM showed that there was a higher percentage of polymers in corn oil and soyabean oil than in palm olein after four days of intermittent frying with french fries (*Figure 1*). No polymers were detected in the fresh samples. The formation of polymers is believed to require the presence of conjugated dienes (Kappelmeir, 1933). The more unsaturated oils such as corn oil and soyabean oil, will experience a faster rate of oxidation of unsaturated fatty acids than will palm olein. The conjugated dienes are the primary oxidation products of unsaturated fatty acids, so it is to be expected that a higher rate of oxidation of fatty acids will result in a higher rate of formation of polymers.

The dielectric constant has been used as a quick method for monitoring oil deterioration (Fritsch, 1979). The presence of water and fat extracted from the fried food can affect the results, but for comparison and for general practical purposes, this is a useful tool for simple determination of the frying quality of oils and fats. The comparative dielectric constant readings for palm olein and cottonseed oil are shown in *Figure 2.* For the Food Oil Sensor (Northern Instrument Corporation, USA) used to monitor the values, a dielectric constant of 4 was taken as the discard point. Based on this parameter, the discard point for RBD palm olein was longer, *i.e.* its frying life was longer than that of cottonseed oil (1½ days for cottonseed oil and about 2½ days for RBD palm olein). Similar observations were made with other liquid vegetable oils.

From a user's point of view, RBD palm olein, with its lower rates of oxidation of unsaturated fatty acids and formation of polymers, and its consequent longer frying life, is an excellent deep fat frying medium and general purpose cooking oil for the household. An additional advantage for housewives in using palm olein lies in easier cleaning of fryers: the sticky films of polymers formed on the walls of fryers when using corn oil and soyabean oil are hard to remove. Furthermore, palm olein has a lesser tendency to foam than corn or soyabean oils and hence presents less of a fire hazard.

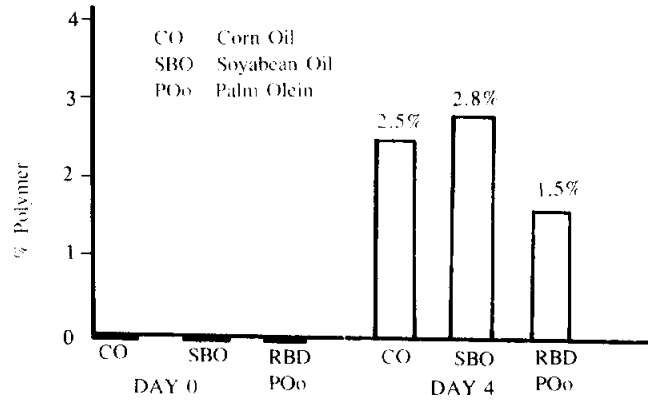
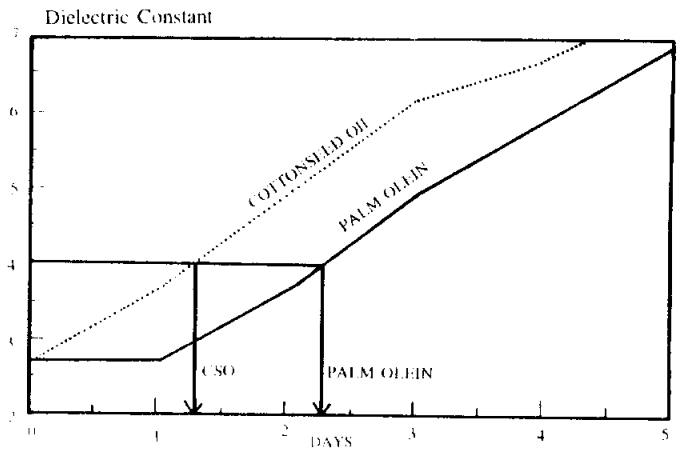


Figure 1. Polymer Formation in RBD Palm Olein, Corn Oil and Soyabean Oil During Frying



* Initial FFA contents : palm olein, 0.09%; cottonseed oil, 0.04%

Figure 2. Dielectric Constants of Palm Olein and Cottonseed Oil vs Time