

PALM OIL CATERERS FOR THE RESTAURANT AND BAKING INDUSTRIES

Palm oil is obtained from the fruit of the oil palm tree, *Elaeis guineensis*. The trees grow optimally within about 10 degrees of the equator and require consistent rainfall throughout the year. The majority of palm oil is produced in Malaysia and Indonesia where growing conditions are ideal. Trees produce fruit throughout the year, with reduced yields during the rainy season. Typically a palm plantation produces about 6000 pounds of palm oil per year - by comparison one acre of soybeans produces about 600 pounds of soybean oil. The life cycle of a palm plantation is about 30 years, after which the old trees are removed and replaced with new tree varieties. The latest varieties are expected to yield up to 50% more palm oil per acre, greatly increasing palm oil output on the same acreage of planted land.

A palm fruit is about 2 inches in diameter and consists of a hard nut called a kernel, surrounded by a fleshy fruit layer. The fruit layer contains the palm oil while the kernel contains a small amount of an oil called palm kernel oil. The palm oil is obtained from the fleshy layer by treatment with steam followed by pressing. No solvents or chemicals are used in the extraction. The pressed oil is called crude palm oil and is bright red in color due to a high content of natural beta-carotene, a vitamin A precursor. For food use, crude palm oil is further refined to remove color and odor using steam, vacuum and natural clay. Also present is a group of natural antioxidants called tocotrienols, which contribute to the stability and shelf life of the oil. Tocotrienols also help protect the body against the effects of oxidation and free radical formation.

Palm oil contains a natural balance of saturated and unsaturated fatty acids. It is composed mainly of an equal amount of palmitic acid and oleic acid, and contains no trans fat. For every gram of saturates consumed, a gram of unsaturated fat will also be consumed. Recent nutrition research has shown that the saturated fat in palm oil raises levels of good cholesterol (HDL) in humans, partially counteracting the well known LDL raising effect of saturated fat in general. Saturated fat is not as bad as it was once made out to be, and is increasingly used as part of a healthy balanced diet.

Palm oil is naturally semi-solid at room temperature (MP approx. 39C) and is an excellent shortening for many food applications without the need for further processing. Palmitic acid, the main saturated fat in palm oil, naturally tends to form small, stable crystals (called beta-prime) that are excellent at stabilizing small air cells, and impart a smooth creamy texture to baked goods. The incorporation of air into baked goods during the creaming process is essential for proper structure and mouthfeel. Large fat crystals result in a grainy mouthfeel and products have a more dense

structure due to a lack of air incorporation. However over the past 30 years, many different shortenings have been developed and tailor made for specific applications using the process of partial hydrogenation. Although palm oil is a single natural product, it is highly versatile due to a physical process called fractionation. The fat is melted and cooled slowly to produce a slurry of high melting point crystals suspended in liquid oil. The crystals are separated from the liquid component by filtration and the resultant 'fractions' have completely different physical properties compared to the original palm oil. The high melting point fraction, palm stearine (MP approx. 55C), is a hard waxy solid while the palm olein fraction is a liquid at room temperature (MP approx. 25C). These fractions can be fractionated again giving additional components with different physical characteristics. By blending the fractions in different proportions, an unlimited variety of shortenings can be generated, matching the functionality of almost any kind of partially hydrogenated vegetable oil.

Palm oil is naturally resistant to oxidation and provides a long shelf life to baked goods and deep fat frying operations. It contains no linolenic acid (the most unstable fatty acid in vegetable oil) and the total content of polyunsaturates is 10%, compared to 60% in soybean oil. The remaining fatty acids are oleic and palmitic acids, both of which are highly stable. Stability of palm oil is further increased by the presence of natural antioxidants. Shelf life and fry stability of all palm oil products are comparable to partially hydrogenated vegetable oil.

When looking for a replacement for a partially hydrogenated shortening, comparing the solid fat profile and melting point to the corresponding palm oil product is a useful first step. It is not realistic to expect an exact match because of the large differences in fatty acid compositions. Palm oil, or a slightly harder or softer version of palm oil, is usually a drop-in solution for typical all purpose shortenings, used for example in cakes and cookies. Some applications including pies, Danish and puff pastries require a more sophisticated shortening. Regular palm oil tends to become brittle when cool, and softens excessively as it warms up. These applications need a fat that remains soft at lower temperatures, and resists melting at high temperature. Appropriate blends of palm fractions provide the temperature tolerance needed for demanding applications. Over 30 palm oil based shortenings and oils have been developed by Lodders Croklaan, providing an off the shelf solution for almost every bakery and frying application that currently uses partially hydrogenated vegetable oil.

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