

We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,400

Open access books available

174,000

International authors and editors

190M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com



Introductory Chapter: An Overview of Palm Oil

Kanchana Samarasinghe and Viduranga Y. Waisundara

1. Introduction

This chapter is meant to summarize and introduce palm oil, its functions, comparisons and contrasts, and composition. Its purpose is to set the stage for readers who are new to the topic of palm oil so that the foundation will be set to go deeper into this mass industry—both technically and scientifically. Palm oil has become a valuable commodity and an essential aspect of many culinary and industrial applications. Thus, it is timely that innovations, technologies, and inventions are set to develop the palm oil industry to the next level—possibly in an eco-friendly manner while preserving its functional properties.

The genus *Elaeis* comes in two species: *Elaeis guineensis* and *Elaeis oleifera*. *E. oleifera*, sometimes known as American palm oil, is more environmentally adaptable than *E. guineensis*, which is known as African palm oil [1]. Compared with other regions of the world, Africa has a wider range of oil palm varieties in general. Palm oil contains a considerable percentage of saturated fatty acids such as stearic acids and palmitic acids; however, it does not contribute to arterial thrombosis or atherosclerosis due to the cardioprotective effect that is present in palm oil [2].

A tropical rainforest, with an average annual rainfall of 1780–2280 mm and temperatures ranging from 24 to 30°C, is the natural environment in which oil palms usually grow. The plum-shaped fruits grow in groups of 200–300 along pedicels near to the trunk after the female flowers have completed their pollination process. The fruit consists of an oil-rich seed, which is also called the kernel. A typical palm fruit measures about 3.5 cm long and weighs approximately 3.5–4.0 grams. According to research, palm oil utilized in Chinese diets has a substantial ability to lower cholesterol levels when compared to other oils [3].

2. Functional properties and bioactive in palm oil

The predominant bioactive compounds and their health benefits are listed in **Table 1**. Palm oil is currently eaten as a dietary fat intake as part of a well-balanced diet around the world [3]. The use of palm oil for culinary purposes dates back thousands of years in the African and Asian continents [3].

There are several phospholipids present in palm oil that enhance brain functioning and nutrient absorption, which are shown in **Table 2**.

Ubiquinones and phytosterols are present in trace amounts in refined palm oil, often known as red palm oil (RPO). Furthermore, research has demonstrated that

Bioactive compounds	Health benefits	References
Tocopherols	Tocopherols reduce the likelihood of cancer, neurological disorders such as Parkinson's and Alzheimer's disease, and heart disease and boost immunity.	[4]
Carotenoids	Carotenoids protect against certain types of cancer by decreasing aberrant cell development and improving gap junctional communication. Carotenoids also aid in preventing heart disease by inhibiting the development and oxidation of LDL.	[5]
Phytosterols	Phytosterols can lower LDL cholesterol concentrations.	[6]
Tocotrienols	Tocotrienols can lower the influence of other cardiac risk factors, such as excessive cholesterol, on cardiovascular health. It can also prevent free radical damage and reverse inflammation.	[7]
Phenolic acids	Phenolic acids have anti-inflammatory properties.	[8]

Table 1.
Bioactive compounds present in palm oil and their potential health benefits.

Phospholipids	Functions
Phosphatidylcholine	Improves cognitive functioning, prevents fat formation in the liver, and regulates the body's energy metabolism [9].
Phosphatidylethanolamine	Regulates body energy metabolism and works as a chaperone.
Phosphatidylglycerol	Regulates enzymes [10]
Phosphatidylinositol	Phosphatidylinositol has the potential to increase reverse cholesterol transport by increasing cholesterol flow into high-density lipids [11]

Table 2.
Functions of phospholipids present in palm oil.

refined palm oil has long been recognized as a superior source of provitamin A carotenoids [12]. According to studies in red palm oil groups, retinol and beta-carotene levels were present at higher levels [13].

3. Processing of crude palm oil

Crude palm oil, which is acquired by pressing the fleshy fruit, and palm kernel oil, which is obtained by crushing the kernel that is in the middle of the fruit, are the two types of oil that are produced in general. A cross section of the palm oil fruit is shown in **Figure 1**.

According to research, crude palm oil requires several procedures to be refined prior to consumption in most cases, and this involves bleaching and deodorizing methods, which are basically used to refine edible palm oil in order to improve its smell, appearance, taste, and stability [14]. These procedures may change their original form in terms of color, odor, and stability. The differences between palm oil and crude palm kernel oil are shown in **Table 3**, whereas the differences in the fatty acid composition of palm oil and palm kernel oil are shown in **Table 4**.

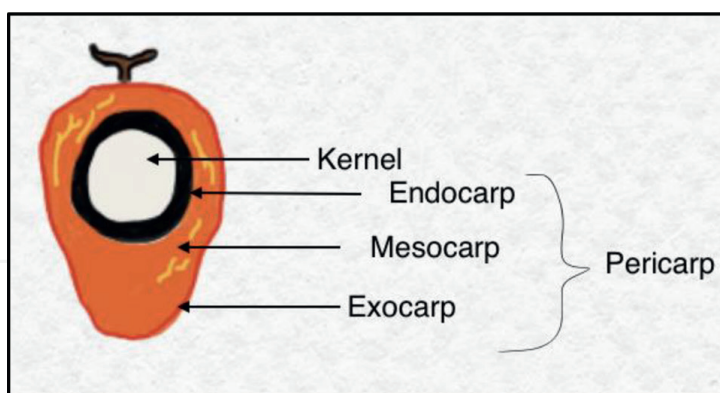


Figure 1.
 Cross section of palm oil fruit.

Palm oil	Crude palm kernel oil
Basically used for culinary purposes when making food.	Generally used to make soap, cosmetics, and for nonedible purposes.
Oil is extracted from the outer part	Oil is extracted from the inner part
Balanced ratio of saturated and unsaturated fatty acids	Comparatively more saturated
Significantly low in lauric acid	Significantly high in lauric acid

Table 3.
 Several differences between palm oil and crude palm kernel oil.

	Palm oil	Palm kernel oil
Caprylic acid (CL)	—	3.9
Lauric acid (L)	—	49.6
Capric acid (C)	—	4.0
Myristic acid (M)	—	16.0
Erucic acid (E)	—	—
Eicosenoic acid (I)	—	—
Oleic acid (Ol)	38.8	13.7
α -Linolenic acid (ALA)	0.3	—
Linoleic acid (La)	9.4	2.0
Arachidic acid (AA)	0.2	0.1
Palmitoleic acid (Pl)	0.1	—
Stearic acid (S)	4.7	2.4
Palmitic acid (P)	45.1	8.0

Table 4.
 Fatty acid composition in palm oil and palm kernel oil.

4. Concluding remarks


As an industry, palm oil production has withstood the test of time and remains a valuable resource for many technical and culinary applications. There are many health benefits associated with the consumption of palm oil. At the same time, for many countries, the palm oil industry serves as a vital sector of their economies. As a highly studied area, it is hoped that the contents of this chapter have provided a general understanding of palm oil and the oil palm tree and thereby, demonstrated the necessity of studying further about this commodity and industry.

Author details

Kanchana Samarasinghe and Viduranga Y. Waisundara*
Australian College of Business and Technology – Kandy Campus, Kandy, Sri Lanka

*Address all correspondence to: viduranga@gmail.com

IntechOpen

© 2023 The Author(s). Licensee IntechOpen. This chapter is distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. 

References

- [1] Barcelos E, Rios SDA, Cunha RN, Lopes R, Motoike SY, Babiychuk E, et al. Oil palm natural diversity and the potential for yield improvement. Table 2. *Frontiers in Plant Science*. 2015;**6**:190
- [2] Saleem A, Naureen I, Naeem M, Tasleem G, Ahmed H, Farooq U, et al. Effect of palm oil and their Main compounds in the Management of Cardiovascular Disease Risk Factors. *Scholars Bulletin*. 2022;**8**(2):59-65
- [3] Odia OJ, Ofori S, Maduka O. Palm oil and the heart: A review. *World Journal of Cardiology*. 2015;**7**(3):144-149. DOI: 10.4330/wjc.v7.i3.144
- [4] Kumar V, Rani A, Dixit AK, Bhatnagar D, Chauhan GS. Relative changes in tocopherols, isoflavones, total phenolic content, and antioxidative activity in soybean seeds at different reproductive stages. *Journal of Agricultural and Food Chemistry*. 2009;**57**(7):2705-2710
- [5] Eggersdorfer M, Wyss A. Carotenoids in human nutrition and health. *Archives of Biochemistry and Biophysics*. 2018;**652**:18-26
- [6] Trautwein EA, Demonty I. Phytosterols: Natural compounds with established and emerging health benefits. *Oléagineux, Corps Gras, Lipides*. 2007;**14**(5):259-266
- [7] McIntyre BS, Briski KP, Gapor A, Sylvester PW. Antiproliferative and apoptotic effects of tocopherols and tocotrienols on preneoplastic and neoplastic mouse mammary epithelial cells (44544). *Proceedings of the Society for Experimental Biology and Medicine*. 2000;**224**(4):292-301
- [8] Neo YP, Ariffin A, Tan CP, Tan YA. Determination of oil palm fruit phenolic compounds and their antioxidant activities using spectrophotometric methods. *International Journal of Food Science & Technology*. 2008;**43**(10):1832-1837
- [9] van der Veen JN, Kennelly JP, Wan S, Vance JE, Vance DE, Jacobs RL. The critical role of phosphatidylcholine and phosphatidylethanolamine metabolism in health and disease. *Bba - Biomembranes*. 2017;**1859**(9):1558-1572. DOI: 10.1016/j.bbamem.2017.04.006
- [10] Morita S-Y, Terada T. Enzymatic measurement of phosphatidylglycerol and cardiolipin in cultured cells and mitochondria. *Scientific Reports*. 2015;**5**:11737-11737. DOI: 10.1038/srep11737
- [11] Burgess JW, Neville TA-M, Rouillard P, Harder Z, Beanlands DS, Sparks DL. Phosphatidylinositol increases hdl-c levels in humans. *Journal of Lipid Research*. 2005;**46**(2):350-355
- [12] Dong S, Xia H, Wang F, Sun G. The effect of red palm oil on vitamin a deficiency: A meta-analysis of randomized controlled trials. *Nutrients*. 2017;**9**(12):1281. DOI: 10.3390/nu9121281
- [13] Sivan YS. Impact of vitamin a supplementation through different dosages of red palm oil and retinol palmitate on preschool children. *Journal of Tropical Pediatrics*. 2002;**48**(1):24-28. DOI: 10.1093/tropej/48.1.24
- [14] Rossi M, Gianazza M, Alamprese C, Stanga F. The effect of bleaching and physical refining on color and minor components of palm oil. *Journal of the American Oil Chemists' Society*. 2001;**78**(10):1051-1055. DOI: 10.1007/s11746-001-0387-8