

# Market Development of Red Palm Fruit Oil and its Contribution in Africa and Southeast Asia

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## INTRODUCTION

Red Palm Fruit Oil comes from oil palms that are traditionally grown in tropical regions of West Africa and are now cultivated on a large-scale in Southeast Asia. Malaysia is one of the world leaders in exports of palm oil. It is a traditional oil used for more than 5000 years in African countries. Crude palm oil is a rich source of natural carotenes (500-700 ppm) (Yap *et al.*, 1991) and vitamin E (600-1000 ppm) (Goh *et al.*, 1985). A patented, non-chemical and environmental-friendly process has been developed that retains more than 80% of the carotenes and vitamin E as tocopherols and tocotrienols, in the final products. Besides natural carotenes and vitamin E, Red Palm Fruit Oil contains other valuable minor components such as phytosterols, squalene and co-enzyme Q10. The entire range of refined red palm fruit oil products including red palm olein, stearin, superolein is marketed as a good source of natural carotenes and vitamin E. These products meet all international specifications of refined oil except for colour due to the presence of natural carotenes. A sensory evaluation showed that Red Palm Fruit Oil products are comparable to refined bleached and deodorised (RBD) palm oil products (Choo *et al.*, 1993).

Red Palm Fruit Oil gets its name from its characteristic dark red colour. The colour comes from carotenes such as beta-carotene and lycopene - the same nutrients

that give tomatoes and carrots and other fruits and vegetables their rich red and orange colors.

## APPLICATIONS

Red Palm Fruit Oil finds excellent applications in many areas such as:

- natural colorant;
- functional food;

- substrate for nutraceuticals;
- animal fat replacement;
- cosmetics and personal care;
- cooking/salad oil;
- frying oil; and
- animal feed fat.

## HEALTH ISSUES AND RED PALM FRUIT OIL'S CONTRIBUTIONS IN THE AFRICAN AND SOUTHEAST ASIAN REGIONS

Vitamin A deficiency is one of the most widespread nutritional deficiencies worldwide. Millions of children and women living in Sub-Saharan Africa and Southeast Asia are at particularly high risk of the adverse health consequences associated with this largely preventable condition. Vitamin A is an essential nutrient that supports growth, development, immune function, and vision in humans (WHO).

Vitamin A deficiency is largely unknown as a public health problem in many industrialised countries, but remains one of the major nutritional problems

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in developing countries like Africa where dietary sources of vitamin A are more limited. Countries in Africa and Southeast Asia have the highest proportion of children and pregnant women with vitamin A deficiency. The adverse effects of deficiency include, but are not limited to, an increased risk of morbidity and mortality.

Vitamin A deficiency can cause blindness, weaken bones, lower immunity, and adversely affect learning ability and mental function. Vitamin A is only found in meat products. Such foods are too expensive for many poor people in Africa. Carotenes in fruits and vegetables can supply the needed vitamin A if an adequate amount of fat is also consumed. Carotenes require fat for conversion into vitamin A. Unfortunately; those who cannot afford animal products often do not eat much fat either. Populations with ample carotene-rich foods available often suffer from vitamin A deficiency because they do not get enough fat in their diet.

Red Palm Fruit Oil, a naturally available and abundant source of fat and pro-vitamin A is poised to counter vitamin A deficiency worldwide. The  $\alpha$ - and  $\beta$ -carotene present in Red Palm Fruit Oil readily converts to vitamin A in the body delivering this vital nutrient in a safe manner without fear of toxic effects that may arise from consuming synthetic vitamin A.

#### **NUTRITIONAL AND MEDICAL STUDIES WITH RED PALM FRUIT OIL IN AFRICA**

The nutritional and health impact of Red Palm Fruit Oil has been widely researched and the main

details published are collected in a paper written by Dr D Kritchevsky (2000). Some areas of the research are summarised in the following paragraphs.

- To Combat Vitamin A Deficiencies in Children (Stuijvemberg and Benade, 2000)

Dr Benade *et al.* of The Medical Research Council of South Africa conducted a study to evaluate the effect of Red Palm Fruit Oil on the vitamin A status of primary school-children. Four hundred 5- to 11-year-old children from an area where subclinical vitamin A deficiency is prevalent, underwent the three-month trial. The children were randomly assigned to one of three groups; a group receiving a placebo biscuit, a group receiving a biscuit with synthetic  $\beta$ -carotene as a vitamin A fortificant and a group receiving a biscuit with Red Palm Fruit Oil as a source of natural  $\beta$ -carotene. After three months of intervention, the results showed Red Palm Fruit Oil-based shortening used in biscuits effectively raised serum retinol concentrations.

- To Improve Vitamin A Status of Lactating Mothers and their Infants (Canfield and Kaminsky, 1999)

This project was conducted to find a sustainable solution to vitamin A deficiency in Honduras. Dr Canfield *et al.* supplemented groups of lactating mothers and their nursing infants with Red Palm Fruit Oil. Mothers who consumed Red Palm Fruit Oil had 2.1-fold increase in their serum  $\beta$ -carotene concentration and 2.5-fold in-

crease in their milk  $\beta$ -carotene concentration. Maternal supplementation with Red Palm Fruit Oil resulted in significant increases of infant serum retinol concentrations.

- Atherosclerosis Reduction (Kritchersky *et al.*, 1999)

The effects of Red Palm Fruit Oil and RBD palm olein on experimental atherosclerosis in rabbits were compared by Dr Kritchevsky *et al.* Each group of eight rabbits was fed a semi-purified diet containing 0.2% cholesterol for 65 days. The rabbits fed with Red Palm Fruit Oil suffered significantly less severe atherosclerosis.

- Cancer Prevention and Control (Murakoshi and Nishino, 1999)

Dr Murakoshi *et al.* found that palm carotenes, which consist of 60% beta-carotene, 30% alpha-carotene and 10% others, behave in a synergistic manner to inhibit carcinogenic activities in mouse carcinogenesis models. In their study on two-stage mouse lung and skin carcinogenesis, and mouse spontaneous liver carcinogenesis models, palm carotenes showed stronger inhibitory activity than alpha-carotene and beta-carotene individually.

#### **Minor Components in Red Palm Fruit Oil**

Minor components found in Red Palm Fruit Oil besides carotenes and vitamin E, which have gained prominence are sterols and ubiquinones. Plant sterols or phytosterols are important because they have great potential in the pharmaceutical industry (Welzel *et al.*) and  $\beta$ -sitosterol is known to

TABLE 4. STEROL COMPOSITION (ppm)

Sterol	Crude palm oil*	Red palm olein (Bonnie and Choo, 1999)
Cholesterol	2.7-13	6.6-11.5
Campesterol	46.4-150	76-83
Stigmasterol	26.3-65.7	59-64
Sitosterol	120-369.5	187-218
Unknown	2-21	<6
Total	210-620	325-365

Source: \* Siew (1990).

Ubiquinone-10 is better known as coenzyme Q10. The quinol form of the compound has been shown to be even more potent as an antioxidant than vitamin E (Kagan *et al.*, 1992).

TABLE 5. UBIQUINONE CONTENT (ppm)

Ubiquinone	Crude palm oil [15]	Red palm olein (Bonnie and Choo, 1999)
Ubiquinone-10	10-80	18-25

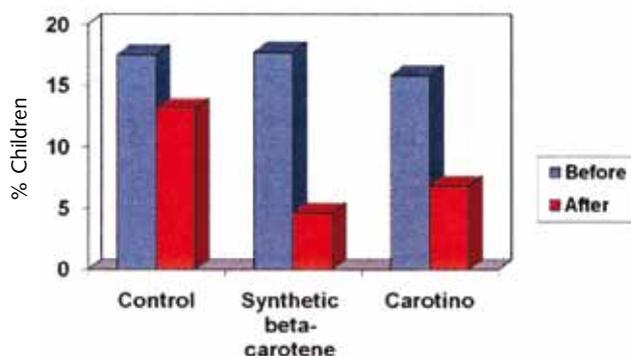


Figure 1. Prevalence of low serum retinol levels (< 15 µg dl<sup>-1</sup>) before and after three months of intervention.

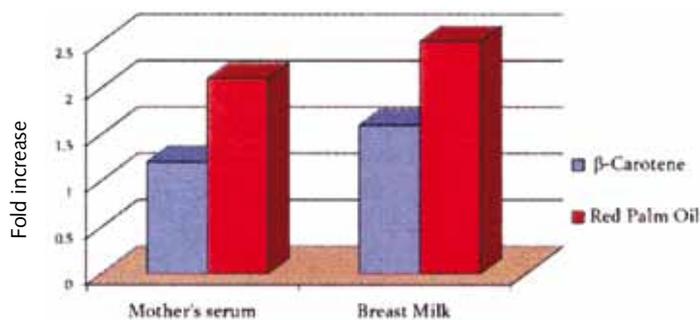


Figure 2. Supplementation of lactating mothers with dietary Red Palm Fruit Oil significantly increased their serum and milk β-carotene levels.

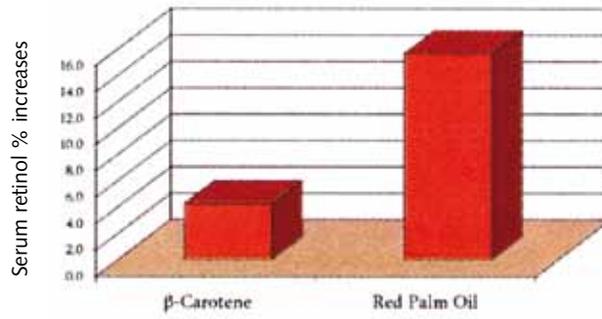


Figure 3. Supplementation with Red Palm Fruit Oil significantly increases infant serum retinol levels.

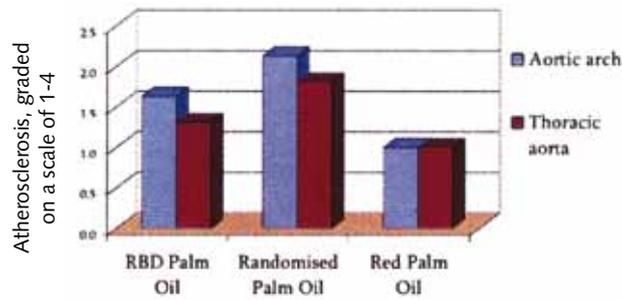


Figure 4. Rabbits fed Red Palm Fruit Oil diets displayed significantly lower atherosclerosis than RBD palm oil and randomised palm oil (randomised palm oil: higher palmitic acid at SN2).

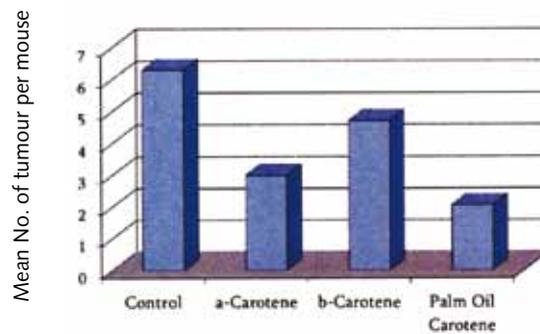


Figure 5. Palm oil carotene has a greater inhibitory effect than alpha-carotene or beta-carotene on spontaneous liver carcinogenesis.

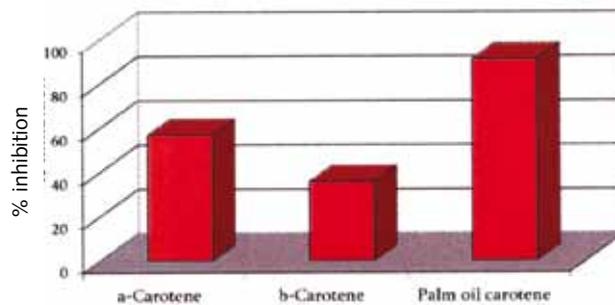


Figure 6. Cancer inhibition effect of palm oil carotenes.

be hypocholesterolemic (Farquhar, 1996).

It follows that Red Palm Fruit Oil would retain similar or higher quantities of squalene than RBD palm oil and further work should be done to confirm it.

## CONCLUSION

Red Palm Fruit Oil can be used in all food applications wherever oils and fats are used. Nutritional and medical benefits of Red Palm Fruit Oil has been scientifically evaluated and documented. Red Palm Fruit Oil products have been in the market for more than 15 years now and they have established their versatility in the food industry particularly as a natural colorant and functional food ingredient.

Red Palm Fruit Oil has a huge potential to combat vitamin A deficiency in countries like Africa and around the world. It also offers potential health benefits in the area of coronary heart disease and cancer.

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