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Nutrient Composition of Palm Oil from Different Varieties of Oil Palm and Health

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Abstract: Palm oil from different varieties of oil palm were examined for their nutrient composition.Palm oil was found to be rich nutritionally. Palm oil from dura variety was richer in unsaturated fatty acids and carotene as vitamin A than tenera variety.The dura variety also had higher iodine values in both loacations.Thus,palm oil from dura variety can prevent some diseases associated with one deficiency or the other as discussed in the study. This might account for dura variety being preferable and more adequate nutritionally than tenera.

Key words: Plam oil, health, composition, nutrient

INTRODUCTION

All edible fat consist primarily of triglycerides, which form when a molecule of glycerol combines with three saturated or unsaturated fatty acid molecules. These lipids have a very high energy value up to 9,000 kcal kg^{-1} or about double the value for proteins and sugars[1]. They play a structural role in cell walls, controlling their fluidity. Some partially unsaturated fatty acids are essential to man, but cannot be synthesized in the digestive system. In addition, they carry the fat soluble vitamins A ,D, E and K. alongside factors such as sendentary life style, genetic background, smoking and alcohol consumption, lipids may play a role in some heart diseases[2,3]. Saturated fatty acids increase the body's synthesis of cholesterol, whereas unsaturated fatty acids reduce the level of cholesterol in the blood stream and help to prevent heart diseases[4].

From a nutritional stand point, palm oil is highly beneficial. Its contents resemble those of other more liquid oils such as maize, sunflower, soya and rapseed. Refining does not harm quality and refined palm oil contains sufficient tocopherols and trocotrienols[2,5]. For most of its food uses palm oil does not require hydrogenation, thereby avoiding the formation of the artificial fats or isomers typically found in hydrogenated oils. Crude palm oil is rich in carotenoids, helping to protect against certain eye diseases by increasing vitamin A in the blood[4], reported that the presence of-carotene does not affect the bioavailability of-carotene from palm oil. They concluded that the 4-days of supplementation of feed of animals with palm oil crotenoids or synthetic beta-carotene improved the plasma beta-carotene status substantially whereas beta-carotene is additionally delivered by the palm oil supplement. Studies carried out on people in Europe, the United States of America and Asia confirmed that, whatever level of palm oil that replaced lipids in the food ration, resulted in no increase in blood cholesterol[3]. Lastly, studies on human populations consuming crude palm oil showed that these populations exhibit fewer skin cancers, liver cancers and cancers of the uterus[3]. The current investigation on the free fatty acid, peroxide value iodine value saponification value and carotene as vitamin A on palm oil from *dura* and *tenera* varieties of oil palm are reported.

MATERIALS AND METHODS

Bunches of palm fruits from the (*dura*) and (*tenera*) varieties of the palm were obtained from two different locations in Abia State and palm oil from NIFOR, Benin, Edo State. The freshly harvested ripe oil palm fruits were processed using a modification of[6]. The freshly harvested ripe oil palm fruits were separated from the bunches and boiled in a large container for about 4 h. The mass of pulp was produced by pounding the boiled fruits in a special pit. The initial stages were carried out in the pit, the sides of which were coated with cement. The whole mass was immersed in water, stirred and the crude oil which rose to the surface was skimmed off into another pot. The fibre was then sifted out of the water manually and finally the nuts were collected and separated from the remaining fibre. The crude oil thus obtained was boiled in smaller vessels where any fibre still present sank to the bottom. The purer oil was again skimmed off and was then fried in a shallow pot to remove any last traces of water[6].

The free fatty acid contents of the palm oil types were determined according to the method described by [7]. Peroxide value was determined by the method of[7]. The iodine value was determined by the method described by [8]. Saponfication value was determined by[9] while carotene as vitamin A was by [9].

Table 1: Comparison of iodine value and level of unsaturation between Dura and Tenera

Oil samples	Free fatty acid (%)	Peroxide value (Milliequivalent (g^{-1})	Iodine value	Saponification value mgKoH gm^{-1}	Carotene as Vit. A (ppm)
Location I					
Tenera	15.80	0.24	47.88	198	690
Dura	9.17	0.38	50.76	203	750
Location II					
Tenera	9.42	1.30	24.12	210	670
Dura	12.08	0.72	54.56	207	734
NIFOR	5.17	0.16	52.60	201	760

RESULTS AND DISCUSSION

The amount of Free Fatty Acid (FFA) in a fat or oil is indicative of its level of spoilage. The FFA of the palm oil from NIFOR is less than those varieties from the other locations in Abia State. *Dura* variety from location I exhibited less FFA values than the *tenera* variety, while *dura* variety from location II exhibited higher FFA values than the *tenera* variety (Table 1). However[10], reported that *dura* variety, in general exhibited higher values of FFA than the *tenera* variety. The mean total fatty acids calculated for the oil samples showed that the *dura* is richer in unsaturated fatty acids in all the locations than the *tenera* varieties. The high level of unsaturation in the *dura* makes it preferable and more adequate nutritionally than the *tenera*[11]. reported that fresh oils usually have peroxide values well below 10m Eq kg^{-1}. In accordance with[11] the oil samples were fresh. However, NIFOR palm oil has the lowest peroxide value.

In general, the greater the degree of unsaturation (i.e., the higher the iodine value), the greater is the liability of the oil or fat to become rancid by oxidation. The *dura* varieties in the locations have higher iodine values than the *tenera* varieties (Table 1). This showed that *dura* variety has a high level of unsaturation than the *tenera* variety. The saponification value of fat or oil gives an idea of the fatty acid constituents of the lipid since with long chain fatty acid constituents in a fat, lower saponification values are obtained per gramme fat[9]. Lower saponification values were obtained for *tenera* in location I while lower values were obtained for *dura* in location II (Table 1). The carotene as vitamin A (ppm) is highest in the palm oil from NIFOR. From Table 1, it showed that the *dura* variety had more carotene as vitamin A than the *tenera* variety. The fat soluble vitamin absorption is aided by dietary fat[12]. The oil is an important source of chemical energy to both man and industry.

CONCLUSION

Palm oil is rich nutritionally but palm oil from the *dura* variety is richer in unsaturated fatty acids and carotene as vitamin A than the *tenera* variety. In other words, palm oil from *dura* variety can reduce level of cholesterol in the bloodstream and thus prevent heart diseases. It can also protect the eye against eye diseases by increasing the vitamin A in the blood. As a result, decrease cellular immunity, increased prevalence of infection and increased mortality rate associated with vitamin A deficiency can also be prevented since *dura* varieties have higher iodine values, they can also prevent goitre and delayed immune response associated with iodine deficiency.

REFERENCES

1. Institute of Shortening and Edible Oils, ISEO, 1994. Food fats and oils. Institute of Shortening and Edible oils, Inc. Washington, D.C., pp: 29.
2. Swern, D., 1979. Bailey's Industrial Oil and Fat Products. John Wiley and Sons, Inc., pp: 817.
3. Jacquemard, J.C., 1998. The Tropical Agriculturalist: Oil palm. Macmillian Publishers, in co-operation with the technical centre for Agriculture and rural co-operation (CTA), Wageningen, pp: 144.
4. Karin, H., G. Christie and W. Anton, 1999. Comparison of the bioavailability of natural palm oil carotenoids and synthetic beta-carotene in humans. J. Agric. Fd. Chem., 47: 1582-1586.
5. Athanassiadis, A., 1989. Refining of palm oil. Lecture presented at the International Conference of Nigerian Institute for Oil Palm Research (NIFOR), pp: 15.
6. Anochili, B.C., 1986. Tropical Agricultural Handbook: Cash Crops. Macmillian Publishers, Ibadan, pp: 54-67.
7. Pearson, D., 1976. The Chemical Analysis of foods. 7th Edn. Edinburgh (Churchill Livingstone).
8. Palm Oil Research Institute of Malaysia PORIM, 1990. The PORIM Test Method Palm oil Research Institute of Malaysia.
9. Ojiako, O.A. and E.I. Akubugwo, 1997. An introductory approach to practical biochemistry. CRC Publications, Owerri, pp: 132.
10. Ekpa, O.D., M.I. Akpanabiatu, M. Amelio and R. Rizzo, 2001. A comparative study of the triglyceride and fatty acid compositions of palm oil from plantations in South-Eastern Nigeria. Global J. Pure and Applied Sci., 7: 61-65.
11. Egan, H., R.S. Kirk and R. Sawyer, 1981. Pearson's Chemical Analysis of Foods. 8th Edn. Churchill Livingstone. New York, pp: 507-546.
12. Akpanabiatu, M.I., O.D. Ekpa, A. Mauro and R. Rizzo, 2001. Nutrient composition of Nigerian palm kernel from the *dura* and *tenera* varieties of the oil palm *(Elaeis* guineensis). Food Chem.,72: 173-177.