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Proximate analysis and fatty-acid profiles of mobola plum seed

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ABSTRACT

The potential of Mobola Plum seed to serve as raw material for industrial applications, domestic consumption was examined by this study. The moisture content, crude protein, crude fat, crude fibre, ash and carbohydrate were 5.11 %, 33.10 %, 5.15 %, 1.60 %, 2.65 % and 52.39 % respectively. The seed is a veritable source for Carbohydrate and protein, which enhance its potential usage for food and feed formulation. The fatty acids profile of the oil showed that it contains high level of unsaturated fatty acids. The Mobola Plum seed oil could be a good source of edible oil for human consumption.

Introduction

In many developing countries of the world, development and sustainable growth are serious problems associated with high population growth rates, limited and rapidly diminishing land for food and forage production etc.; therefore there is need to explore all avenues, especially the vast underexploited flora, to augment available food resources and in the face of dwindling raw materials, to feed the dormant industries (Amoo et al., 2010). These create the need for higher agricultural production and research into full potential of several species of local agricultural crops that abound in such countries but are underutilized. *Parinari Curatellifolia* also known as Mobola Plum is one of such plants that needs extensive research. *P. Curatellifolia* is a tropical evergreen fruit tree with a mushroom shape like. It belongs to the family *Chrysobalanceae*, found over a great range of places in Africa, in forest along streams and enduring alone in areas of cleared up woodland. It grows at its greatest in areas of high rain fall reaching a size of 23-26 m tall. When rain fall less it grows up to 10 m only. The bark is rough and corky .The leaves are distinctly bicoloured, having a white-silver undersurface and a dark green-grey upper surface. The fruit is a drupe, and is yellow-orange with grey speckles when ripe. The oval rounded fruit which has a scaly texture may take up to a year to ripen and is found at twigs ends. The plum-like fruits are ±50 mm long with a yellow edible flesh, taste pleasant when completely ripe. The fruit can be collected when ripe and once the pulp has disintegrated, the seed may be separated, dried and stored. A careful search at literature revealed that nutritional quality of the seed and potential of the seed oil in industry have not been demonstrated. This work is therefore focus on the evaluation of the proximate composition of the seed, and the fatty acid composition with a view to exploiting its nutritional and industrial potentials.

Materials and Methods

Mobola Plum *fruits* were collected from Eruwa Township, Ibarapa East L.G.A. of Oyo State, Nigeria. The seeds were separated, air-dried and mincing into small pieces and grinding it in a mill to a fine powder and kept in airtight container. Proximate composition was determined by the standard methods of the AOAC (1990).

Fatty Acid Composition Analysis

The fatty acid composition and analysis were determined by the method described by Bello et al. (2011).

100 mg of the oil sample was saponified with 1.2 ml of 0.5 M methanolic KOH at 60^0C FOR 10 minutes, neutralized with 0.7 M HCl and methylated with 3.0 ml BF_3-CH_3OH for about 10 minutes in a water bath at 60^0C. The product was then extracted with petroleum ether (40-60^0C). The fatty-acid methyl ester was separated by a Perkin Elmer Auto sampler XL gas chromatograph with BPX-70.02; 30 m ×0.25 mm(i.d);0.25 µm film thickness column. Helium was the carrier gas at a flow rate 20 psi and a split injector (220^0C, split flow rate, 40:1). The temperature was programmed from 60^0C at 10^0Cmin^{-1} and finally 235^0C. The total run time was 27.7 minutes. Detection was by FID at 220^0C. Identification and quantification of the methyl esters was made by comparison of retention times of standard fatty acid methyl esters.

Result and Discussion

The results of proximate composition were presented in Table 1. Moisture content of Mobola Plum was 5.11 %. This value was compared with *Pterygota Mocrocarpa* seed 7.27 %, which was described to be moderate by Amoo et al. (2010). High moisture content aid microbial growth and reduce shelf-life of the seed. Thus, the low moisture content of the seed will reduce the cost of preservation and processing of the seed for both industrial and domestic uses. The crude protein 33.10 %, was compared with value obtained from dry breadnut seeds (13.3-19.6 %) by Ragone et al. (2006) which claimed that breadnut seed have appreciable amount of protein and cowpea (21-34 %). According to the Food and Nutrition Board, food plants that provide more than 12 % of their calorific value of protein are a good source of protein (Bello et al., 2011).

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Therefore; Mobola Plum seed has a great potential usage for food and feed formulation. The ash content of the seed 2.65 % is relatively low in comparison with African yam bean with ash content 3.87 %. (Oshodi et al., 1997). Fat content of 5.15 % was obtained for Mobola Plum seed; this showed that the seed is not a promising source of commercial valuable fat. Values of 1.60 % and 2.65 % were estimated for crude fiber and ash content respectively.

The percentage carbohydrate content is very high 52.39 % much higher than that of Nigerian Pear (*Dacryodes edulis*) 13.1 % (Hart, et al.2006) and full fat fluted Pumpkin seed flour (Fagbemi, 2007).Hence the seed is a good source of energy for animals when put in their feed and also for human beings if incorporated into diet.

The fatty acid compositions of Mobola plum seed oil are given in Table 2. The fatty acids were mainly unsaturated, contained 8.03 % of monosaturated and 91.97 % of Polyunsaturated. The unsaturated fatty acids are 9-octadecenoic (oleic) 5.66 %; 9,12-octadecenoic (linoneic) 91.97 % and cis-11-eicosenic (eicosenic) 2.37 %. High level of unsaturation plays an important role in lowering high blood cholesterol and also in the treatment of atherosclerosis (Axtell, 1981). Polyunsaturated fatty acid such as linoleic is essential for the human body because it cannot be synthesized in the body (Baydar, et al., 2001).

Conclusion

Mobola plum seed is a potential seed for industrial and domestic usages. The proximate analysis revealed that the seed is a veritable source for Carbohydrate and Protein which enhance its potential usage for food and feed formulation. The quality properties of fatty acids are markedly dependent on their degree of unsaturation. Mammals lack the enzymes needed to produce polyunsaturates, and therefore , polyunsaturated fatty acids must be supplied through external sources (Baydar, et al., 2001). For *Parinari Curatellifolia* having a high level of linoleic acid, this increased the importance of Mobola plum seed oil, particularly in the treatment of high Cholesterol and atherosclerosis. The Mobola plum seed oil could be a good source of edible oil for human consumption.

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Table 1: Proximate Composition of Mobola Plum seed

Constituents	Compostion (%)
Protein	33.10 ±0.12
Fat	5.15±0.10
Crude fiber	1.60±0.10
Ash	2.65±0.21
Moisture	5.11±0.20
Carbohydrate	52.38±0.01

Values are means of triplicate determination ± standard deviation of mean

Table 2: Percentage Fatty Acids Composition of the oil from the Seeds of Mobola Plum

Fatty Acids	% Composition
Monosaturated	
9-octadecenoic acid (C 18:1)	5.66
Cis-11-eicosenoic acid (C 20:1)	2.37
Total monoene fatty acid	8.03
Polyunsaturated	
9,12-octadecenoic (C 18:2)	91.97
Total polyunsaturated fatty acid	91.97