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Extraction, Proximate Analysis and Elemental Composition of Guna (*Citrillus Vulgaris*)

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ABSTRACT

Guna seeds were obtained from farm lands in Gombi local Government Area of Adamawa state. These were then ground using mortar and paste. Further extraction was carried out using n-hexane as a solvent. The extracted oil was characterized via proximate analysis, physical tests and elemental compositions. Proximate analysis indicated protein content of 61%,crude fat12.00,acid value of 0.112 mgKOH/g,free fatty acid(FFA);5.60,and 47% oil peroxide value;7.27mgKOH/g moisture content ;5%.The crude fibre ,ash content were6.67 and 0.73 respectively. Physical tests revealed a dark brown oil colour,refractive index of 1.46,and a specific gravity of0.987cm^2 at 28^{0}C .Elemental compositions through atomic absorption spectrometer(AAS) indicated the presents of some elements namely; potassium(K),Zinc(Zn),Sodium(Na),Cupper, Lead and Manganese were not detected. These classical results showed that guna seed oil has high protein and oil contents and can be exploited for industrial purposes even though guna seed has a low saponification value 112.00mgKOH/g in comparison to pumpkin seed oils . The obsense of toxic substances makes it suitable for use in food applications
Keywords: Elemental analysis, proximate analysis, protein content,Guna seed, acid value.

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INTRODUCTION

Plants essentially constitute to a larger extent various amounts of fatty acids in various concentrations depending on their origins. Every species of plant produces some quantity of oils during their life cycles. However, only few plants oils are produce in commercial quantity to be used as sources of commerce. The most important oils therefore, are those obtained in commercial quantities from locally source *plants*.Guna seed has been receiving considerable attention since ancient times.In west Africa,the seeds are used as a common component in daily meals.

Research carried out by Fakou et al 2004, showed that the inclusion of melon seed as a supplement in diets containing high cholesterol improves serum lipids [1]. Guna(*Citrillus vulgaris*) is of the curcumbitaceace family which was believed to have originated from south where it was found growing wild. It is now found in northwest Africa and Northern Nigeria today [2].Features of the seed include a roundish oval melon which is sweet and contains a whitish pulp. The seed is milky in colour and small in size usually sourced locally and stored at moderate temperature conditions. It is used considerably due to its high nutritional value as a food supplement and the oil obtained is used for frying and cooking of food. The large scale cultivation of Guna presents a scenario for sources of food and industrial utility more especially in plastic applications. As earlier studied by Ghaniyu (2005), Fakou et al (2004) and Achu et al (2005), indicated that melon seed popularly known as egusi contains a considerable amount of oil [1,3,4]. This therefore served as stimulus to investigate the potentials of Guna as a supplementary food source through proximate analysis and elemental composition and which provides information on economic viability of the oil so obtained.

MATERIALS AND METHODS

MATERIALS

Chemical used included; phenolphthalein,hexane,iodine supplied by British Drug House. Other laboratory equipment used included soxchlet apparatus, water bath, heating mantle, electric weighing balance etc.Guna was obtained from a farm land in GA’ANDA ,Gombi local Government Area ,Adamawa State, Nigeria.

METHODS

Sample Preparation

This was done after conditioning the sample in accordance to (AOAC,2000) standards, the seeds were cleaned and kept in a moderate temperature. These were then ground using mortar and pestle.[5]

Extraction of Oil

100ml extraction flask was weighed empty and 100g grinded Guna seed was folded in a thick filter paper and inserted an extraction thimble. The extraction was carried out using n-hexane at a temperature of between 60-80^{o}C .The solvent was evaporated on a water bath at 69^{o}C.The flask containing the extracted oil was dried at 30-40^{o}C for at least 30minutes.This was cooled and weighed in accordance to the methods described by Oshodi and Ekpirigin [6].

Chemical Analysis of Guna Seed Oil

Saponification was determined in accordance to the methods described by(AOAC,1990),Free fatty acids(FFA) was also determined as described by(AOAC,1990).Crude fat was determined by the methods of American society of analytical chemist(AOAC,2000) [5,7].

Physical Characteristics of Guna Seed Oil

Specific density was determined using density bottle according to the methods described by (AOAC,2000) using a gravity bottle. Refractive index was determined using Abbes' refractometer standardization with distilled water.Colour was determined using a tint meter.

Elemental Analysis

Sodium(Na) and potassium were determined using flame photometry with heating maintained between 400^{0}C to450^{0}C.Cupper(Cu),Lead(Pd),Manganese(Mn),and Zinc(Zn) were determined using Atomic Absorption Spectrophotometer(AAS-model21 VGP)

RESULTS AND DISCUSSIONS

Results

Table1 depicts the results of proximate analysis of Guna seed oil, Table 2 represents the physical characteristics of GUNA oil and Table 3 shows the elemental composition of the oil.

Table1 PROXIMATE ANALYSIS

CHARACTER	RESULT
Saponification value	112mgKOH/l
Iodine value	10.20
Acid value	0.112mgKOH/l
Free fatty acid(FFA%)	5.60
Peroxide value	7.27mgKOH/l
Protein content(%)	61.00
Moisture content	5.00
Ash content	0.73
Crude fiber	6.67
Crude fat	12.00
Carbohydrate content	14.60

Table 2 PHYSICAL CHARACTERISTICS

S.NO	CHARACTER	RESULT
1	Specific gravity	$0.987cm^3$at 28^0C
2	Refractive index	1.46
3	Colour	Dark Brown
Control	Distilled Water	1.33

Table 3 ELEMENTAL COMPOSITION

S/N	ELEMENT	CONC.(ppm)
1	Potassium(K)	28.00
2	Sodium(Na)	1.00
3	Zinc(Zn)	2.05
4	Cupper(Cu)	ND*
5	Lead(Pd)	ND*
6	Manganese(Mn)	ND*

NOTE: ND* NOT DETECTED

DISSCUSSIONS

The chemical characteristics of Guna seed oil are shown in table 1,from the results it can be seen that the percentage of oil obtained was 47% signifying that GUNA seed can be exploited commercially for vegetable oil production and can be used as a substitute for groundnut oil which is approximately 50% and comparable to that of cashew nut oil of 49% but lower than that 0f sesame seed reported by Adeleja cotton seed(19.50%),soybeans(19.00 %),palm oil(48.65%),and groundnut(49.00%) [8].

The saponification value for most plant stand outside the range of (188-196) with groundnut oil having 218 and cashew nut oil at 177.The saponification value for the extracted oil stands at 112 as shown in Table1, this is lower than cashew nut oil and groundnut oil [9]. This showed that the oil cannot easily be saponified and hence not suitable for soap making. The iodine which is a useful property in predicting the drying property of oil which ultimately informs its utility was found to be 10.20. This value falls below the once reported by (Ajayi and Akinrinade,2002) for drying and in agreement with the values reported by (Adeleja,2006) that is between the values of 9.00-65.00 for non-drying oils [10]. The value recorded for Guna seed oil shows that it could be utilized in making lubricant, leather and candle as reported by Adeleja [8].

The peroxide value of Guna seed oil was found to be 7.27kgKOH/l which is in agreement with studies reported by (Adeleja, 2006).Most conventional oils have peroxide values less than10 for fresh oils. Peroxide value is an important property in the determination of oil rancidity [8].

Acid value is an indicator for edibility of oil and suitability for industrial use, here Guna oil has 0.112 which falls within the recommended codex 0.6 and 10 for virgin and non-virgin oils and fats respectively(Adeleja,2006).This in essence suggests that Guna seed oil is suitable for edible purposes and other industrial utility.

The high crude protein content of 61.00% found with guna seed oil is higher than that reported by (Ene-Obong and Carnvela;Apata and Ologbolo) [11, 12].The concentration of which varies with species, methods of isolation, nature of maturity and soil conditions. This goes to show that the seed can also be as sources of sustainable natural resins for plastic applications.

Iodine value is a useful property in the determination of useful industrial applications and more importantly for edible purposes. Here, the iodine value for Guna seed oil was found to be 10.20 . This informs that the oil could be useful in industrial purposes of manufacturing candles, leather applications, dressing and lubricants which is in accordance with the studies (Adeleja, 2006). More so,the low acid value recorded in this investigation showed that, guna oil is a non-drying oil containing low levels of polysaturated fatty acid .This goes a long way to show that guna oil has low iodine value and can be stored for a long period of time without going rancid.

However, the low ash content recorded for guna oil in this investigation indicates that the oil as rich in minerals compared to pumpkin meal (3.8%) but approximately close to close to melon oil (1.10%).

The oil has low moisture and free fatty acid values of 5.00% and 5.60 respectively indicating an improved shelflife. This is shown in Table1.

Carbohydrate is a very important class of food needed in biological systems. Here, the oil was found to be 14.60% in carbohydrate content which informs the usefulness as food supplement.

The physical properties of guna seed oil are shown in Table 2.The specific gravity of guna seed oil (0.987g/cm^3) compared favorably with that of the studies [13] for melon seed with values of 0.915g/cm^3 and can be used in place of melon seed oil.

The metallic composition of Guna seed oil studied is given in Table 3.In this investigation, the oil is a source of supply of potassium (K) with a value higher than melon seed oil (7.71),lowcast bean oil(10.55),seseame oil(6.41) but lower than pumpkin seed oil(40.77). This makes it suitable as source of edible and commercial oil. The calcium content of guna seed oil (1.00) is comparable to sesame seed oil (1.18) but then the values recorded for melon seed oil [14]. Likewise, lead (Pb), Manganese (Mn) and Cupper (Cu) were not detected or present at best sufficiently minute quantities which indicate lesser toxicity of the oil studied.

CONCLUSION

Guna seed oil can be as a substitute to groundnut oil,seseame seed oil and melon seed oil in terms of edible and commercial purposes and compares favourably with the oil obtained from soy beans . The bioavailability and higher protein content suggest the use of the oil as a source of profitable commerce and replenishing edible purposes as a food supplement.

RECOMMENDATION

Owing to bioavailability and high protein content of guna seed oil,futher exploitation of the oil for bioplastic applications will contribute tremendously in reducing farm surplus and judicious utilization of this sleeping giant.

REFERENCES

[1] Fakou E, Achu MB, Tchouanguep MF. J food Agric Nutrition and Development 2004: 4(1): 11(s).
[2] Fasuyi AO. Afri J Biotech 2003; 5: 49-53.
[3] Ghaniyu O. J Med Fd 2005; 8: 560-563.
[4] Achu MB, Fakou E, Tchieang C.2005; 14: 1329.
[5] AOAC, Official Methods of Analysis, 2000, 13th ed. Association of Official Analytical Chemist Pub.,Washington D.C.,Pp.128,132-134.
[6] Oshodi AA and Ekpirigin MM. Food Chem 1989; 34: 1-5.
[7] AOAC. Association of Official Analysis Chemist. Official Methods of Analysis, 1990, 14th (Edu), Washington D.C Pp 801-805.
[8] Adelaja JO. Evaluation of mineral constituents and physicochemical properties some oil seeds, M.sc. Industrial Chemistry, University of Ibadan, Ibadan, 2006.
[9] Pearson D. The Chemical Analysis of foods, 1976, 7thed.Churchil Livingstone,London.
[10] Ajayi IA and Oderinde RA. Disov Innoov 2002; 14: 20-24
[11] Ene-Obong HN,Carnovale E. Food Chem 1992; 43: 169-175
[12] Apata DF, Ologhobo AD. Food Chem 1994; 49: 333-338.
[13] Dawodu FA and Omole O. J Sci 2009; 34 (2): 157-164
[14] Fagbemi TN, Oshodi TO and Ipinmoroti KO. Pak J Nutr 2005; 4: 205-256.