International Journal of Chemical Science
Online ISSN: 2523-2843, Print ISSN: 2523-6075; Impact Factor: RJIF 5.22
Received: 17-02-2019; Accepted: 21-03-2019
www.chemicaljournals.com
Volume 3; Issue 3; May 2019; Page No. 22-24

Phytochemical screening of aqueous and ethanolic extracts of *Moringa oleifera* seed and physicochemical analysis on the seed oil cultivated in Lere local government area, Kaduna state

Edah Alexander Oba[1], Shuaibu Sunday Opeyemi[2], Wapwera Jidimma Augustine[3]
[1-3] Department of Chemistry, Faculty of Natural Sciences, University of Jos, Jos, Nigeria

Abstract
Phytochemical analysis was carried out on *Moringa oleifera* seeds and the following were found to be present; flavone aglycones, saponins, alkaloids, terpenoid, steroids, and tannins. The isothiocyanates present in the *Moringa oleifera* seed are responsible for its anti-inflammatory property (Mahajan *et al*., 2007). Physicochemical analysis was carried out on the oil sample extracted by cold press method. The acid value, peroxide value, iodine value and refractive index of the oil were found to be (1.23±0.02) mg KOH/g, (10.80±0.12)mEqO_2/g, (67.87±0.54)I_2/100g and (1.4668±0.03) respectively. The assay with respect to the Standard Organization of Nigeria criteria for edible oil is suitable. It was not ideal for soap and liquid detergent production.

Keywords: phytochemical, physicochemical, cold press, analysis

Introduction
Moringa oleifera is a member of the Moringaceae family of perennial angiosperm plants, which includes 12 other species (Olson, 2010) [11]. Native of the sub-Himalayan northern parts of India, it is cultivated throughout tropical and sub-tropical areas of the world, where it is known by various vernacular names, with drumstick tree, horseradish tree and malunggay, being the most commonly found in the literature. *Moringa oleifera* is an edible plant. A wide variety of nutritional and medicinal virtues have been attributed to its roots, bark, leaves, flowers, fruits, and seeds (Anwar *et al*., 2007) [1].

Phytochemical Constituent of *Moringa oleifera* Seeds
The phytochemicals present in the seeds oil includes saponins, alkaloids, terpenoid, steroids, glycoside, flavonoids (flavone aglycones), and tannins (Fahey, 2005) [5]. Phytochemical analyses have also shown that its leaves are particularly rich in potassium, calcium, phosphorous, iron, vitamins A and D, essential amino acids, as well as such known antioxidants such as β-carotene, vitamin C, and flavonoids (Bennett *et al*., 2003) [3].
The seed which have been tagged the most important part of the plant are brownish with semi-permeable seed hull (Makkar and Becker, 1997) [10]. It has been used for centuries in traditional medicine to treat a variety of ailments such as arthritis rheumatoid disorders and several muscular disorders. It has also been reported to improve overall health in patients due to the presence of chemical substances often referred to as secondary metabolites.

Moringa Seed Oil
Moringa oil is extracted from the seeds of *Moringa oleifera*, by cold press or solvent extraction method. It is pale yellow in color, smells like peanut oil, and is high in behenic acid. *Moringa oleifera* seed oil has been identified as very useful oil in the medicinal books of the Greeks and the Romans. It is widely used as a topical agent for skin and the hair.

Experimental Methods
i) Sampling of Moringa Seed
The *Moringa oleifera* seed samples were collected from Saminaka, Lere Local Government Area of Kaduna State, Nigeria in 2017 and identified at the Federal College of Forestry, Jos. Plateau State.
The seeds of *Moringa oleifera* were dried for seven (7) days under shade at room temperature to avoid loss of active compounds. The dried seeds were then pulverized from a mortar and pestle after which it was stored in an air tight vessel for further use.

Aqueous extract: The extraction process used was hot water method following the procedure of Handa (2008) [13]. 50g of the powdered sample were soaked in 500cm^3 of distilled water and boiled for about ten minutes. After boiling, the sample was double-filtered using cheese cloth and collected in a conical flask and allowed to cool. The filtrate was then dried in hot air oven at temperature of 70^{o}C.

Ethanol extract: 50g of the powdered sample were soaked in 500cm^3 of absolute ethanol and allowed to stand for 24hrs. The mixture was then stirred up occasionally. After 24hrs the sample was double-filtered using a cheese cloth and collected in a conical flask. The filtrate was dried in hot air oven at temperature of 45^{o}C (Handa, 2008) [13].

Extraction of *Moringa oleifera* Seed Oil
The dried *Moringa oleifera* seeds were subjected to further pounding so as to increase the surface area. About 200g of the Moringa seed powder was set aside for phytochemical analysis, while the remaining was cold-pressed to extract the

oil using a wooden mortar. After the cold-press oil extraction process, the cake was discarded while the oil was separated and stored in a bottle.

Physico-Chemical Analysis of *Moringa oleifera* Seed Oil

The physico-chemical analysis of the *Moringa oleifera* seed oil was carried out based on the method specified by Habib (1986) [7] and A.O.A.C (2012) [2].

Phytochemical Analysis on *Moringa oleifera* Seed Extract

The phytochemical analysis of the Moringa seed extract (Aqueous and ethanolic) was carried out to determine the presence of Alkaloids, steroids and triterpenoids, tannins, anthocyanosides, flavones aglycones, saponins and coumarins using the standard procedures as described by Chitravadivu *et al* (2009) [4].

Results

Table 1: Result Obtained from Physico-Chemical Analysis

S/N	Parameters	Value	SON (2015)
1	Acid value (mg of KOH/1g of oil)	1.23±0.02	7.00
2	Iodine value (I_2/100g of oil)	67.87±0.54	108-120
3	Peroxide value ($mEqO_2/g$)	10.80±0.12	10.5-11.0
4	Refractive index (25ºC)	1.4668±0.03	1.4665-1.4686

Table 2: Result Obtained from Phytochemical Analysis

S/N	Phytochemical	Aqueous Extract	Ethanolic extract
1	Steroids and terpenoids	++	++
2	Alkaloids	++	-
3	Flavones aglycones	++	+++
4	Anthraquinones	+++	++
5	Tannins	++	+
6	Saponins	++	+
7	Coumarins	-	-

Key: -: not detected; +: present in low concentration; ++: present in moderate concentration; +++: present in high concentrations.

Discussion

***Moringa oleifera* Seed Oil**

The oil extracted was a liquid at room temperature, pale yellow in colour and smelled like peanut oil.

The phytochemical analysis was carried out on the seed extract to ascertain the presence of the phytochemicals such as steroids and terpenoids, Flavones aglycones, Anthraquinones, Tannins, Saponins and Alkaloids (absent in the ethanolic extract), but coumarin is absent in both extracts which indicates the possible preventive and curative properties of *Moringa oleifera* seed Thereafter, physicochemical analysis was carried out on the oil sample. The acid value, peroxide value, Iodine value and refractive index of the oil were found to be (1.23±0.02)mgKOH/g, (10.80±0.12)$mEqO_2/g$, (67.87±0.54)I_2/100g and (1.4668±0.03**)** respectively. The degree of acidity, rancidity, unsaturation and purity of the oil were notable (Fahey, 2005) [5].

Conclusion

The presence of phytochemicals such as steroids and terpenoids, alkaloids in the aqueous extract, which were notably absent in the ethanolic extract, reveal that the choice of solvent employed in the extraction process is very vital in the properties later expressed by the extract. The presence of flavones aglycones, anthraquinones, tannins, and saponins indicates the potential application of the oils from the dried and pulverized seed of *Moringa oleifera* as having potential application in the prophylactics and cure of certain bacterial infections. The physicochemical analysis showed that the *Moringa oleifera* seed oil is good for consumption as food due to its low acid value and peroxide value. The low iodine values is an indicator of its high saturation which renders it unsuitable for soap and liquid detergent production with respect to SON, (2015) [12] guidelines.

Recommendation

It is needful to research more on the physicochemical analysis on the *Moringa oleifera* seed oil and the pharmacological studies to support the use of *Moringa oleifera* as a medicinal plant in this region.

References

1. Anwar F, Latir S, Ashraf M, Gilan A. *Moringa oleifera* a food plant with multiple medicinal uses. Phytother. Res. 2007; 21:17-25.
2. A.O.A.C. Official Methods of Analysis of the AOAC International No.994.12.19th Chapter 4, 18-19, Official Journal of the European Communities 19.9.98, Gaithersburg, Maryland, USA, 2012.
3. Bennett R, Mellon F, Pratt J, Dupont M, Pernins L, Kroon P. Profiling glucosinolates and phenolics in vegetative and reproductive tissues of multi-purpose trees *Moringa oleifera* L. (horseradish tree) and *Moringa stenopetal* L. J. Agric. Food Chem. 2003; 51:3546-5553.
4. Chitravadivu C, Manian S, Kalachelvi K. Qualitative analysis of Selected Medicinal Plants, Tamil Nadu, India. Mid. East J. Sci. Res. 2009; 4:144-146.
5. Fahey J. A review of the medical evidence for its nutritional, therapeutic and prophylactic properties. Trees life J. 2005; 1.
6. Firestone D. Determination of the iodine value of oils and fats: summary of collaborative study. JAOAC Int. 1994; 77(3):674-6. PMID 8012219.
7. Habib MA. Studies on the Lipid and Protein Composition of Guava Seeds *(Psidium guajava)*. As reported in Food Chemistry, 1986; 22:7-16. http://dx.doi.org/10.1016/0308-8146(86)90003-8
8. Kuriyama Hiroko, Watanabe Satoko, Nakaya Takaaki, Shigemori, Ichiro, Kita, Masakazu, *et al*. Immunological and Psychological Benefits of Aromatherapy Massage. Evidence-Based Complementary and Alternative Medicine. 2005; 2(2). doi:10.1093/ecam/neh087. PMID 159375583.
9. Mahajan SG, Mali RG, Mehta AA. Effect of *Moringa oleifera* Lam. Seed extract on toluene di-isocyanate induced Immune-mediated inflammatory responses in rats. J Immunotoxicol. 2007; 4:85-96.
10. Makkar H, Becker K. Nutrients and anti-quality factors in different morphological parts of the *Moringa oleifera* tree. J. Agri. Sci. Cambridge. 1997; 128:311-322.
11. Olson ME. Flora of North America Committee, ed. eFlora summary: Moringaceae: Drumstick Family. Flora of North America, North of Mexico. 7. New York and Oxford. 2010; pp.167-169.

12. SON. Standards for edible oil, Book of standards, Standard Organisation of Nigeria, 2015.
13. Handa SS, Khanuja SPS, Longo G, Rakesh DD. Extraction Technologie for Medicinal and Aromatic Plants, (United Nations Industrial Development Organisation and the International Centre for Science and High Technology, 2008.