Quest Journals
Journal of Research in Humanities and Social Science
Volume 9 ~ Issue 4 (2021)pp: 08-12
ISSN(Online):2321-9467
www.questjournals.org

Research Paper

Study of some phytochemicals and functional group analysis in *moringa oleifera* (leaves and flowers)

Don-lawson Chioma and Okah, Reminus
Department Of Science an d Laboratory Technology,
Captain Elechi-Amadi Polytechnic Rumuola, Port-Harcourt
Rivers-State, Nigeria.
Corresponding Author: Don-lawson Chioma

ABSTRACT
The infra-red (IR) spectra analysis of moringa oleifera indicated the presence of the following functional groups and their frequency ranges which includes; O-H stretching vibrations (3790-3390), C-H stretching (2953-2752), N-H stretch(1643-1514),C=N symmetric stretching (2723-2351) bending, N=O symmetric stretching (1460-1305), C-N stretch (1265-1033),C=O stretching(1651-1566) and C=C bending (1033-721). The phytochemical analysis of moringa leaves using standard procedures shows it contains (%) saponin 5.0%, flavonoid 5.42%, alkaloid 5.36% and cyanogenic glycoside 3.3% while the saponin, flavoniod, alkaloid and cyanogenic glycoside in flower are 3.20%, 7.12%, 1.55% and 2.6% respectively. This result shows that the presence of saponin, alkaloid and cyanogenic vvglycoside are higher in moringa leaves than its flowers while flavonoid is higher in concentration in moringa oleifera flower than its leaves. . It has been shown from the analysis that the percentages of the phytochemicals are not lethal especially the cyanogenic glycoside in the sample which indicates less toxicity and a minor quantity of hydrogen cyanide which can easily be detoxified for better health benefits.

KEYWORDS: *moringa oleifera, saponin, alkaloid, infra-red spectrophotometer etc*

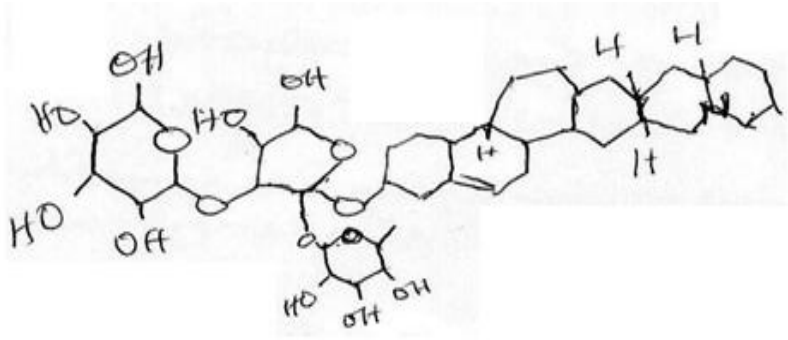
Received 29 Mar, 2021; Revised: 10 Apr, 2021; Accepted 12 Apr, 2021
Published with open access at www.questjournals.org

I. INTRODUCTION

The importance of *moringa oleifera* cannot be over-emphasized. It is a plant species that is very crucial medically, traditionally, industrially, economically and ornamentally. Hence, this research was intended to ascertain or analyze some phytochemicals in *moringa oleifera* and their usefulness. (Patrick and Moyo,2011). The phytochemicals analyzed were found to be some of the parameters in *moringa oleifera* plant which has made it very useful to man and his environment. (Forster, and Hartonut,2006) Some of the phytochemicals determined were saponin, flavonoid, cyanogenic glycoside and Alkaloid using the leaves and flowers. This has also shown that some parts of *moringa oleifera* are very edible and can be properly digested, also its usefulness for good health (Frank,2006).*Moringa* plant, (*moringa oleifera)* is a highly valued plant that is mostly cultivated in the tropics and sub-tropics, it is a multi-purpose tree which originated from India, Philippines, Sri-lanka, Thailand, Malaysia, Pakistan, Nigeria, Malaysia, etc. It is a perennial softwood tree with timber of low quality, but for centuries has been advocated for traditional, medicinal and industrial uses with various edible parts. (Fugile and Olson, 2010).. *M. oleifera* belongs to the morinagaceae family which has various species of deciduous trees classified in a single genus. (Fahey and Jed 2005). *M. oleifera* is the most widely known and distributed species. All parts of *moringa oleifera* are very useful. They are majorly used for food, medicinal and industrial purposes. It is cultivated to use as a vegetable (leaves, green pods, flower seeds), for spice (mainly roots) for cooking and cosmetic oil (seeds) and as a medicinal plant (all plant organs). Medicinally, *moringa* parts are used for treatment of anaemia, anxiety, asthma, fever, semen deficiency (Frank, 2006). Traditionally, it is used for skin infections and sores in Malaysia and India. Its utility as a non-food product has also been extensively described. Nutritionally, *moringa* trees have been used to combat malnutrition, especially among infants and nursing mothers. morin*ga* leaves (Andreas, 2009). contain more vitamin A than carrots, more calcium than milk, more iron than spinach, more vitamin c than milk, more potassium than bananas and that the protein quality of *moringa* leaves rival that of milk and eggs. (Ted and Elevitch, 2010).. It has high anti-oxidant

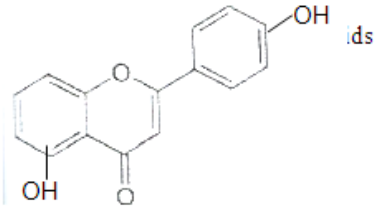
properties making it a valuable source of vitamins A, C and E. it is one of the highest naturally occurring sources of anti-oxidants. (Hossein,2008). The phytochemicals studied such as saponins, cyanogenic glycosides, flavonoids, and alkaloids are natural products which exist in plants and are very significant in the nutritional, medicinal and health benefits of moringa plants.(Lindhorst 2007)

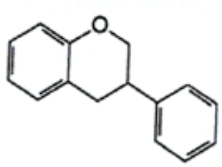
SAPONINS



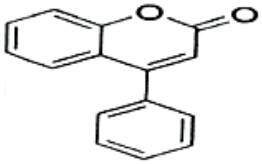
Structure of Saponin

FLAVONOID



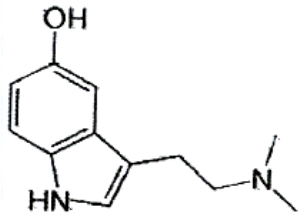


(b) Isoflavan

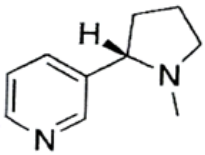


(c) Neoflavonoids

ALKALOIDS



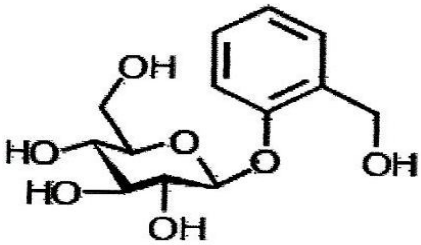
Bufoteinin



Nicotine

Structures of Alkaloids.

CYANOGENIC GLYCOSIDE



Structure of Glycoside

II. MATERIALS AND METHOD

Phytochemical Screening.

Crude extracts were subjected to phytochemical tests for presence of saponin,alkaloid,flavonoid and cyanogenic glycosides using standard procedures.

Determination of Alkaloid:

To 5g of the sample in a 500ml beaker was added. 200ml of 10% Acetic acid in ethanol was added and covered. It was allowed to stand for 2hrs, this was filtered and the extract was concentrated on a water bath to one-quarter of the original volume 50mls concentrated ammonium hydroxide was added drop wise to the extract until precipitate was formed. The solution was allowed to settle, the precipitate was collected and washed with ammonium hydroxide and filtered. The residue was dried and weighed.

Determination of Flavonoid: .

10g of the sample was repeatedly extracted with 100ml of 80% aqueous methanol at room temperature. The solution was filtered. The filtrate was later transferred to a crucible and evaporated to dryness over a water bath and weighed to a constant weight.

Determination of Saponins:

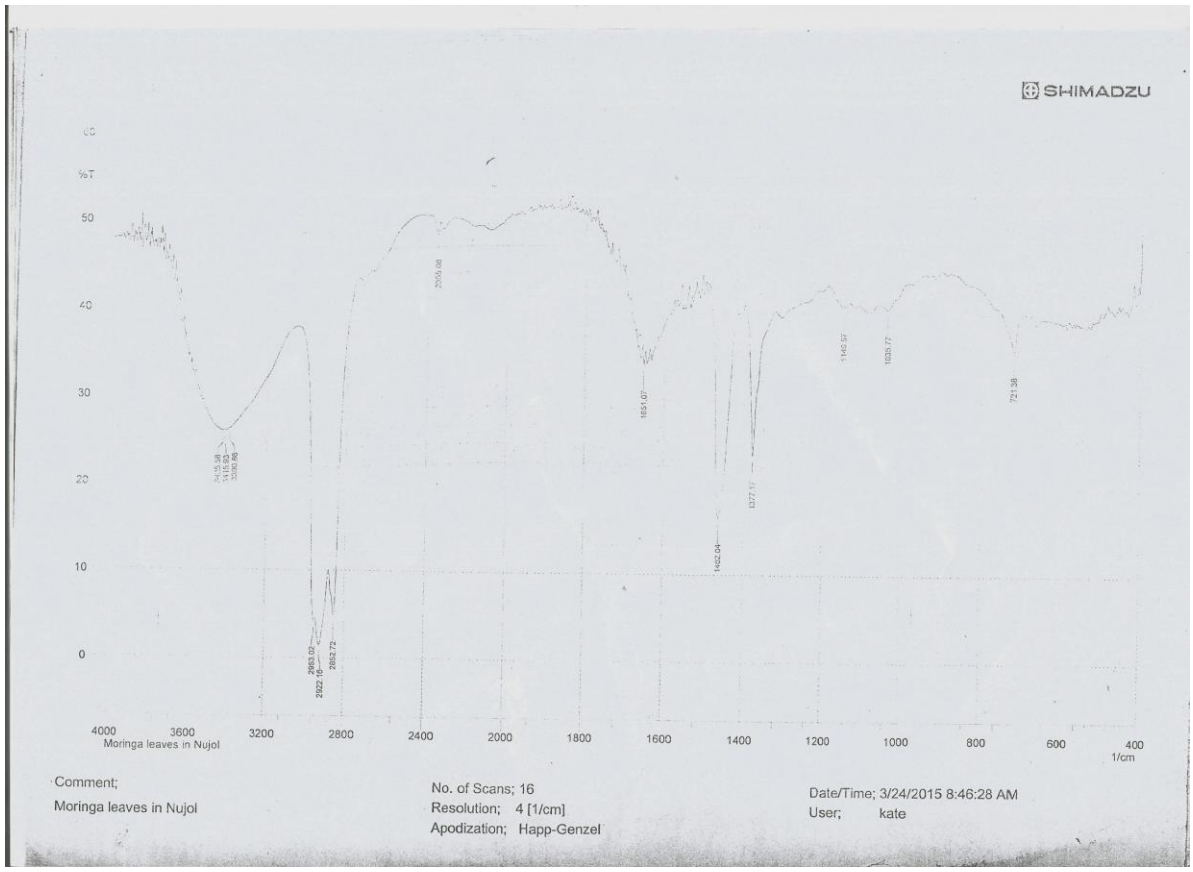
10g of sample was first defatted using acetone solvent by soxhlet continuous extraction method. The residue in the thimble was extracted with methanol solvent into a pre-weighed distillation flask by soxhlet continuous extraction. The extract was distilled to dryness and further placed in an air oven to eliminate all traces of methanol solvent. The flask was then reweighed to obtain the weight of the Saponin in the sample.

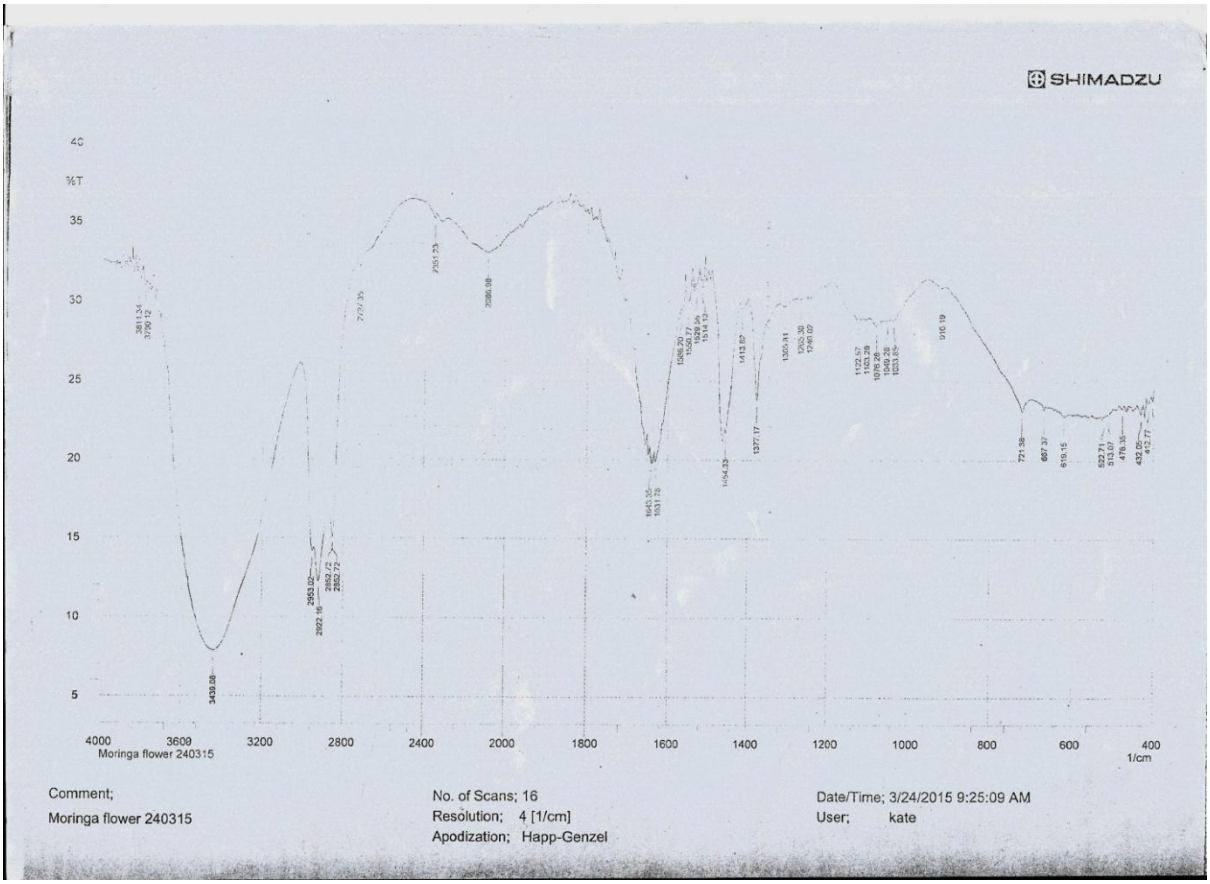
Determination of Cyanogenic Glycoside

10g of sieved sample (sieve No. 20) in 800ml Kjeldahl flask was added 200ml water and allowed to stand for 3hrs. Steam distillation was employed and 155ml was distillated into sodiumhydoxide solution (0.5g in 20ml H_2O) and diluted to 250ml. 10ml of the distillate was titrated against 0.02N silvernitrate using micro-burette. End-point was determined at permanent mixture turbidity.

INFRA RED (FTIR) SPECTRUM

FTIR 8400S Fourier Transform Infrared spectrophotometer was used to identify the functional groups,





III. RESULT AND DISCUSSION

SAMPLE IDENTIFIED	SAPONIN	FLAVONOID	ALKALOID	CYANOGENIC GLYCOSIDE
Percentages	%	%	%	mg/10g
Moringa leaves	5.00	5.42	5.36	0.20
Moringa flowers	3.20	7.12	1.56	0.16

Results of some phytochemical analysis of *moringa oleifera* leaves and flowers (dry) are presented in the table above. From our analysis, it shows that phytochemicals; saponin, alkaloid and cyanogenic glycoside are higher in *moringa oleifera* leaves than in its flower while flavonoid concentration or percentage is higher in *moringa oleifera* flower than its leaves. Flavonoid has the highest percentage in the flower. The high percentage of flavonoid in the *moringa* flower is responsible of its naturally bright colouration and fragrance, it is also interesting to note that flavonoid has the highest concentration or percentage in the leaf sample. The different parameters determined were variously distributed in the sample, this could be seen in the following percentages for the *moringa* leaves, saponin 5%, flavonoid 5.42% alkaloid 5.36% and cyanogenic glycoside 3.3% while in *moringa* flowers, the percentages of the parameters are saponin 3.20%, flavonoid 7.12%, Alkaloid 1.56% and cyanogenic 2.6%. This confirms that *moringa oleifera* leaves and flowers are good sources of saponin and flavonoid which contain high amount of lipids. The caloric value was high due to high content of lipids. Saponin helps in protecting the plant against microbes and fungi and may also enhance nutrient absorption and aid in animal digestion. The presence of saponins have many health benefits which includes; reduction of blood cholesterol level, cancer and improvement of the immune system. (Bate-smith,1962) and (Hartmut, 2009).The results revealed that the phytochemical parameters analyzed in the sample of *moringa oleifera* leaves and flowers are of good health benefits and therefore, *moringa oleifera* is a good source of food. The phytochemical components in *moringa oleifera* flowers and leaves are useful in treating medical ailments like hypertension, cancer, asthma, atherioscheriosis etc. Also act as anti-cancer, anti-allergic, antioxidants, anti-viral and anti-inflammatory effects (Hartmut, 2009). The percentage of cyanogenic glycoside in the sample shows that, it is less toxic and will produce a minor quantity of hydrogen cyanide which can easily be detoxified.

Infra-red(IR) spectrum of *moringa* leaves and flowers

BOND TYPE	FREQUENCES RANGES (CM^{-1})
O-H	3790-3390
C-H	2953-2752
N-H	1643-1514
C=N	2723-2351
N=O	1460-1305
C-N	1265-1033
C=C C=O	1033-721 1651-1566

Infra-red (IR) spectral bands scan of the *moringa oleifera* leaves and flowers samples are presented in table 4.2 their frequencies are related to the functional group similar to that reported by(Williams and Flemings 1964). The broad O-H stretching vibration of alcohol group of the entire sample were in the region (3790-3390cm^{-1}) and the C–O stretch of alcohol was in the region (1265-1030cm^{-}). Other functional groups observed were: C-H stretching vibrations of alkane (2953-2752cm^{-1}), N=O symmetric stretching (1643-1514cm^{-1}), C-N stretch (1454-1377cm^{-1}),C=O stretch(1651-1566) and C=C bending(1033-721).The bands of the crude extract of *moringa oleifera* leaves and flowers sample indi cate mainly the presence of carboxylic fatty acid and O-H of fatty alcohol, while the absorption band of C-N and N-H shows the presence of some protein material.

IV. CONCLUSION

Phytochemical analysis of *moringa oleifera* leaves and flowers reveal the presence of saponins, alkaloid, cyanogenic glycoside and flavonoid which have so much health benefits especially for treatment of some ailments. Industrially, the phytochemicals are also very useful in making food, beverages, drinks, shampoos and some facial cleansers. The IR bands also indicated the presence of some functional groups like O-H, carboxylic, fatty acid and O-H fatty alcohol, while the absorption band of C-N and N-H shows the presence of some protein and cyanide materials.

REFERENCES

[1]. Andreas, L (2009). The Alkaloids. Molecular, Clinical and Environmental Toxicology. Springer Press, p20.
[2]. Bate–Smith, S. (1962) Flavonoid Compounds, Comparative Biochemistry III. New York: Academic Press P 75-809.
[3]. Bohm, H. and Kocipal-Abyazam, F. (1999): "Analyzing Flavonoids" from Plant Varieties. Journal on Biotechnology 6(4) 188-195.
[4]. Breneman L. l. (1954) "Review of Cyanide Composition and Effects and its Bioactive Compounds" Phytotherapy Research 24(6): 701-24.
[5]. Brito-Arias A. (2007) Oxidative Effect of Cyanides Compounds in Plants and Animals. J. Chem. Edu. 20(09): 1567.
[6]. Fahey. H. and Jed, W. (2005) *"Moringa oleifera*: A Review of the Medical Evidence for its Nutritional, Therapeutic and Phylactic Properties Part I Tree of Life Journal. P.84
[7]. Forster,E. and Hartonut, K. (2006) Saponing Biosynthesis, "Metacyc pathway". Cambridge university press. P.4ff
[8]. .Frank, B. and Vertkaik, E. (2006) Plant and Soil, Short-term and Long-term Effects of Tannins on Nitrogen Mineralization and Litter Decomposition in Leaf. Agathis Australis, Vol. 287, P 337-345
[9]. Fugile A. and Olson M. E.(2010) Flora of North America Editorial Committee, ed. Moringaceae: Drumstick Family. New York and Oxford Pp. 167-169.
[10]. Hossein H. (2008), "Review of Pharmacological Effects of Glycyrrhizin Sp and its Bioactive Compounds" Phototherapy Research 22(6): 709-24,
[11]. Lindhorst T. K. (2007) Analysis on Cyanides Compounds Effects on Plants. 24(6): 605-24.
[12]. McNaught, A. and Alan, D. (1997). Flavonoids, Isoflavonoids And Neoflavonoids, Compendium of Chemical Terminology (2nd Ed).Oxford. Scientific.
[13]. Patrick J. and Moyo B. (2011). African journal of Biotechnology Vol.10 (60), pp. 12925-12933.
[14]. .Riguera, R (1997). Isolating Bioactive Compounds from Organisms; Journal of Marine Biotechnology 5(4) 187-193.
[15]. Ted R and Elevitch A.(2010) " Farm and Forestry Production and Marketing Profile for *Moringa"* Journal for Food Composition And Analysis 19 (6-7): 544