International Journal of Applied
and Natural Sciences (IJANS)
ISSN(P): 2319-4014; ISSN(E): 2319-4022
Vol. 7, Issue 6, Oct - Nov 2018; 35-42

International Academy of Science,
Engineering and Technology
Connecting Researchers; Nurturing Innovations

A PHYTOCHEMICAL PROFILE AND SOME HEAVY METALS ANALYSIS OF *LASIANTHERAAFRICANA* LEAVES AND STEM

Sudi. P. D, Hauwa. S. M & Idongesit. E.E

Research Scholar, Department of Chemical Science Technology, Federal Polytechnic, Mubi, Adamawa, Nigeria

ABSTRACT

The Phytochemical profile and some heavy metals in Lasianthera Africana leave and stem found in Calabar, Cross River State, Nigeria wasanalysed. Lasianthera Africana is widely used in traditional medicine and for human consumption. The results of phytochemical screening showed the presence of Saponin, Terpenoid, Alkaloid, Combine sugar, Reducing sugar in both the leave and stem while Anthraquinone is absent in leave and stem. Analysis of heavy metals showed the following concentrations in leaves; Cd 0.03± 0.002mg/kg, Cu 1.75± 0.2mg/kg and Zn 1.21± 0.3mg/kg while the stem showed, Cd 0.029± 0.001mg/kg, Cu 1.68± 0.1mg/kg and Zn 1.20± 0.1mg/kg, but Pb is less than detectable limit of AAS in both the stem and leave. Comparison of heavy metals with (FAO, 1984) maximum limit of trace metal in vegetable showed that Cd and Cu are above the level which may be as a result of some human activities or pollution source around the areas where the plant is cultivated.

KEYWORDS: *Phytochemical, Heavy Metals, Lasianthera Africana, Analysis, Concentration*

Article History

Received: 04Sep2018 | Revised: 17 Sep 2018 | Accepted: 12 Oct 2018

INTRODUCTION

In the recent year research on mechanical plant has attracted a lot of attention globally. A large body of evidence has accumulated to demonstrate the promising potential of medicinal plant used in various traditional, complimentary and alternate systems of treatment of human diseases (Sule*et al,* 2010).

Medicinal plants are those that contain one or more of its photochemical that can be used for the synthesis of useful therapeutic agent (Sofowora, 2000). The wide range of medicinal plants like flowers, leaves, barks, stems, fruits and roots extract have been processed for variety of pharmacological activities (Momin*etal*., 2012)

In the last two centuries, there have been serious investigations into the chemical and biological activities of plants and these have yielded a compound for the development of synthetic organic chemistry and the emergent of medicinal chemistry as a rout for the discovery of more effective therapeutic agent (Roja&Roa, 2000).

Recently, some higher plant products have attracted the attention of scientist to search for the photochemical for their use as antimicrobial; such plant product would be biodegradable and safe to human health (Sule, *et al,* 2010).

The use of medicinal herb in the treatment and prevention of diseases is attracting attention by scientists worldwide (Sofowora, 1993). In Africa today, up to 80% of the population uses traditional medicine in primary health care (WHO, 2006).

Lasianthera Africana (P. Bear) is perennial glabrous shrubs of the family icacinceae whose height may reach from 61 to 136cm widely distributed in the tropical rain forest. There are four ethno variety distinguished by their taste, lead colour and ecological distribution (Jiofac*et al.*, 2009). The leaves are consumed as vegetable in Southern Nigeria (Burkilli, 1985).

Figure 1

There are 26 species of lasianthera reported by kesper (2001).

Some of which include; L. African, L. autro- calendonica, L. javanica, L. capitulate, L.dichrocarpa, L. donnaiensis, L.lanceolata, L. littoralis, L. marcrocarpa, L. macrophylla, L.

maingayi, L. malaccensis, L.membraneecea, L.ovalifolia, L. papauna, L. parviflora, L.perobtusa,L.prasina, L. secundiflora, L.umbellata and L. vitiensise.t.c.

Heavy metals refers to any metallic element that has a relatively high density and is toxic and poisonous even at low concentration (Ferguson, 1990). Human activities contribute to the pollution load on the soil which are released and easily taken up by the plant or leached into the soil which caused environmental pollution (Ogbonnal& Isinmah, 2007). Heavy metals contamination of vegetables can be underestimated as the food stuff are important component of human diet. Under certain environmental conditions, heavy metals may accumulate to toxic concentration and cause ecological damage (Wang &Mullingan, 2009). Heavy metals may enter the human through inhalation of dust, direct ingestion of soil and consumption of food plants grown in metal-contaminated soil (Combra*et al*., 1999; Dudka& Miller, 1999). The aim of this study is to analyse the phytochemicals and some heavy metals found in *lasianthera Africana* leaves and stem.

MATERIALS AND METHODS

Instrument and Apparatus

Analytical weighing balance, buck scientific 210 VPG atomic absorption spectrophotometer, bunsen burner, water bath, laboratory glass wares, desicator, rotary evaporator, mortar and pestle, biomega H400-HS hot plate, spatular and what manNo.42 filter paper.

Chemicals and Reagents

All the reagents and chemicals used were of analytical grade. Concentrated sulphuric acid, ethyl alcohol, acetic anhydride, bromine water, gelatin solution, Fehlingsolution, Wagner's reagent, ferric chloride solution, magnesium chip,

concentrated hydrochloric acid, ethanol solution, methanol, n-hexane, 10% ammonia, aqueous sodium hydroxide, Hager's reagent, cadmium chloride, zinc nitrate, copper sulphate, lead nitrate, ice water and distilled water.

Sample Preparation

The plant sample was obtained from Calabar, Cross River State, Nigeria in the month of March 2017 the plant was taxonomically authenticated by the Department of Agricultural Technology, Federal Polytechnic Mubi, Adamawa State.

The fresh stem and leaves of the plant was cut into pieces and air dried under room temperature for two weeks. The dried plant was grinded using mortar and pestle into a powdered form and stored in an airtight container.

Sample Extraction

3kg of the grounded plant material was socked in methanol for 72hours and the solvent was removed under reducing pressure 40 degrees using a rotary evaporator to afford a reddish brown residue. The residue was then extracted exhaustively by maceration at room temperature with n-hexane, these fractions were used to carry out the phytochemical screening.

Phytochemical Analysis of the Extract

A qualitative phytochemical test was carried out according to the method of Raman (2006) and Harborne (2005) to identify some phytoconstituent in the extracts.

Test for Saponins: Form test – Test solution when mixed with water and shaken result in the formation of froth, which is stable for 15 minutes indicating a positive result.

Froth Test: To 5mL of the test solution a drop ofbicarbonate solution was added. The mixture was shaken vigorously and left for three minutes. If was observed for the formation honey comb like froth for the positive result.

Test for Tanning: Gelatin Test – Test Solution was treated with a gelatin solution to give a white precipitate indicating the presence of tanning.

Test for Alkaloid: Hager's Test – Test solution when treated with a few drops of Hager's reagent (saturated picric acid solution) result in the formation of a yellow precipitate indicating a positive result for the presence of alkaloid.

Wagner's Test: (Iodine in potassiumiodite): The test solutions were treated with a few drops of Wagner's reagent. It was then observed in the formation of reddish brown precipitate which indicates the presence of alkaloids.

Test for Flavonoids: Ferric Chloride Test – the test solution when treated with a few drops of ferric chloride solution result in the formation of blackish red colour indicating the presence of flavonoids.

Shinoda Test: Test solution was treated with a few fragments of magnesium ribbon and concentrated hydrodiloric acid and observed for the appearance of red to pink colour after few minutes for the presence of flavonoids.

Test for Glycosides: Bromine Water Test – Test solution were dissolved in bromine water and was observed in the form of yellow precipitate indicating a positive result for glycosides.

Test for Terpenoids: – Test solution was dissolved in ethanol and a few drops of acetic anhydrideo were added followed by concentrated sulphuric acid. It was observed in the formation of pink violet colouration indicating the presence

of terpenoid.

Test for Combine Sugar: - The method described by Trease and Evans(2008) was adopted. 2mL of the extract was hydrolyses by boiling with 5mL of dilute hydrochloride acid and the resulting solution was neutralized with sodium hydrochloride solution. Few drops of Fehling solution were then added and heated on a water bath for 2 minutes and was observed in the formation of reddish brown precipitate indicating a positive result from combining sugar.

Test for Reducing Sugar: The method described by Trease and Evans(2008)was adopted. 2mL of the extract was dissolved in distilled water and filtered. The filtrate was heated with 5mL of equal volume of Fehling's solution and was observed for the formation of red precipitate indicating positive result for reducing sugar.

Test for free Anthraquinones: The Method described by Trease and Evans (2008) was adopted. Bontragerstest – 2mL of the extracts was shaken with 10ml of 10% ammonia for 5minute, no pink, violet or red coloration was observed indicating a negative result for free anthroquinine.

Analysisof Heavy Metal

Ashing

Leaves and stem powdered sample was placed in a porcelain crucible and inserted into the muffle furnace and heated between 450-550^{0}C temperature for 3hours to decompose the organic components.

Digestion of the Ashed Sample

The ashed sample was digested using the method described by A.O.A.C (2000) for the determination of heavy metals using atomic absorption spectrophotometer (AAS).

Determination of Heavy Metals

The heavy metals were determined using VPG 210 atomic absorption spectrophotometer and the method described by Mendham, Denney, Barnes& Thomas (2006) was adopted.

RESULTS AND DISCUSSIONS

Table 1: Qualitative Phytochemical Screening Results

Constituent	Stem	Leaves
Saponin	+	+
Tannins	+	-
Glycoside	+	+
Terpenoid	+	+
Alkanoid	+	+
Flavonoid	+	+
Reducing Sugar	+	+
Combine Sugar	+	+
Free Anthraquinone	-	-
Key:	= Absent, + = Present	Key:

Table 2: Mean Concentrations (mg/kg) of Heavy Metals

Plant Part	Cd	Cu	Pb	Zn
Leaves	0.03± 0.02	1.75± 0.2	LTDL	1.21± 0.3
Stem	0.029± 0.001	1.68± 0.1	LTDL	1.20± 0.1

Each value is the mean values of 2 determinations ± S.D, S.D is the standard deviation, LTDL is less than detectable limit

The result of the phytochemical screening of the leaves and stem extract of *lasianthera Africana*Table.1 showed the presence of saponins, glycosicle, terpenoid, alkaloid, flavonoid, combine sugar and reducing sugar in both the leaves and stem while tannins is present in the stem but absent in the leaves, while anthroquinine is absent in both the leaves and stem.

These photochemicalwere known to show medicinal activity as well as exhibiting physiological activities (Sofowora, 1993). One of the components detected like glycoside have been reported to have anti- bacterial potentials and many traditional medicine practitioner used as many varieties of herbal preparation to treat different microbial disease the study is reported by (Sule, *et al.* 2000). The phenolic and flavonoids are widely distributed secondary metabolite in plants responsible for a wide range of biological activities such anti-oxidant, anti-apoptosis, anti-aging, anti-carcinogen, anti-inflammation, anti-atherosclerosis, cardiovascular protection and improvement of endothelial function, as well as inhabitation of angiogenesis and cell proliferation activities (Asha *et al.*, 2011 &Naresh, 2011).Alkaloid has cancer treating properties and this result was supported by (Asaolu, 2003).

Heavy metals analysis of*lasianthera Africana*Table.2 showed the following concentrations of heavy metals in leaves; Cd 0.03±0.002 mg/kg, Cu 1.75± 0.2 mg/kg and Zn 1.68±0.3 mg/kg while that of stem showed; Cd 0.029± 0.001 mg/kg, Cu 1.68± 0.1 mg/kg and Zn 1.20±0.1 mg/kg. The concentration of Pb is less than the detectable limit (LTDL) of the AAS.

The concentration of copper is higher than the (FAO, 1985), maximum, safe limit of trace metal in vegetable 0.2mg/kg. Copper toxicity was studied by Yang *et al.* (2002) and was found that the root and shoots both showed increased levels of copper, similarly Xiongand Wang (2005) studied that the copper concentration in shoots increase with an increase in its concentration in soil. The concentration of cadmium is slightly higher than the (FAO, 1985) safe limit of trace metals in vegetable 0.01mg/kg; it has been reported that cadmium is highly mobile metal, and can be easily absorbed by the plant a realpart. A relation between levels of cadmium in the root zone and its absorption was shown by Gardiner *el at.*(1995)and Rarnos, Estebor, Lucena, & Garate (2002).

The concentration of zinc is less than the (FAO, 1985) Maximum safe limit of trace metals in vegetable 2.0mg/kg. Although the levels of zinc is less in the plant, but acute exposure of zinc can cause tachycardia, vascular shock, dyspepticnausea, vomiting, pancreatic disorder, diarrhea and damage of hepatic parenchyma (Salgueiro*el., al* 2000).

CONCLUSIONS

This study revealed that *lasianthera Africana* leaves and stem extract hold promises as source of pharmaceutically important phytochemicals. The levels of heavy metals in the soil where this plant is grown should be as certain to check the level of pollution and human activities which may get to the end users.

RECOMMENDATIONS

- Further studies should be carried out in order to isolate the phytochemical constituent and test their sensitivity on the different micro - organism.
- Acute toxicity limit and dosage should be evaluated

- Other toxic metal level should be determined to ascertain the level of pollution load around the soil where these plants are grown.

REFERENCES

1. *Asaolu, M.F.(2003). Chemical Composition and phytochemical screening of the seeds of gacima kola. Pakistan Journal of Science 46:145 – 147.*
2. *Asha, K., Rasika, C.T. Nirmala, R.D. &Tyoti, P.S. Ann. Biol Res. 2(1): 176 – 180*
3. *A.O.A.C (2000) Association of Official AnalyticalChemistry. Official method of analysis 9th edition New York.*
4. *Burchili, H.M. (1985). The Useful Plants of West Africa Royal Botanical Garden. Second Royal Botanical Garden 2; 545.*
5. *Combra, K., Martines, T., Urzelai, A. &Alanso, E. (1999). Dust Analysis of a Farm area near a lead and cadmium-contaminated Industrial Site. Journal of soil Contain 8(5): 527 – 540.*
6. *Dudka, S. &Miller, W. P. (1999) Permissible Concentration of Assenic and lead in soils based on risk assessment. Water, air, soil pollution. 133(1/4): 127 – 132.*
7. *FAO (1985). Water Quality for Irrigation for Agriculture. Irrigation Drainage Paper, 29: - 1-30.*
8. *Ferguson, J.E. (1990). The Heavy Elements: Chemistry, Environmental Impact and Health Effect. Oxford: Pergamin Press PP 382 – 399.*
9. *Gardiner, D.T., Miller, R.W., Bachamchian, B., Azan, A.S &Session, D.R. (1995). Effect of repeated sewage sludge application on plant accumulation of heavy metals. J Agric. Exo.syst. erwiron.55:1-6.*
10. *Harborne, J.B. (2005). Phytochemical method. Springer (India) Pvt. Ltd. New Delhi.pp17.*
11. *Jiofac,T, Ayissi, I.,Fokonang,C, Guedje, N. &kemeuze, V.(2009). Ethnabotany and phytomedicine of the Nyong valley forest in Cameroon. African journal of pharmacology.3(4):144-150.*
12. *Kesper,K.(2001). Multiple Origin of the tropical forest trees family icaucinaceae. American journal of botany 88(12): 2259-2274.*
13. *Maresh, S. G. (2011). Evaluation of Antiodant activity of Citrulluslamatus seed extract in Rats. Lat. Am. J. Pharm. 303:429-434.*
14. *Mendham,J., Denney, R.C.,Barnes, J.D & Thomas, M.J.K.(2006). Quantitative chemical analysis (6thed.). Dorling kinderly (India) Pvt,ltd. Pp340-487.*
15. *Momin,M.A.N., Bellah,S.F., Aprose,A.,Urmi, K.F &Rana,M.S. (2012). Phytochemical screening and cytocity of ethanoid extract of Sennasiamea leaves. J. pharm.sci.Res.4(8).1817-1879.*
16. *Ogbonnal, D. N. &Isinmah, N.O. (2007). Microbiology and Physiochemical characteristic of the soil of waste collection site in Portharcord city, Nigeria-Nigerian Journal of soil science 104 – 106.*
17. *Raman, N. (2006).phytochemical technique. New Indian publishing agencies, New Delhi. pp19.*

18. *Rarnos, I. Estebor, E., Lucena, J.J. & Garate, A. (2002). Codmium uptake and sub cellular distribution in plants of lactucaapCa-Mn Interaction. J. plant sci. 162: 461-467.*
19. *Roja, G. & Rao, P.S. (2000). Anticancer compound from tissueculture of medicinal plant. J. herbs species and medicinal plants.7:71-102*
20. *Salgueiro, M., Zubulaga, J., Lysionek, M., Sarabia, A., Caro, M.I., & Paoli, R. (2000). Zinc as an essential micro nutrient: A review. Nutr. Res. 20: 737-755.*
21. *Sofowora, A. (1993). Medicinal plant and traditional medicine in Africa. Spectrum book Limited, Ibadan, Nigeria pp 86.*
22. *Sofowora, E.E (2000). Phytochemical screening Nigerian medicinal plant Lioydia. J. integrated med. 41:234-246.*
23. *Sule, W.I..Okonkon, I.O., Joseph, T.A., Ojeze, M.O., &Nwanze J.C. (2010). Invitro antifungal activity of sennaalatalinn crude leaf extract. Research journal of biological science 5(3): 2752-284.*
24. *Trease, G.E. & Evans, M.C (2008)A text book of pharmacognosy. Bullertindal and caused, London. 13th Edition pp176-180.*
25. *Wang, S. &Mullingan, C.N. (2009). Enhance Mobilazation of asenic and heavy metals from mine tailing by humic acid. Chemosphere. 74: 274-279.*
26. *World Health Organization (2006). Traditional medicine. Fact Sheet no.134.*
27. *Xion,Z.T. &Wang, H.(2005).Copper toxicity and bioaccumulation in Chinese cabbage (brassica pecinensisRuPr.).Environ. Toxicol. 20:188-194.*
28. *Yang, X.E., Long,X.X., Mi, W.Z, Ye,Z.Q., He, Z.l. Staffela, P.J &Calvert, D.V. (2002). Assessing copper threshold for phyto toxicity and potential dietary toxicity of selected vegetables crops. J. Environ. Sci. Health B. 37: 625-635.*