EAS Journal of Nutrition and Food Sciences
Abbreviated Key Title:EAS J Nutr Food Sci
ISSN: 2663-1873 (Print) & ISSN: 2663-7308 (Online)
Published By East African Scholars Publisher, Kenya

Volume-5 | Issue-2 | Mar-Apr; 2023 | DOI:10.36349/easjnfs.2023.v05i02.004

OPEN ACCESS

Original Research Article

Chemical Characterization of Two Mistletoe Plants Found in NISLT, Samonda, Ibadan Premises

Ikokoh, P. P. A[1*], Murtala, M[1], Imohiosen, J. J[1], Idenyi, E. O[1], Aribo, T[1], Gbadegesin Y.H [1], David Bwai[2]

[1]Nigerian Institute of Science Laboratory Technology (NISLT), Samonda, Ibadan, Nigeria
[2]Sheda Science and Technology Complex, (SHESTCO), Sheda CL., 900103, Abuja, Federal Capital Territory, Nigeria

Article History
Received: 14.02.2023
Accepted: 08.03.2023
Published: 26.04.2023

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: This study investigated the chemical composition of two mistletoe leaves for its ascribed folkloric medicinal uses. The mistletoe leaves used for this research was harvested from Neem plant and Fig plant. Proximate analyses, phytochemical screening, Elemental and antioxidant analysis were carried out on both leaves. Alkaloids, saponin, cardioglycosides, Flavonoids, and steroids varied between mistletoe leaves obtained from Neem and fig trees. Saponins, steroids, and cardio glycosides have higher values in mistletoe of Neem. The concentration of Calcium, magnesium and potassium were high in the mistletoe of Neem. Copper, sodium and chromium was not detected in mistletoe of Fig, while it is present in low concentration in the mistletoe of Neem. The differences in the levels of 2, 2-diphenyl-1-picrylhydrazyl hydrate in the two botanicals under investigation revealed that Mistletoe of Neem has superior antioxidant properties compared to Mistletoe of fig. Mistletoe of Neem contain higher quantities of most of the secondary metabolites therefore, it may be of more pharmacological and nutritional value than mistletoe on fig, thus could have more medicinal and industrial values.

Keywords: Mistletoe, Neem, Fig, Metabolites, Proximate analysis, Phytochemical screening.

INTRODUCTION

Mistletoe is a general term for woody shoot parasites in several plant families, especially in *Loranthaceae* and *Viscaceae* families (Ogunmefun *et al.,* 2013). It is popularly called "Kauchi" and "ewe afomon" among the Fulani and Yoruba speaking people of Nigeria, respectively. It is an obligate semi-parasitic evergreen tropical plant, normally found growing on a variety of trees, including palm fruit, mahogany and other tropical plants. Birds feed on the fruit of the plant and the undigested seeds from the bird droppings are spread on tree branches and thus germinate on the host plant (Adebisi *et al.,* 2013). Mistletoe is always propagated by seed and cannot be cultivated in the soil like other plants, hence the ancients considered it to be an excrescence of the tree.

In West Africa, mistletoes are found on many tree crops of economic importance including shea butter tree, neem tree (*Azadirachta indica*), citrus species, especially sweet orange (*Citrus sinensis*) and grape (*Citrus paradise*), cocoa (*Theobroma cacao*) and rubber (*Hevea brasiliensis*) (Begho *et al*., 2007). Various species of these hemi-parasitic plants growing on other economic, medicinal and cultivated trees such as the hog-plum (*Spondiasmonbin*), the brimstone tree (*Morinda lucida*), the African Rauwolfia (*Rauwolfia vomitoria*), the kola-nut tree (*Cola nitida*), the sand paper tree (*Ficusex asperata*), teak (*Tectona grandis*), the bread fruit tree (*Artocarpus altilis*),forest trees such as *Terminalia glaucescens*, *Ficusmucuso*, etc. have also been found. These findings seem to lend credence and support to the Yoruba adage which sees the Mistletoes as having no roots but that they (mistletoes) are related to all tree hosts.

The typical farmer or gardener sees mistletoes as notorious and devastating parasites which pose serious losses to economically-valuable fruit trees like cocoa, rubber, kola-nut, and medicinal plants like *Morinda lucida* and *Rauwolfia vomitoria* whether growing in wild forests, gardens or orchards (Jiofack *et al*., 2010). Very often, host trees that have lots of mistletoes suffer from them as the triumph of mistletoes lead to poor growth and productivity and eventual death of such host plants, especially during unfavorable

***Corresponding Author:** Ikokoh, P. P. A
Nigerian Institute of Science Laboratory Technology (NISLT), Samonda, Ibadan, Nigeria

weather conditions and if the host plant is merely a shrub or a small tree.

In Nigeria, mistletoe is used as a remedy for several human and animal ailments that include stomach ache, diarrhea, dysentery, wound healing and cancer. Ruminants and local fowls do relish it without any reported digestive disorder (Egbewande *et al*., 2011). Mistletoe has been analyzed and observed to contain lecithin, viscotoxin, polysaccharides and many phytochemicals as active ingredients (Adebisi *et al*., 2013). It has been reported to have hypoglycaemic properties; since it decreases the blood glucose level and has effects in controlling the loss of body weight which occurs in person with diabetes mellitus (Obatomi *et al*., 1994). The aim of this project is to determine the chemical properties of two mistletoe plants found in NISLT premises.

MATERIALS AND METHOD

Plant collection and analysis

The mistletoe leaves used for this research was harvested from Neem plant and Fig plant. They were harvested in early September from NISLT premises. The mistletoe leaves were dried at room temperature and milled under aseptic condition into powdered form and preserved in a well labeled air tight container for proximate composition, phytochemicals, oxidative activity and elemental analysis. Proximate analyses were carried out according to the procedure of Association of Official Analytical Chemist (A.O.A.C., 2000). Quantitative and qualitative phytochemical screening was done by the method of Odebiyi and Sofowora, (1979).

RESULT AND DISCUSSION

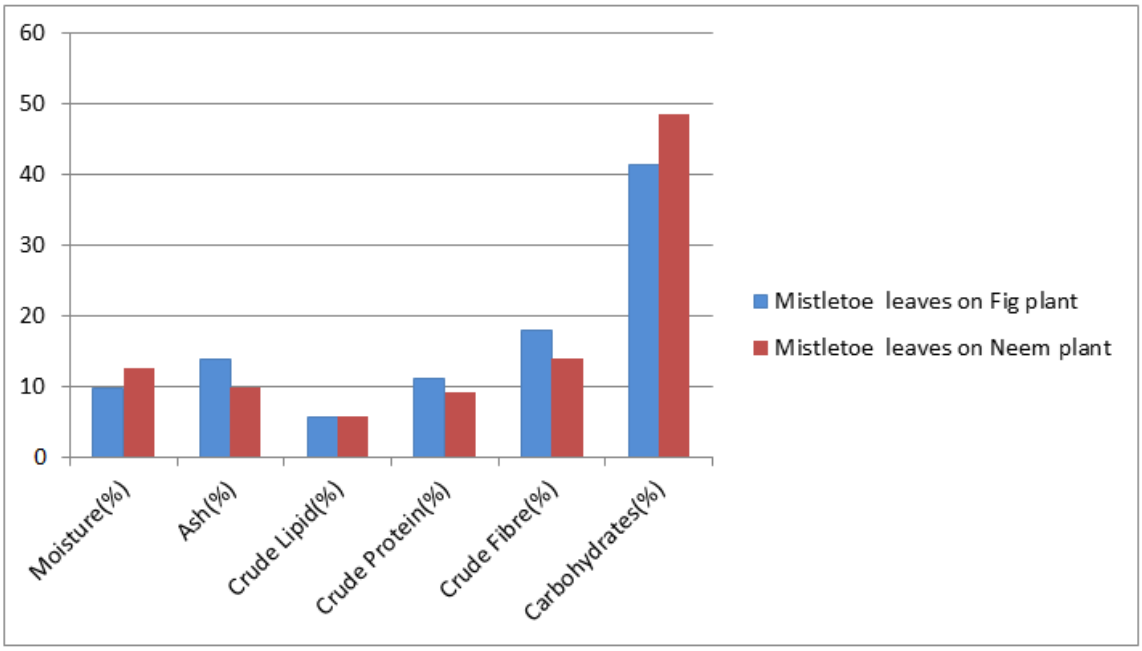

Fig 1: Proximate analysis of the Mistletoe leaves from Fig and Neem

Table 1: Phytochemical Screening (Quantification)

S/NO	PARAMETER-	Mistletoe leaves on Fig plant	Mistletoe leaves on Neem plant
1	Alkaloids (mg/g)	0.486	0.280
2	Saponins(mg/g)	0.686	0.568
3	Flavonoids(mg/g)	0.198	0.558
4	Tannins(mg/g)	Nil	Nil
5	Phenols(mg/g)	Nil	Nil

Table 2: Phytochemicals Screening (Qualitative)

S/NO	PARAMETER-	Mistletoe leaves on Fig plant	Mistletoe leaves on Neem plant
1	Alkaloids	+	+
2	Saponins	+	+
3	Tanins	-	-
4	Phenols	-	-
5	Flavonoids	+	+
6	Cardiacglycoside	-	+

S/NO	PARAMETER-	Mistletoe leaves on Fig plant	Mistletoe leaves on Neem plant
7	Antraquinones	-	-
8	Cardenolides	+	+
9	Resins	-	-
10	Terpenoids	-	-
11	Steroids	+	+

Key (+) = positive (-) = negative

Table 3: Elemental Analysis

S/N	Parameters	Mistletoe on Fig leaves Concentration(mg/Kg)	Mistletoe on Neem leaves Concentration(mg/Kg)
1	Manganese(Mn)	34.15	44.40
2	Potassium(K)	1215.48	1468.38
3	Sodium(Na)	ND	19.61
4	Iron(Fe)	88.23	186.09
5	Zinc (Zn)	20.395	12.07
6	Copper(Cu)	ND	2.59
7	Magnesium(Mg)	837.605	4324.36
8	Calcium(Ca)	1951.58	5486.83
9	Chromium(Cr)	ND	106.42

ND: Below the detection limit of the equipment which is 0.001mg

Table 4: Free Radical Scavenging Activity

S/N	Concentration(mg/ml)	Mistletoe leaves on Fig plant	Mistletoe leaves on Neem plant	Vitamin C %inhibition
1	0.5	42.32	52.56	93.29
2	0.25	32.98	43.77	93.07
3	0.125	15.86	28.99	92.51
4	0.0625	13.91	18.29	85.99
5	0.03125	8.75	15.86	56.32

DISCUSSION

The result of the proximate composition of mistletoe leaves from Fig and Neem trees is as shown in Fig 1. There is a slight difference between proximate compositions of the two mistletoe plants with the mistletoe of Neem having the highest value. The carbohydrate content is the highest concentration in the two leaves with 48.50% in the mistletoe of Neem and 41.30% in the Mistletoe of fig. Carbohydrates are ubiquitous and can perform a wide array of biological roles based on therapeutics; therefore both mistletoe plants can be used extensively in cardiovascular and hematological treatment ranging from inflammatory diseases and antithrombotic treatment to wound healing (Kilcoyne *et al*., 2007).

The qualitative and quantitative phytochemical contents of the mistletoe leaves are represented in Table 1 and 2. This indicates that flavonoids, alkaloids, saponins, cardenoloids and steroids were deeply present at varying intensities while Tanins, phenols, Antraquionones, resins, and terpenoids were completely absent. However, cardio glycoside was present in mistletoe of Neem plant and absent in mistletoe of Fig plant.

Plants have medicinal potential because of the bioactive phytochemical elements that have a physiological effect on humans and animals (Aborisade *et al*., 2017; Korkmaz *et al*., 2021). Because of changes in the concentration of various phytochemical ingredients between Mistletoe of Fig and Mistletoe of Neem plant, the potential for these botanicals to produce physiological effects on a biological organism may differ.

The presence of alkaloid is slightly present in both mistletoe with 0.486 mg/g of alkaloid in the mistletoe leaves of fig while 0.280mg/g of alkaloid in mistletoe of Neem. Alkaloids are organic compounds that contain nitrogen, known to exhibit marked physiological activity when administered to animals (Okwu, 2004). This implies that the mistletoe of fig can be used as basic medicinal agents for central nervous system stimulant, topical analgesic, ophthalmologic, antispasmodic and bactericidal effects (Osuagwu *et al*., 2007; Samali *et al*., 2012). They are also used in relieving pains, anxiety and depression (Obochi, 2006; Ekam and Ebong, 2007)

The level of Flavonoids in the mistletoe of Neem is 0.558mg/g while that of Fig is 0.198mg/g. By implication, the mistletoe of Neem has a better

flavonoid activity. Flavonoids have been shown to have antibacterial, anti-inflammatory, antiallergic, antimutagenic, antiviral, antineoplastic, antithrombotic and vasodilatory activity (Allan and Miller, 1996). The two mistletoe plant contains saponins with slight differences between the two. The mistletoe of fig contains the 0.686mg/g saponin while mistletoe of Neem contains 0.558mg/g. The two mistletoe plants are capable of neutralizing some enzymes in the intestine that can become harmful, building the immune system and promoting wound healing. They also prevent excessive absorption of cholesterol and reduce the risk of cardiovascular diseases (Akinpelu and Onakoya, 2006; Olaleye, 2007); strengthen the contractions of cardiac muscles (Aja *et al*., 2010; Schneider and Woliling, 2004); exhibit cytotoxic effects and growth inhibition against a variety of cells making them have anti-inflammatory and anticancer properties (Akinmoladun *et al*., 2010).

The elemental content of this study of two mistletoe plants is high which is in contrast with that of Moyosore *et al*., (2013), where a different trend was observed in a specie of mistletoe with much lower values for some minerals like Calcium and phosphorus brought about by factors such as plant species, geographical location, age of the plant, period of the year(season) the plant was collected, drying temperature, extraction method as well as the part of the plant used (Njoya *et al*., 2018).

Calcium is the most abundant element obtained from the two mistletoe plants. The mistletoe of Neem contains 5486.83mg/Kg of calcium while that of Fig contains 1951.58mg/kg. Calcium is important in teeth, bone and muscle metabolism (Turan *et al*., 2003). The required daily amount of calcium for adults is 800 mg/day (Alaimo, 1994). According to Shills and Young (1988), a food rich in calcium content should be greater than 1 mg/g and a food poor in calcium is less than 0.5 mg/g. From the result, the mistletoe leaves from Neem samples are very rich in calcium and iron which is an normal essential trace element for hemoglobin formation, for central nervous system and energy metabolism (Ishida *et al*., 2000).

Magnesium is the second most abundant in both Mistletoe. The mistletoe of Neem contains 4324.36 mg/Kg of calcium while that of Fig contains 837 mg/kg. The presence of high Magnesium in the mistletoe of Neem can help in improving circulatory diseases such as heart disease. Without magnesium, many enzymes in the human body would function less efficiently and magnesium contributes to calcium and potassium metabolism and therefore essential for bone strengthening (McLean, 1994).

The sodium content obtained from study was not detected in mistletoe on fig but was detected in mistletoe of neem (19.61mg/kg). The implication of low concentration of sodium in the samples is that consumption of extract of mistletoe leaves sourced from any of the two trees cannot aggravate hypertension in consumers of the extract (Ishiwu *et al*., 2013).

The Vitamin C inhibition by the extracts of mistletoe found in both Fig and Neem leaves are generally low when compared with that of fig leaves, Neem leaves and that of standard. This suggests that some of the chemical characteristics of mistletoe areconferred to them by their host trees. The differences in the levels of 2, 2-diphenyl-1-picrylhydrazyl hydrate in the two botanicals under investigation reveal that Mistletoe of Neem has superior antioxidant properties to Mistletoe fig and by implication, Mistletoe of Neem may be of more pharmacological and nutritional value than mistletoe fig. The stronger antioxidant activity of mistletoe of Neem may be due to its higher Flavonoids and cardioglycosides concentration than mistletoe of fig.

The potent antioxidant activity of flavonoids and their ability to scavenge hydroxyl radicals, superoxide anions and lipid peroxy radicals may be the most important function of flavonoids (Allan and Miller, 1996).

CONCLUSION

Finally, phytochemical concentrations found in both plants have a very strong antioxidant capabilities, it has the ability to neutralize some harmful enzymes found in the intestine, and it also have antibacterial, anti-inflammatory, and anti-allergic activities. The two plants have essential trace element which are responsible for hemoglobin formation, central nervous system and energy metabolism. It can also be used to manage some disease found in the circulatory system. However mistletoe of Neem contains higher concentration of some secondary metabolites compared to that of the fig thus could have more medicinal and industrial values than the mistletoe of fig.

REFRENCES

- Aborisade, A. B., Adetuu, A., & Owoade, A. O. 2017. Phytochemical and proximate Analysis of some medicinal leaves. *Clinical Medicine and Research*, 6(6), 209-214.
- Adebisi, F., Oluwaseye, A., Fausat, A., Michael, A., Adedayo, A.., Ikokoh, P., Salisu, A., & Chukwu, N. (2013). Chemical characterization and antimicrobial activity of Loranthusmicranthus Linn leaves. *Journal of medicinal plant research*, 7(45), 3332-3336. DOI: 10.5897/JMPR2013.5283 Academic Journals http://www.academicjournals.org/JMR.
- Aja, P. M., Okaka, A. N. C., Onu, P. N., Ibiam, U., & Urako, A. J. (2010). Phytochemical constituents of Talinumtriangulare (water leaf) leaves. *Pakistan Journal of Nutrition*, 9(6), 527-530.

- Akinmoladun A. G., Obuotor, E. M., & Farombi, E. O. (2010). Evaluation of antioxidant and free radical scavenging capacities of some Nigerian indigeneous medicinal plants. *Journal of Medicinal Food*, 13(2), 444-451.
- Alaimo, K. (1994). Dietary intake of vitamins, minerals, and fiber of persons age 2 months and over in the United States, Third National Health and Nutrition Examination Survey, Phase-1, 1988-1991, Advance Data 258 (Nov. 14), 1.
- Allan, L., & Miller, N. D. (1996). Antioxidant Flavonoid: Structure, Function and Clinical Usage. *Alt Med* Rev, 1, 103-111.
- A.O.A.C. (2000). Official Methods of Analysis. Association of Official Analytical Chemist. 15th Ed Arinton. VA, USA.
- Begho, E. R., Omokhafa, K. O., Omo-ikerodah, E. E., & Akpaja, E. O. (2007). Some observations on the fruit set and incidence of mistletoe on rubber trees in Nigeria. American-Eurasian *Journal of sustainable Agriculture*, 1(1), 13-18.
- British Pharmacopoeia. (1980). Ash value, Acid insoluble, water soluble extractive and Alcohol extractive. Appendix XII Majesty Stationery office London. 2, 1276-1279.
- Egbewande, O. O., Jimoh, A. A., Ibitoye, E. B., & Olorede, B. R. (2011). Utilization of African mistletoe (Tapinanthus bangwensis) Leaf Meal by Broiler Chickens. Pakistan *Journal of Nutrition*, 10(1), 19-22.
- Ekam, V. S., & Ebong P. E. (2007). Serum protein and enzymes level in rats following administration of antioxidant vitamins during caffeinated and non-caffeinated paracetamol induced hepatoxicity Nigeria. *J Physiol* Sci, 22(1), 65-68.
- Isengard, H. D. Water content, one of the most important properties of food. *Food Control*, 12(7), 395-400. DOI: 10.1016/S0956-7135(01)00043-3
- Ishida, H., Suzuno, H., Sugiyana, N., Innami, S., Todoro, T., & Mackanea, A. (2000). Nutritional evaluation of chemical components of leaves stalks and stems of sweet potatoes (Ipomeabatatas). *Food Chem*, 68, 359-367.
- Ishiwu, C. N., Obiegbuna, J. E., & Aniagolu, N. M. (2013). Evaluation of chemical properties mistletoe leaves from three different trees (Avocado, African Oil Bean and Kola). *Nigerian Food Journal*, 31(2), 1-7.
- Jiofack, R. T., Dondjang, J. P., & Nkongmeneck, B. A. (2010). The loranthaceae of the Bafou areain Cameroon: Identification, distribution, biology and eradication strategies. In Burgt X van der, Maesen J van der, Onana J. M., editors. Systematics and conservation of African plants: Proceedings of the 18th AETFAT Congress, Younde, Cameroon: 26th February -2nd March 207, pp.229-235.
- Kilcoyne, M., & Lokesh, J. (2007). Carbohydrates in therapeutics; cardiovascular hematological agents' medical chemistry, *journal of pharm. Pharmacology*.
- Korkma, N., Dayangac, A., & Sevindik, M. (2021). Antioxidant, antimicrobial and antiproliferative activites of Galium aparine. *Journal of Faculty of Pharmacy of Ankara University*, 45(3), 554-564.
- McLean, R. M. (1994). Magnesium and its therapeutic uses: A review. *The American Journal of Medicine*, 96, 63.
- Moyosore, O., Nwoke, S. C., Imaga, N. A., Magbagdeola, A. O., Ebuehi, A. O., & Okafor, O. A. (2013). Preliminary Investigation of The Nutritional Qualities, Phytochemical Properties and Antioxidant Activities of Aqueous Extract of Mistletoe Leaves (Tapinanthusbangwensis) Grown on Orange Trees. *The FASEB Journal*, 27, 794-816.
- Njoya, H. K., Chukwu, E., Onyeneke, Okwuonu C. U., & Erifeta, G. O. (2018). Phytochemical, proximate and elemental analysis of the African mistletoe (*Tapinanthus preussii*) crude aqueous and ethanolic leaf extracts. *Journal of Medicinal Plants Studies*, 6(6), 162-170.
- Obatomi, D. K., Bikomo, E. O., & Temple, V. C. (1994). Antidiabetic properties of African Mistletoe in Streptozotocin induced diabetic rats. *Journal of Ethnopherrmacol*, 43, 13-17.
- Obochi G. O. (2006). Effect of alcohol-kolanut interaction on biochemical indices of neuronal function and gene expression in Wistar albino rats. A PhD Thesis submitted to the Graduate School, University of Calabar-Nigeria.
- Odebiyi, O. O., & Soforowa E. A. (1978). Phytochemical screening of Nigerian medicinal plants Llyodia, 41(3), 234-246.
- Ogunmefun, O. T., Fasola, T. R., Saba, A. B., & Oridupa, O. A. (2013). The Ethnobotanical, Phytochemical and Mineral Analyses of Phragmanthera Incana (Klotzsch), A Species of Mistletoe Growing on Three Plant Hosts in South-Western Nigeria. *International Journal of Biomed Sci*, 9(1), 33-40.
- Okwu D. E. (2004). Evaluation of the chemical composition of indigenous spices and flavouring Agents. *Global Journal of Pure and Applied Science*, 7, 455-459.
- Olaleye, M. T. (2007). Cytotoxic and antibacterial activities of methanolic extract of Hibiscus sabdariffa. *Jounal of Med Plant Res*, 1(1), 9-13.
- Osuagwu, G. G. C., Okwulelie, I. C., & Emenike J. O. (2007). Phytochemical and mineral components of the leaves four Nigerian Pterocarpus (JACQ) species. *Int Journal of Mol Med Adv Sci*, 3(1), 6-11.
- Samali, A., Florence, D. T., Odeniran, O. A., & Cordelia, O. N. (2012). Evaluation of chemical constituents of Phyllanthusnaruri. *Afr Journal of Pharm and Pharmacol*, 6(3), 125-128.

- Schneider, G., & Wolfling J. (2004). Synthetic cardenolides and related compounds. *Current organic chemistry*, 8(14), 1381-1403.
- Shills, M. E. G., & Young, V. R. (1988). Modern nutrition in health and diseases. In Nieman, D. C. Butherpodorth, D. E., & Nieman, C. N. (eds.) Nutrition. WMC Publishers, Dubugue, USA, pp.276-601.
- Turan, M., Kordali, S., Zengin, H., Dorsun, A., & Sezen, Y. (2003). Macro and micro mineral content of some wild edible leaves consumed in Eastern Anatolia. Acta Agriculture Scandinavica, section B, *Plant Soil Science*, 53, 129-137.

Cite This Article: Ikokoh, P. P. A, Murtala, M, Imohiosen, J. J, Idenyi, E. O, Aribo, T, Gbadegesin Y.H, David Bwai (2023). Chemical Characterization of Two Mistletoe Plants Found in NISLT, Samonda, Ibadan Premises. *EAS J Nutr Food Sci, 5*(2), 57-62.