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Chemical analysis of bryophyllum pinnatum (never die) leaves

Aminu Dauda[1] and Zainab Haruna Garba[2]

[1]Department of chemistry, faculty of science, firat university, elazig, Turkey.

[2]Department of pure and industrial chemistry, faculty of natural science, university of jos, plateau state, Nigeria.

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ABSTRACT

Chemical analysis of the leaf of *Bryophyllym pinnatum* was carried out. The moisture content and the ash content were found to be 83.91% ± 0.21 and 13.30% ± 0.41. The leave of the plant was found to contain Na, Ca, K, Mn, Mg, Fe, Cu, Cr and Zn. The level of these mineral in mg/ l00g sample were found to be 0.13% ±*0.3*, 599.97%, ± 24.54; 5.51% ± 0.08; 4.71% ±0.27; 247.11% ± 33.11; 6.62% ± 1.72; 82.96% ± 6.96: 60.%% ± 8.01 and 0.10% ± 0.01 respectively. The elemental analysis using sodium fusion test shows that the leave contain nitrogen, chlorine, and bromine. The present of these mineral elements in the plant could be part of the contributing factors which suggest the use of the plant for various therapeutic applications.

Introduction

Medicinal plants are plants use by herbalist's and are thought to have medicinal properties. Few plants or their phytochemical constituents have proven to have medicinal effects by rigorous science.

Plants have the ability to synthesize a wide variety of chemical compounds that are used to perform important biological functions and to defend against attack from predators such as insects, fungi, and herbivorous mammals. Many of these phytochemical have beneficial effects on long-term health when consumed by human beings.

The use of the plant as medicine predates written human history. The study of the traditional human use of' plants is recognized as an effective way to discover future medicines. In 2001, researchers identified 122 compounds used in modem medicines which were derived from "ethnomedical" plant sources. 80% of these have had ethnomedical use identical or related to the current use of an active element of the plant.

The use of herbs to treat diseases is almost universal among non-industrialized societies, and often more affordable than purchasing expensive modern pharmaceuticals. The World Health Organization (W.H.O) estimated that 80 percent of the population of some Asian and African countries presently use herbal medicines for some aspect of primary healthcare.

In Nigeria, many indigenous plants are used in herbal medicine to cure diseases and heal injuries (Okwu 2006). Such medicinal plants include *Bryophyllum pinnatum*(Never die). The active ingredient of most of the commonly used conventional drugs was originally derived from a plant before there pharmaceutical mass production from synthetic chemical (Sofowara, 1993).

Bryophyllum pinnatum belongs to the family crassulaceae, it is a perennial herb growing widely and used in folkloric medicines in tropical Africa, tropical America, India, China and Australia (Engler, 1926). It is classified as a weed (Oliver, 1983).

Bryophyllum pinnatum is an erect succulent perennial shrub that grows 1 to 1.5m in height and reproduce from seeds and also vegetatively from leaf bubbles (Agoha, 1974). The steam is hallow four angled and usually branched, leaves are opposite, decussate, succulent 10-20cm long. The lower leaves are simple whereas the tipper ones 3-7 foliate and are long-petioled, they arc fleshy dark green that are distinctively scalloped and trimmed in red. Leaf blade pinnately compounds with 3-5 leaflets, 10-30em, petioles 2-4cm leaflet blades oblong to elliptic, 6-8x3-5cm, margin crenate with each notch bearing a dormant bud components to develop into a healthy plantlets (Jaiswal, 2006), apex obtuse. The leaves are furnished with rooting vegetative buds, implore scenes terminal paniculate 10-40cm.

Flowers are much bell-like pendulous, calyx tubular; 2-4cm, corolla reddish to purple, 5cm base sparsely ciliate lobes ovate-lanceolate, stamens inserted basally on corolla nectar scales oblong follicles included in calyx and corolla tube. The fruit-pud with four septa and numerous, ellipsoid smooth striate seeds within. The plant flowers in November-March and fruit in April (Paranjpe, 2005; Jaiswal, 2006; Variers 2002).

Bryophyllum pinnatum is widely distributed in tropical Africa, tropical America, India, China and Australia. The plant also flourishes throughout the South-Eastern Nigeria. This is the only kalanchoe species found in South America, however, 200 other species are found in Africa, Madagascar, China, and Java. It is also known as katakataka which is an adjective for astonishing or remarkable (Duster 1985). It is an introduced ornamental plant that is now growing as seed around plant crops (Dalziel, 1995). The plant is easily propagated, found in thickets and open places.

In south eastern Nigeria, the herbs *is used to* facilitate the dropping of the placenta of newly born baby (Daniel, 1995). The plant leaf is normally mildly exposed to heat and the juice extracted and applied to the baby's placenta on daily basis. The pushed leaves as well as the extracted juice are mixed

Tele: +905346842796

E-mail address: tasekkur@gmail.com

with palm oil and rubbed on abscesses or another smelling. This is also applied on ulcer, burns, and on the body of young children when they are ill (Agoha 1974).

In traditional medicine, the leaves of this plant have been used for antimicrobial treatment (Oliver, 1983; Mehta et al, 1952; Akinpelu 2000). Antifungal (Misra et al, 1979), antiulcer (Pal et al, 1989; Pal et al., 1992); antihypertensive (Ojewole, 2002) potent antihistamine and anti-allergic activity (Pal et al.. 1999). The Palikur *mix* the leaf juice with coconut oil of andiroba oil and then rub it on the forehead for migrant and headaches. To the Sonia indigenous people heat the leaves and apply them topically on boils and skin ulcer. Leaf juice is also used in the treatment of coughs, bronchial affections, blood dysentery, jaundice and gout (Sofowara, 1993).

(Mickcnzie *et* al., 1987) investigated that cardiac glycoside poisoning was produced in calves given flowers heads of [he hybrid of *Bryophyllum* species. They also found that for each plant except *(B. tubiflorum),* the calves were each given a single dose of 20g wet weight per kg body weight. The results of the calf toxicity experiment with the amount of bufadienolide measured in the plants suggest that bryotoxins A, B, and C probably accounted for the observed disease (Mckeenzie et al., 1987; Reppas, 1995).

In view of the different uses of Bry*ophyllum pinnatum* leaves, therefore the aim of this study is to determine the proximate, elemental and mineral composition of the leaves of Bryophyllum pinnatum.

Materials and Methods

The bryophyllum pinnatum leaves used for this study were obtained from the federal college of forestry, Jos plateau state, Nigeria.

The proximate composition of the sample which was moisture content, Ash content were carried out in triplicate using standard analytical method AOAC (1990). The Nitrogen, chlorine, and bromine were determined by sodium fusion test.

The minerals were determined by dry ashing the sample at 650°C to constant weight and dissolving the ash in a volumetric flask using distilled water with few drops of Conc. Hydrochloric acid, Nitric acid and Perchloric acid. Standards of the various trace elements were prepared and run against individual cathode lamp selected for each element using Atomic absorption spectrophotometer ASTM(1985). The minerals were reported in mg/100g.

Table 1. The Result of Moisture Content.

	$A_{(g)}$	$B_{(g)}$	$C_{(g)}$
Weight of empty crucible	20.086	21.867	12.214
Weight of Sample	5.000	5.000	5.001
Weight of Sample + crucible	25.086	26.867	17.215
Before drying			
Weight of sample + crucible after drying	20.876	22.653	13.051
Lost in weight	4.210	4.214	4.163
Moisture %	4.210 x 100 5.000 84.20%	4.214 x 100 5.000 84.28%	4.163 x 100 5.001 83.26%

Mean = $\frac{84.20 + 84.28 + 83.26}{3}$

= 83.91% ± 0.21

Table 2. Ash Content.

	$A_{(g)}$	$B_{(g)}$	$C_{(g)}$
Weight of crucible	16.949	22.630	11.575
Weight of Sample	2.002	2.001	2.001
Weight of Sample + Crucible before ashing	18.951	24.631	13.576
weight of sample + crucible after	17.223	22.885	11.845
Weight of ash	0.274	0.255	0.270
% ash content	0.274 x 100 2.002 0.1368 x 100 13.686%	0.255 x 100 2.001 0.127 x 100 12.744%	0.270 x 100 2.001 1.35 x 100 13.493

Mean = $\frac{13.686 + 12.744 + 13.493}{3}$

= 13.30% ± 0.41

Table 4.Proximate Composition.

Parameters determined	% composition
Moisture content	83.91% ±0.21
Ash content	13.30% ± 0.41

Table 5. Mineral Composition.

ELEMENT	COMPOSITION (mg/l00g)
Calcium	599.97±24.54
Magnesium	247.11±33.11
Sodium	0.13 + 0.03
Potassium	5.51± 0.08
Lead	Not Detected
Copper	82.96±6.96
Zinc	0.1±0.01
Nickel	Not Detected
Manganese	4.71±0.27
Iron	6.62±1.72
Chromium	60.96±8.01

Discussion

A photochemical analysis is very useful in the evaluation of some active biological compound of some medicinal plants. The qualitative and quantitative analysis of Bryophyllum pinnatum were carried out on fresh and dry samples.

The moisture content of the sample was found to be 84. 57%±.21, while the ash content which is usually an indication of the concentration of inorganic and mineral substance was found to be 12.80% ± 0.947.

The herbs were found to contain nitrogen, chlorine, bromine and also is a good source of the mineral element such as sodium, calcium, potassium, magnesium, manganese, iron, copper and zinc.

Calcium was found to be the most abundant macro element present in the plant to be 599.97±24.54, normal extracellular calcium concentration are necessary for blood coagulation and for the integrity, intracellular cement substance (Okaka et al., 2001). It also helps in the development of strong bone and teeth. Sodium was found to

Table 3. Elemental Analysis.

TEST	OBSERVATION	INFERENCE
1cm3 of sample filterate+H_2SO_4+$FeSO_4$ (1cm3) then boil for few minutes	Green colour was observed	Nitrogen present
1cm3 of sample filterate+dil CH_3COOH+lead acetate solution	No colour change	Sulphur not confirmed
1cm3 of sample filterate+HNO_3+Heat cool and add 1ml $AgNO_3$ solution	White precipitate was observed	Chlorine present
1cm3 of sample filterate+HNO_3+$AgNO_3$+NH_3 solution	Yellowish White precipitate was observed	Bromine confirmed
1cm3 of sample filterate+HNO_3+$AgNO_3$+NH_3	Soluble in ammonia	Iodine not confirmed

the 0.13±0.03, the lower sodium content of Bryophyllum pinnatum might be an added advantage due to the direct relationship of sodium intake with hypertension on human (Dalsalt, 1972).Zinc was determined to be 0.10mg/I00g±0.0l; the presence of zinc in the plant could mean that the plant can play valuable roles in the management of diabetics which result from insulin malfunction (Pal et al, 1990: Okwu, 2001). Other minerals such as magnesium, copper, and chromium were found to be present in appreciable quantities. This indicates that the plant is a good source of mineral useful for proper body function.

Conclusion

Bryophyllum pinnatum synonyms kalanchot pinnata is a good perennial herb growing widely and used in folkloric medicine in tropical Africa, India, China, Austria and tropical America. Classified as a weed, the plant flourishes throughout the southern part of Nigeria.

The result of this research work shows that the leaves of Bryophyllum pinnatum contain minerals in appreciable quantities and the leaves possess activities like anti-ulcer, anti-inflammatory, analgesic, antihypertensive as a powerful pain reliever. Bryophyllurn pinnatum is used in the treatment of wounds, burns, and ulcer in herbal medicine and also in the treatment and prevention of infections. As a rich source of mineral element Bryophyllum pinnatum can be a potential source of useful drugs.

References

Agoha R.C. (1974). Medicinal Plants of Nigeria, offset Drakkering faculfectder wiskunde in Naturwetens chappen, the Netherlands; 33.41

Akinpelu, D.A. (2001). Antimicrobial activity of Bryophyllum pinnatum leaves fitoterapia. 71(2):193-194.

Alibi, D.A, Onibudial M.Z., Amusa N.A. (2005). Chemical and Nutritional Composition of four Botanicals with fungitoxic properties. Whold J of Agric Sci. 1:84-85 (PUBMED).

Ayodele, A.E. (2001). Methods in plant analsysis. Journal of Science; 10:134-136.

Chopra RN, Nayer, S.L, Chopra IC (1956). Glossary of Indian Medicinal Plant Council of Scientifica and Industrial Research, 1:330.

Dahl – Salt L.K. and Hypertension. Clin A.M.J. (1972) Nutri. 25:231 – 238.

Daiziel J.M. (1955), The useful plants of West Tropical African. Grown Agents for oversea Government and Administration; p28, 53, 415.

Dasilva S.A, Costa S.S., Mendonca S.C., Silva E.M., Moraes V.L., and Rossi Bergmann B. (1995). Therapeutic effect of oral kalachoe pinnata leaf extract in murine leishmaniasis. Acta tropica.60(3):201-210.

Duster, P.J.)1986). Heart and flowers: Bryophyllum Poisioning of cattle. Journal of veterinary medicine: 7:222-7.

Jaisival S. and Sawhney S. (2006). Correlation of epiphyllus bud differentiation with foliar senescenece in crassulacean succulent kalanchoes pinnata as revealed by thidiazuron and ethrel application J. of plant physiology 163:717-722.

Kamboy A. Saluja A.K. (2009), Bryophyllum pinnatum (Lam), Kurz. phytochemical and pharmacological profile, A review pharmacognosy review; 3:364 -74.

Kirtikar, K.R. and Bsu B.D. (1975). Indian medicinal plants, periodical experts, Delhi, 2:2nd ed:999

Marriage P.B., and Wilson D.G., (1971). Analysis of organic acids of Bryophyllum pinnatum. Can. J. Biochem 49-282-295.

Mehta and Bhat J. U.X (2001), Studies on Indian medicinal plant II, bryophyllum a new antibacterial substance from leaves of bryophyllum, calycinum salsib J. University Bombay 21:21-25.

Misra S. and Dixits S.N. (1979) Antifungal activity of leaf extract of some higher plants. Acta Botanica India 7:147-150.

Muzitano, M.F. Lzeide W.T., Catherine G, Kaiser C.R., Rossi, Bergmann B., and Costa S.S. (2006). The antileishmanial activity assessment of unusual flavonoids, from Kalanchoe pinna. Phytochemistry 67:2071-2077.

Ojewole, J.A.O (2002) Antihypertension properties of Bryophyllum pinnatum (lam) (oken) leaf extracts. Am J. Hypert 15(4): A34-A39.

Okaka, J.C., and Okaka A.N. (2001). Food composition, spillage and shelf life extension ocgares Academic Publishers, Enugu, Nig. 54-56.

Okwu, D.E. (2001), Evaluation of the chemical composition of indigenous species of south Eastern Nigeria. Global J. Pure Appt. Sci. 7:455- 459.

Okwu, D.E. and Josiah, C. (2006). Evaluation of the chemical composition of Bryophyllum pinnatum. Journal of Science; 6:30-37.

Okwu, D.E. and Josiah, C. (2006). Evaluation fo the chemical composition of two Nigerian Medicinal Plants. African Journal of Biotechnology 5(4): 357-361.

Oliver – Bever)2983). Medicinal plants in tropical Nest Africa III Anti-infection the rap with higher plants J. Ethnopharmacology: 9:1-83.

Pal, S. and Nag Chaudhari A.K. (1992). Further studies on anti-inflmmatory profile of the methanolic fraction fo the fresh leaf exract of Bryophyllum pinnatum fitoterapia ^3:451-459.

Pal, S. and Nag Khaudhari A.K. (1989). Preliminary studies on the anti-inflammatory and analgesic activities of Bryphyllum innatum. Med. Sci. res, 17. 17: 561-562.

Pal, S. and Nag Chauhari A.K. (1999), (Neuropsychopharacological profile of the methanolic fractions of bryophyllum pinnatum leaf extract J. Pharm Pharmacolo. 51:313-318.

Radford, D.J., Gillies A.D. and Hinds J.A. (1986), Naturally occurring cardiac glycoside. Med. J. Aust. 144:540-544.

Rastoge R.P. and Mehrotra B.N. (1960-1969), compend of ndian med plants CDRI Lucknow and PID new Delhi 1:63-64, Rastoge R.P. and Mehrotta B.N. (1990-1994), Compendium of Indian Medicinal Plants 5:141-145.

Reppas, G.P (1995). Bryophyllum pinnatum poisoning of cattle, Aust Vet J. 72(1):425-427.

Rossi, B.R. Torres-Santos E.C., Santos A.P.P, Almedia A.P., Costa, S.S. and Dal-Silva S.A. (2000). Treatment of cutaneous leishmaniasis with kalanchoe pinnata Experimental and clinical daa. Phytomedicin 7:115.

Siddiqu, Fa:zi, S. Siddiqui B.S., Sultans N. (1989). Triterpenoids and phenonthrenses from leaves of Bryophyllum pinnatum phytochemistry: 28:2433-2438.

Sofowara, A. (1993). Medicinal Plants and traditional medicine in Africa, New York John wiley and sons 119.

Takashi, Y. Xiu – Zhen TY, Rong-yang, Donald M.R. Kuottsiung M.L. (1988). Chem Structure and stereochemistry of Bryophyllum A, A novel potent cytotoxic Bufadienolide orthiacetate from brophyllum pinnatum, phar Bull 36(4):1615-1617.

Toshihiro, K. WCMC, Toshitake, T. and Toro M. (1991). Steols of Kalanchoe pinnata first report of the isolation of both C-24 epimers of 24-Alkyl A 25-sterol from higher plants lipids 26:660.

Variers, V.P.S. (2002), Indian medinal plants a compendium of 500 species, orient Longman 3:282-284.

Vishnol N.K. (1979). Advanced practical organic Chemistry, Department Christ Church college, KANPUR.
Yamagishi, T. Harna M. Yan x Z. Chang J.J and Lee K.H. (1988). Antitumor agents, 110, Bryophyllum B, A Noval potent Cytotoxic Bufadienolide Othoacetate from bryophyllum pinnatum. Pharm Bul 36 (4): 1615-1617.