Agricultural Journal 6 (1): 28-30, 2011
ISSN: 1816-9155

The Chemical Constituents of the Leaf of *Aspilia africana* as a Scientific Backing to its Tradomedical Potentials

T.A. Abii and E.N. Onuoha
Department of Chemistry, Michael Okpara University of Agriculture, Umudike Abia State, Nigeria

Abstract: The chemical constituent of the leaves of *Aspilia africana* were studied. The results shows the following chemical constituents; alkoloids (6.350±0.841%), tannins (0.188±0.035%), saponins (2.260±0.15%) flavonoids (2.006±-0.11%) and phenols (0.109±0.15%), respectively. The concentration per 100 g of vitamins in the leaf of the plant are as follows ascorbic acid (11.00±0.15 mg) niacin (3.045±0.081 mg) thiamine (1.940±0.025 mg), riboflavin (0.135±0.100 mg). The mineral elements determined are per 100 g Calcium (246±4.345 mg), Nitrogen (213.00±6.600) and Phosphorus (25.00±0.500), zinc (34.675±0.54), nickel (10.975±1.330), Selenium (Se) (10.875±1.880), Boron (B) (9.675±2.045) and lead (Pb) (7.425±1.050), these results show that the list may possess the medicinal potentials as claimed by tradomedical practitioners.

Key words: Chemical constutuents, leaf, scientific baking, traditional, potentials, Nigeria

INTRODUCTION

The new global interest in the search for anti-infective bactaria from natural sources has led to the investigation of many more Nigerian plants now than previously (Okwute, 1998). *Aspilia africana* is one of the many indigenous plants used by tradomedical practitioners in Nigeria to cureb certain illnes. It is known as organgila in Ibo, Tazalian in Hausa, Yungung in Yoruba and Edemedong in Efik (Single, 1965).

Aspilia africana is a common weed of field crops in West Africa found in fallow land, especially in the forest zone. It is a scrambling perennial herb varying in height from 60 cm to about 1.5 m depending on rainfall (Agyakwa and Akobundu, 1987). The flowers are showy yellow florets and the fruits are bristly and minutely hairy with 4 angled schemes about 5 mm long. There are several indigenous uses of the leaves and flowers of this plant. The most notable being the use to stop bleeding and fast healing of wounds.

They are used in the treatment of rheumatic pain (Oliver, 1960) as well as bee and scorpion stings (Single, 1965). The plant is used to treat different diseases in different ecological zones due to varying chemical composition as a result of various ecological conditions of different places. In Kenya, they are used to kill internstinal worms in Uganda, it is used to treat gonorrhea (Page *et al*., 1992). The methanol extract of the leaves are reported to cure malaria and respiratory problems (Musyimi *et al*., 2007). A concussion of the leaves are used to cure eye problem and as a lotion for the face to relieve frabrile headache. They are also used to cure ringworm and dysentery. In this research, we investigate the chemical constituents of the leaves of *Aspilia africana* in an attempt to provide a profile that gives a scientific backing to various tradomedical claims and uses of the leaves of *Aspilia africana*.

MATERIALS AND METHODS

Sample collection: The fresh samples of the leaves of *Aspilia africana* were collected from Ezihiitte local government area of Imo state, Nigeria. The samples were identified at the taxonomy section of the Department of Forestry of Michael Okpara University of Agriculture Umudike, Nigeria.

Sample treatment: The leaves were washed with distilled water and air dried first. They were then dried in an oven at a temperature of 60°C for 48 h. The dried leaves were then ground into powder with an electric moulinex blender and sieved using 2 mm sieve and stored in air-tight container until required for analysis.

Mineral element analysis: The minerals were extracted by the wet-acid digestion. About 1 g of the powdered sample was weighed into a digestion and treated with a mixture of 5 mL of HCL, 2 mL of conc. H_2SO_4 and 20 mL of conc. HNO_3. The content was heatedin a fume chamber continuously until dense white fumes appear. The digest

Corresponding Author: T.A. Abii, Department of Chemistry, Michael Okpara University of Agriculture, Umudike Abia State, Nigeria

was then heated strongly for about 20 min allowed to cool and filtered using number 40 whatman filter paper. The prepared extract was used for the mineral analysis. Caicium and magnesium were determined EDTA Versanate complexometric titration (James, 1995). Potassium and sodium by the flame photometric method (AOAC, 1991) phosphorous was determined by the vanadium-molybdate yellow method using UV-Visible spectrophotometer (Model Unican 969) and nitrogen by the semi-micro distillation method using Markham Kjeldahl apparatus (AOAC, 1991). The trace elements lead, cadmium, zinc, copper, selenium and boron were determined using atomic absorption spectrophotometer at appropriate maximum wavelength of absorption for each meyal (AOAC, 1991).

Phytochemical analysis: The phytochemicals were assayed using standard methods. Saponins were determined by the method as described by Peng *et al.* (1995). Alkoloids by the method described by Maxwell *et al.* (1995) while flavanoids were analysed using Boham and Kocipai-Abyyazum method of 1994. Tannins and Phenols were determined spectro-photometrically.

Vitamine determination: Riboflavin, thiamine and niacin were determined by the method described by Skala analyzers while ascorbic acid (vitamin C) was determined by the method described by Barakat.

RESULTS AND DISCUSSION

Table 1 shows the percentage composition of 5 phytochemicals of Pharmacological interest. Alkoloids have the highest concentration of 6.350% followed by saponins with 2.60% and flavonoids with 2.006%. Tannis have 0.188% and phenols have 0.109%. Table 2 is the vitamin content in mg/100 g. Ascorbic acid (vitamin C) tops the list with 11.00 followed by niacin with 3.045 thiamine comes next with 1.940 while reboflavin has the least of 0.013. Table 3 shows the trace metal and the major mineral elements of the leaf. Zinc (Zn) tops the list of the trace element with a concentration per 100 g of 34.675 mg followed by Nickel with 10.915 mg. Lead has a concentration of 7.09 mg while selenium has 10.870 mg concentration and boron 9.65 mg. The concentration of copper is 6.200 mg/100 g. Among the major mineral elements, calcium has the highest concentration per 100 g of 2.460 mg followed by nitrogen with 213.500 mg and magnesium 88.1 mg. Potassium comes next with 57.575 mg concentration while phosphorus has the least concentration of 25.00 mg. The major mineral elements has calcium as the most predominant while zinc tops the list among the trace elements.

Table 1: Phytochemical composition

Parameters	Concentration (DW %)
Alkoloids	6.350±0.840
Saponins	2.260±0.150
Flavonoido	2.006±0.110
Tanius	0.881±0.035
Phenols	0.109±0.015

Date are mean value±Standard Deviation (SD) of three replicate, DW = Dry Weight

Table 2: Vitamins' content

Parameters	Concentration (mg/100 g)
Ascorbicacid	11.00±2.3500
Niacin	3.045±0.824
Thianin	1.940±0.025
Reboflovin	0.130±0.010

Table 3: Mineral contents

Parameters	Concentration (mg/100 g)
Calcium	246.000±4.345
Nitrogen	213.000±6.600
Magnesuim	88.100±2.400
Potasuim	57.500±1.500
Phosphorus	25.000±0.500
Zinc	34.675±2.514
Nickel	10.975±1.330
Selenium	10.975±1.880
Lead	7.425±1.050
Boron	7.675±2.045

Data are mean of two replicates

Rao and Gopalan (1984) reported that normal extracellular calcium concentration is necessary for blood coagulation and for the integrity of intercellular cement substance. Zinc oprivides a protective mechanism against virus and its deficiency leads to the weakening of the immune system and slow wound healing diarrhea and mental depression (Strausel and Saltman, 2000).

The potential of *Aspilia africana* to stop bleeding and heal wounds fast could be as its high calcium and zinc contents. Selenium is an antioxidant that stimulates the immune system and contributes to the formation of antibodies against infectious agents. Copper has an intrisic ability to kill a variety of potentially harmful pathogens (Feder, 2008). Thus, selenium and copper reinforce the wound healing of this *Aspilia africana*. Deficiency of magnesium causes mouscular cramps, rigidity and spasm. The presence in *Aspilia africana* of the minerals magnesium calcium and phosphorus that form the skeleton makes it useful for those suffering from bone demineralization and gives credence to the use of this plant to cure osteoporosis and rheumatism. The phytochemical analysis shows that the leaf of *Aspilia africana* is very rich in alkaloids and saponins which are known to have antimicrobial activities (Duke, 1992). It contains flavonoids which are super antioxidants that provide protection against oxidative cell damage (Salah *et al.*, 1995) and against allergies, viruses ulcers and inflammation (Harborne, 1984). Phenols and their

oxidative products are corrosive to living bacteria cells (Baker and Breach, 1980) and are considered to be potentially toxic to the growth and development of pathogens (Singh and Sawhney, 1988) tannins have astrigent properties which hasten the healing of wounds and inflamed mucous membranes. This is due to their ability to bind to protein of exposed tissues and precipitating the protein. This then forms a mild antiseptic protective coat under which regeneration of new tissues takes place leading to wound healing (Hunt *et al*., 1980). The presence of these phytochemicals explains why the leaf of *Aspillia africana* is use by tradomedical practitioners to stop bleeding, cure wounds, allergies, rheumatism, inflammation and ulcers. The vitamin composition reveals the presence of high concentration of ascorbic acid (vitamin C). This vitamin is reported to be implicated in the synthesis of anti, inflammatory steroids and also in wound healing and treatment of gonorrhea (Broguist, 1982). Its deficiency impairs the normal formation of intercellular substance throughout the body including collagen and bone matrix (Hunt *et al*., 1980; Hoen and Kanfer, 1978). The lack of Riboflovin provokes a slowdown in growth as well as alteration in the skin and retina causing sight deficiency. The presence of these vitamins in *Aspilia africana* makes it an important tool in herbal medicine and helps to account for its use in wound healing, treatment of skin disease, eye trouble (Okoli *et al*., 2007).

CONCLUSION

This research and its results gives justification to the use of the leaves of *Aspilia africana* in trado medial practices for the cure of different ailments. The leaves of this plant therefore can be used as a potential source of useful drugs.

REFERENCES

AOAC, 1991. Official Methods of Analysis. 15th Edn., Association of official Analytical Chemist, Washigton DC. USA.

Agyakwa, C.W. and I.O. Akobundu, 1987. A Hand Book of West African Weeds. International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria.

Baker, F.I. and M.R. Breach, 1980. Microbiology Techniques. Bulter Orths, London, pp: 245.

Broguist, H.P., 1982. Carnitene biosynthesis and function. Fed. Proc., 41: 2840-2842.

Duke, J., 1992. Handbook of Biological Active Phytochemicals and their Activities. CRC Press, Boca Raton, FL. USA., pp: 99-131.

Feder, B.J., 2008. Regulators stamp copper as a germ killer. New York Times.

Harborne, H.E., 1984. Nutritional Reviews. 5th Edn., The Nutritional Foundation Inc., Washington DC. USA., pp: 418.

Hoen, S.K. and J.N. Kanfer, 1978. L-Ascorbic acid and lysosomal acid hydrolase activities in Guinea pig liver and brain. J. Biochem., 56: 352-356.

Hunt, S., I.L. Groff and J. Holbrook, 1980. Nutrition, Principles and Chemical Practice. John Eiley and Sons, New York, pp: 49-52, 459-462.

James, C.S., 1995. Analytical Chemistry of Foods. Capman and Hall, New York.

Maxwell, A., M. Seepersaud, R. Pingal, D.R. Mootoo and W.F. Reynolds, 1995. 3 beta-aminospirosolane steroidal alkaloids from *Solanum triste*. J. Natl. prod., 58: 625-628.

Musyimi, D.M., J.A. Ogar and P.M. Muema, 2007. Effects of leaf and root extracts of aspilia mossambicensis wild on some selected micro organisms. Int. J. Biol. Chem., 1: 213-220.

Okoli, C.O., P.A. Akah, S.V. Nwafor, A.I. Anisiobi, I.N. Ibegbunam and O. Erojikwe, 2007. Anti-inflammatory activity of hexane leave extract of *Aspilia africana* C.D. adams. J. Ethnopharmacolgy, 109: 219-225.

Okwute, S.U., 1998. Anti-Microbial and Phytochemical Screening of Dabergin Sexatilis. Vol. 1, JPAS Zuma, Abuja Nigeria.

Oliver, B.E.P., 1960. Medicinal Plants in Nigeria. Nigerian College of Arts, Science and Technology, Lagos, Nigeria.

Page, J.E., F. Balza, T. Nistida and G.H.N. Towere, 1992. Biologically active diterpenes from *Aspilia mossambicensis*, a chimpanzee medicinal plant. Phytochemistry, 31: 3437-3439.

Peng, J., X. Yao, H. Kobayashi and C. Ma, 1995. Novel furostanol glycosides from *Allium macrostemon*. Plant Media, 6: 58-61.

Rao, B.S.N. and C. Gopalan, 1984. Nutritional Reviews. 5th Edn., The Nutrtional Foundation Inc., Washington DC. USA., pp: 326.

Salah, N., N.J. Miller, G. Pagange, L. Tijburg, G.P. Bolwell and C. Rice-Evans, 1995. Polyphenolic flavanols as scavengers of aqueous phase radicals and as chain-breaking antioxidants. Arch. Biochem. Brophys., 322: 339-346.

Singh, R. and S.K. Sawhney, 1988. Advances in Frontier Areas of Plant Biochemitry. Prentice-Hall of Indian Private Ltd., New Delhi, pp: 489.

Single, B.C., 1965. Medicinal Plant of Nigeria. 1st Edn., Nigeria Natural Press Ltd., Nigeria.

Strausel, L. and P. Saltman, 2000. Trace Mineral Interactions. Department of Biology University of California, San Diego, CA. USA.