JASEM ISSN 1119-8362
All rights reserved
Full-text Available Online at www.bioline.org.br/ja

J. Appl. Sci. Environ. Manage. June, 2010

Vol. 14 (2) 103 - 106

Proximate and Phytochemical Profile of *Sansevieria liberica* Gérôme and Labroy

IKEWUCHI, C C; *IKEWUCHI, C J; AYALOGU, O E; ONYEIKE, N E

Department of Biochemistry, Faculty of Science, University of Port Harcourt, P.M.B. 5323, Choba, Rivers State, Nigeria

ABSTRACT: The proximate and phytochemical composition of *Sansevieria liberica* Gérôme and Labroy leaves was investigated. The proximate composition includes moisture (56.10%), crude fibre (5.88% wet weight and 13.39% dry weight), total carbohydrate (4.09% wet weight and 9.32% dry weight), crude protein (21.88% wet weight and 49.84% dry weight), total ash (2.95% wet weight and 6.72% dry weight), crude lipid (0.10% wet weight and 0.23% dry weight) and caloric value (104.78% wet weight and 238.68% dry weight). The phytochemical screening revealed the presence of alkaloids, carotenoids, flavonoids (catechins and flavones), phytates, saponins and tannins; with 0.72% wet weight and 1.64% dry weight carotenoids, 2.20% wet weight and 5.01% dry weight phytates, 0.40% wet weight and 0.91% dry weight saponins, and 0.01% wet weight and 0.02% dry weight tannins. This result support the medicinal use of the plant, and in addition, unveils the possibility of its acting as a potential source of food nutrients and nutraceuticals. @ JASEM

Sansevieria liberica (family Agavaceae, Ruscaceae or Dracaenaceae), is one of the bowstring hemp species (Evans, 2005), with concave, short petioled leaves that are in part transversely banded with light and dark green, also linearly striated with whitish to light green and dark green striations (Reed, 1978). The leaves contain over 2% fiber. This plant has long rhizomes with long fibrous roots and a rapid rate of growth. A number of species of bowstring hemp, such as *Sansevieria cylindrica*, *Sansevieria ehrenbergii*, *Sansevieria guineensis*, *Sansevieria longiflora*, *Sansevieria roxburghiana*, *Sansevieria trifasciata* and *Sansevieria zeylanica* are grown as ornamental plants (USDA, 2008). They are widely distributed throughout the tropics. In Nigeria, the leaves and roots of Sansevieria liberica are used in traditional medicine for the treatment of asthma, abdominal pains, colic, diarrhea, eczema, gonorrhea, hemorrhoids, hypertension, monorrhagia, piles, sexual weakness, snake bites and wounds of the foot (Gill, 1992; Osabohien and Egboh, 2008; Adeyemi *et al*., 2009). The sedative and anticonvulsivant activities of the roots have been studied by Adeyemi *et al*. (2007). In this study, we investigated the proximate and phytochemical composition of Sansevieria liberica, with a view to unveiling the possible nutritional and nutraceutical potentials of the plant.

MATERIALS AND METHODS

Collection of plant samples: Samples of fresh *S. liberica* plants were bought from a horticulturist by Air Force Gate, Aba Road, Port Harcourt, Nigeria and from within Alikor Estate, Choba, Nigeria. After due identification at the University of Port Harcourt Herbarium, Port Harcourt, Nigeria, they were rid of dirt and stored for subsequent use in the analysis.

Proximate analysis: A portion was used immediately for proximate analysis. Proximate analysis to determine the moisture, crude protein, fat, ash, fiber and total carbohydrate contents of the samples were carried out in triplicates according to standard methods (AOAC, 2006). The energy value was calculated using the Atwater factors 4, 9 and 4 for protein, fat and carbohydrate respectively (FAO/WHO/UNU, 1991).

Determination of the phytochemical profile: The phytochemical screening of the sample was carried out as described by Harbone (1973), and Sofowora (1980). The sample was screened for alkaloids, flavonoids (catechin and flavone), phytates, saponins and tannins. Quantitative determination of carotenoids, phytates, saponins and tannins were carried out in triplicates, using the method of AOAC (2006).

RESULTS AND DISCUSSION

Table 1 shows the proximate composition of S. liberica. Its moisture content is less than those of *Amarantus hybridus*, *Talinum triangulare*, *Telferia occidentalis* (Oguntona, 1998), *Pennisetum purpureum* (Okaraonye and Ikewuchi, 2009), *Tridax procumbens* (Ikewuchi *et al*., 2009), but greater than that of *Chromolaena odorata* (Igboh *et al*., 2009). The moisture content of any food is an index of its water activity (Olutiola *et al*., 1991), and is used as a measure of stability and the susceptibility to microbial contamination (Uraih and Izuagbe, 1990). This implies that *S. liberica* may have a relatively longer shelf-life than these other plants. Dehydration would increase the relative concentrations of the other food nutrients (Table 1) and improve the shelf-life/durability/keep-ability of *S. liberica*.

*Corresponding author: E-mail: ecoli240733@yahoo.com ; Telephone: +2348033715662

Table 1: Proximate composition of the leaves of *Sansevieria liberica*

Parameter	Composition			
	/100g Wet weight		/100g Dry weight	
	Amount	%DV	Amount	%DV
Moisture (g)	65.10	-	-	-
Dry matter (g)	34.90	-	100.00	-
Total ash (g)	2.95	-	8.45	-
Crude protein (g)	21.88	43.36	62.69	124.23
Crude lipid (g)	0.10	0.15	0.29	0.43
Total carbohydrate (g)	4.09	1.38	11.72	3.95
Reducing sugar (g)	0.61	-	1.73	-
Crude fiber (g)	5.88	23.25	16.85	66.63
Caloric value (kcal)	104.78	5.18	300.23	14.84

Values are means of triplicate determinations. Percent daily values (%DV) are for adults or children aged 4 or older, and are based on a 2,000 calorie reference diet. The daily values may be higher or lower based on individual needs (NutritionData, 2008).

The crude protein content observed here, for *S. liberica*, is higher than those reported for *A. hybridus*, *T. triangulare*, *T. occidentalis* (Oguntona, 1998), *C. odorata* (Apori *et al*., 2000; Igboh *et al*., 2009), *P. purpureum* (Okaraonye and Ikewuchi, 2009) and *T. procumbens* (Ikewuchi *et al*., 2009). A 100g serving of *S. liberica* can provide about 43-99% of the recommended dietary allowance (Table 1). This high protein content implies that this plant can contribute significantly to the daily human protein requirements, usually about 23-56g. The crude lipid content of *S. liberica* is less than those of *A. hybridus*, *T. triangulare*, *T. occidentalis* (Oguntona, 1998), *P. purpureum* (Okaraonye and Ikewuchi, 2009) and *T. procumbens* (Ikewuchi *et al*., 2009), and comparable to that of *C. odorata* (Igboh *et al*., 2009). Its total carbohydrate content is less than those of *A. hybridus*, *T. triangulare* (Oguntona, 1998), *C. odorata* (Igboh *et al*., 2009) and *T. procumbens* (Ikewuchi *et al*., 2009), but greater than that of *P. purpureum* (Okaraonye and Ikewuchi, 2009). The Crude fibre content recorded in this study, for *S. liberica*, is greater than those of *A. hybridus*, *T. triangulare*, *T occidentalis* (Oguntona, 1998), *P. purpureum*, (Okaraonye and Ikewuchi, 2009) and *T. procumbens* (Ikewuchi *et al*., 2009) but less than that of *C. odorata* (Igboh *et al*., 2009). A 100g serving of *S. liberica* can provide about 23-53% of the recommended dietary allowance (Table 1). Evidences from epidemiological studies suggest that increased fiber consumption may contribute to a reduction in the incidence of certain diseases like diabetes, coronary heart disease, colon cancer, high blood pressure, obesity, and various digestive disorders (FAO, 1990; SACN, 2008). Dietary fibers alter the colonic environment in such a way as to protect against colorectal diseases. It provides protection by increasing fecal bulk, which dilutes the increased colonic bile acid concentrations that occur with a high-fat diet (Dillard and German, 2000). So, herein lays a likely benefit derivable from the consumption of this plant. Its ash content is less than that of *T. occidentalis*, but greater than those of *A. hybridus* and *T. triangulare* (Oguntona, 1998), *C. odorata* (Igboh *et al*., 2009), *P. purpureum* (Okaraonye and Ikewuchi, 2009) and *T. procumbens* (Ikewuchi *et al*., 2009). The caloric value of *S. liberica* is greater than those of *A. hybridus*, *T. triangulare* (Oguntona, 1998), *P. purpureum* (Okaraonye and Ikewuchi, 2009), and *T. procumbens* (Ikewuchi *et al*., 2009) but less than that of *C. odorata* (Igboh *et al*., 2009).

Table 2: Phytochemical profile of *Sansevieria liberica*

Phytochemical	Status
Alkaloids	+
Carotenoids	++
FlavonoidsCatechins Flavones	++ ++
Phytates	+++
Saponins	++
Tannins	+

Key: += slightly present; ++= moderately present; +++= highly present

Table 3: Some anti-nutritional and carotenoid contents of *Sansevieria liberica*

Component	Composition	
	% Wet weight	% Dry weight
Carotenoids	0.72	2.06
Phytates	0.22	0.63
Saponins	0.40	1.15
Tannins	0.01	0.03

Values are means of triplicate determinations

The phytochemical screening revealed that *S. liberica* is highly rich in phytates, moderately rich in carotenoids, flavonoids (catechins and flavones) and saponins, with little content of alkaloids and tannins (Table 2). All these have potential health promoting effects, at least under some circumstances (Basu *et al.*, 2007). Table 3 shows the result of the

quantification of some of the phytochemicals present in *S. liberica*. *S. liberica* has higher carotenoid content than *Vernonia amygdalina* (Ejoh *et al.*, 2007). Carotenoids provide many brilliant animal colors, as in the flamingo, starfish, lobster and sea urchin (Harbone, 1973; Best, 2006). They are antioxidants, protect against cancer, cataract and radiation damage, boost the immune system (Best, 2006; Basu *et al.*, 2007), and are precursors of vitamin A (Chaney, 2006). β-Carotene is used as a food colorant. The phytate content in *S. liberica* (Table 3), is greater than those reported for *P. purpureum* (Okaraonye and Ikewuchi, 2009), *Piper guineense*, *T. triangulare*, *T. occidentalis* (Oguntona, 1998), *Trichosanthes anguina* fruits (Ojiako and Igwe, 2008) and *Vigna unguiculata* (Osagie, 1998) and comparable to that of *C. odorata* (Igboh *et al*., 2009). Phytic acid binds calcium, iron, zinc and other minerals, thereby reducing their availability in the body (FAO, 1990). It also inhibits protein digestion by forming complexes with them (Singh and Krikorian, 1982). However, phytate content can be lowered by various processing methods (FAO, 1990). Finally, our results revealed that *S. liberica* is a potentially rich source of plant protein and nutraceuticals.

REFERENCES

Adeyemi, OO; Akindele, AJ; Ogunleye, EA (2009). Evaluation of the antidiarrhoeal effect of Sanseviera liberica Gerome and Labroy (Agavaceae) root extract. J Ethnopharmacol, 123(3): 459-463. doi:10.1016/j.jep.2009.03.023

Adeyemi, OO; Yemitan, OK; Adebisi, OO (2007). Sedative and anticonvulsivant activities of the aqueous root extract Sanseviera liberica Gerome and Labroy (Agavaceae). J Ethnopharmacol, 113(1): 111-114.

AOAC (Association of Official Analytical Chemists), (2006). Official Methods of Analysis of the AOAC (W. Horwitiz, Editor), 18th edn. Washington DC: Association of Official Analytical Chemists.

Apori, SO; Long, RJ; Castro, FB; Ørskov, ER (2000). Chemical composition and nutritive value of leaves and stems of tropical weed Chromolaena odorata. Grass Forage Sci, 55(1): 77–81. Doi: 10.1046/j.1365-2494.2000.

Basu, SK; Thomas, JE; Acharya, SN, (2007). Prospects for Growth in Global Nutraceutical and Functional Food Markets: A Canadian Perspective. Aust J Basic Appl Sci, 1(4): 637-649. http://www.insinet.net/ajbas/637-649.pdf

Best, B, (2006). Phytochemicals as Nutraceuticals. http://www.benbest.com/nutrceut/phytochemicals.html

Chaney, SG, (2006). Principles of Nutrition II: Micronutrients. In: Devlin, T.M. (ed.), Textbook of Biochemistry, with Clinical Correlation, 6th ed. John Wiley and sons, New York, pp: 1091-1120. ISBN 10 0-471-67808-2

Dillard, CJ; German, JB (2000). Phytochemicals: nutraceuticals and human health. J Sci Food Agric, 80(12):1744-1756.

Ejoh, RA; Nkonga, DV; Inocent, G; Moses, MC, (2007). Nutritional Components of Some Non-Conventional Leafy Vegetables Consumed in Cameroon. Pak J Nutr, 6(6): 712-717.

Evans, WC, (ed) (2005). Trease and Evans Pharmacognosy, 15th edn. India: Elsevier. ISBN: 10: 81-312-0087-6.

FAO, (1990). Roots, tubers, plantains and bananas in human nutrition. FAO Corporate Document Repository, Rome. http://www.fao.org/docrep/t0207e/T0207E08.htm#7

FAO/WHO/UNU, (1991). Energy and Protein Requirements: Report of a Joint FAO/WHO/UNU Expert Consultation. WHO Technical Report Series 724.

Gill, LS, (1992). Ethnomedical Uses of Plants in Nigeria. Uniben Press, Benin City, Nigeria. p209.

Harbone, JB, (1973). Phytochemical Methods, a Guide to Modern Technique of Plant Analysis, 2nd edn. Chapman and Hall, New York.

Igboh, MN; Ikewuchi, JC; Ikewuchi, CC, (2009). Chemical Profile of Chromolaena odorata L. (King and Robinson) Leaves. Pak J Nutr, 8(5): 521-524.

Ikewuchi, JC; Ikewuchi, CC; Igboh, MN, (2009). Chemical Profile of Tridax procumbens Linn. Pak J Nutr, 8(5): 548-550.

NutritionData, (2008). Know what you eat: Nuts, cashew nuts, oil roasted, without salt added. http://www.nutritiondata.com/

Oguntona, T, (1998). Green Leafy Vegetables. In: Osagie AU, Eka OU (eds), Nutritional Quality of Plant Foods. Nigeria: Post Harvest Research Unit, Department of Biochemistry, University of Benin, Benin City, pp: 120-133. ISBN: 978-2120-02-2.

Ojiako, OA; Igwe, CU, (2008). The Nutritive, Anti-Nutritive and Hepatotoxic Properties of Trichosanthes anguina (Snake Tomato) Fruits from Nigeria. Pak J Nutr, 7(1): 85-89. http://www.pjbs.org/pjnonline/fin657.pdf

Okaraonye, CC; Ikewuchi, JC, (2009). Nutritional and Antinutritional Components of Pennisetum purpureum (Schumach). Pak J Nutr, 8 (1): 32-34.

Olutiola, PO; Famurewa, O; Sonntag, H-G, (1991). An Introduction to General Microbiology, A Practical Approach. Germany: Heidelberger Verlagsanstalt und Druckerei GmbH Heidelberg. ISBN: 3-89426-042-4

Osabohien, E; Egboh, SHO, (2008). Utilization of Bowstring Hemp Fiber as a Filler in Natural Rubber Compounds. J Applied Polymer Sc, 107: 210–214.

Osagie, AU, (1998). Antinutritional factors. In: Osagie AU and Eka OU (eds), Nutritional Quality of Plant Foods. Nigeria: Post Harvest Research Unit, Department of Biochemistry, University of Benin, Benin City, pp: 1 106 ISBN: 978-2120-02-2.

Reed, DW, (1978). Sansevieria - Identification and Culture. Louisiana Society of Horticultural Research, 14(2):30-77.

SACN, (2008). Draft SACN position statement on dietary fibre and health and the dietary fibre definition - August 2008. SACN/08/20. http://www.sacn.gov.uk/pdfs/ final draft sacnstatement on dietary fibre for website.pdf

Singh, M; Krikorian, AD, (1982). Inhibition of trypsin activity in vitro by phytate. J Agr Food Chem, 30: 799-800

Sofowora, A, (1980). Guidelines for research promotion and development in traditional medicine. Nig J Pharmacy, 11: 117-118.

Uraih, N; Izuagbe, Y, (1990). Public Health, Food and Industrial Microbiology. Nigeria: Uniben Press. ISBN: 978-2027-00-6.

USDA, (2008). USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?33057