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RESEARCH ARTICLE

NUTRITIONAL AND MINERAL ASSESSMENT OF *SOLANUM TRILOBATUM (L.)* FRUIT

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ABSTRACT

Introduction: Edible wild plants are nature's gift to mankind. Considering the growing need to identify alternative bio-nutritional sources, *Solanum trilobatum* (L.) of the family Solanaceae was evaluated as wild edible fruit to study their nutritive and mineral composition in order to prioritize their edibility for indigenous people.

Materials and Methods: The major proximal components (moisture, ash, lipids, proteins, fibers and carbohydrates) were determined by standard AOAC methods and the concentration of various minerals (Na, K, Mg and Ca) and trace elements (Fe and Zn) were recorded by using an atomic absorption spectrophotometer.

Results: Our results indicated a range of moisture contents from 80 ± 0.56 g/100g (fresh weight basis); protein 5.5 ± 0.89 g/100g (fresh weight basis); carbohydrates 25 ± 0.78g/100g and fiber 3.3 ± 0.55g/100g. The highest levels of Mg((194 ± 0.07) mg/100g), Ca((60 ± 0.42) mg/100g) and Na((28 ± 0.11) mg/100g) and lowest levels in potassium ((0.73 ± 0.04) mg/100g), Iron ((0.34 ± 0.08) mg/100g) and phosphorus ((0.02 ± 0.01) mg/100g) and the basic detect level of Fe.

Conclusion: According to our results, *Solanum trilobatum* is recommended for commercial-scale production for the pharmaceutical industry to overcome medicinal crises as they are potential medicinal sources and its contain moderate nutrient profiles.

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INTRODUCTION

In human nutrition, fruits play an important role for balanced diet. fruits are the cheapest source of natural nutritive foods which help in building resistance against diseases (Ravindran *et al*., 2004). In human diet, fruits and vegetables in general are considered to be the primary source of carbohydrate, protein and fat. Besides there are some trace elements required by the body like copper, manganese and zinc which act as enzyme co-factor (Yunfeng *et al*., 2006). As per the specifications of the National Institute of nutrition at least 300g of fruits and receive less than 50mg of vitamin C daily, to be consumed by an individual for a balanced diet (Anju puri *et al*., 2000). Fruits are abundant in nutrients such as fibre, potassium, folate and vitamin C. A number of fruits used in the traditional medical system of remedies in India. They have been shown to possess immunostimulating activity acting at different levels of the immune system (Dhasarathan *et al*., 2008). *Solanum trilobatum* Linn (Family: Solanaceae) is one of the important wild medicinal climber, more commonly available in Southern India. *Solanum trilobatum* is an extensively used Indian traditional medicine to cure numerous diseases viz., tuberculosis, respiratory problems and bronchial asthma (Govindhan *et al*., 2004). It was reported to be very effective in tumor reduction (Mohana and Devi, 1996). *S. trilobatum* was reported to harbour hepatoprotective activity, antimicrobial activity, antioxidant activity, cytotoxic activity, haemolytic activity, protective effect, immunomodulatory activity and anti-inflammatory properties (Shahjahan *et al*., 2004). The present study deals with the determination of nutritive value and mineral content of *Solanum trilobatum* fruits

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MATERIALS AND METHODS

Collection and preparation of plant material

The *Solanum trilobatum* fruits were collected from Coimbatore district, Tamil Nadu state, India. The fruits were cut into pieces and air-dried. The dried samples were pounded into powder using mortar and pestle. The powder obtained was kept in the laboratory and used for proximate and mineral elements analysis during the period of the research.

Proximate analysis

The standard methods (Ozer and Derici, 1998) were adopted to determine the proximate composition of fruit samples; moisture

(weighing the fresh samples before and after oven drying at (103 ± 2) °C for 24 h), ash (incineration in a muffle furnace at 550 °C), protein, crude fiber (extraction with 1.25% NaOH, drying the residue for 4 h at 102 °C followed by muffle incineration at 600 °C for 30 min) (Humphry *et al*., 1993; Anon, 1995) and total carbohydrates (Kjeldahl, 1983).

Mineral element analysis

Determination of mineral elements

Finely ground (5 g) of sample was oven dried at 60°C and was weighed into crucible. The sample was ignited into a muffle furnace for 6-8 hours at a temperature between 450°C and not exceeding 500°C, a grayish white ash was obtained. The sample was cooled on asbestos sheet and 5 cm3 1N HNO_3 solutions was added to it. It was evaporated to dryness on a steam bath or a hot plate at a low heat of 400°C for 15 min. until a perfectly white or grayish white ash is obtained. The sample was later cooled on asbestos sheet and 10 cm^3 1N HCl was added and the solution filtered into 50 cm3 volumetric flask. The crucible and filter paper were washed with additional 10cm3 portion of 0.1N HCl three times to make up to the volume with 0.1N HCl solution. The filtrate was stored for Na, P, K, Ca, Mg, Fe and Zn determination using Atomic Absorption Spectrophotometer (AOAC 1990).

Statistical analysis

Descriptive statistics were performed by using Microsoft Excel 2007 to calculate mean and standard errors for mineral contents of fruit sample.

RESULTS

Nutritional Properties

The data on proximate composition of nutrients in *S.trilobatum contain* moisture (80 ± 0.56 g/100g), Protein (5.5 ± 0.82g/100g), Carbohydrate (25 ± 0.78g/100g), Ash (18.6 ± 0.12g/100g) and Fiber (3.3 ± 0.55g/100g). The moisture content is one of the important factors as many of the physical properties of edible fruits may vary due to changing its value (Omobuwajo *et al*., 2003). The moisture content of *S.trilobatum (80* ± 0.56 g/100g) was similar to mulberries (80.37 ± 0.14 g/$100g^{-1}$) (14). The S.trilobatum contain high protein content (5.5 ± 0.89 g/100g) fresh weight basis than the edible part of sunberry (2.7%) and Dabai fruit (3.8%) (Patel *et al*., 2011; PheBe and YeiKheng, 2011). *S.trilobatum* fruit contain lower content of fiber 3.3 ± 0.55g/100g dry weight than that of the *Morus. alba* (13.50 ± 0.28) g/100 g–1 dry weight and *F.carica:* (8.60 ± 0.96) g/100 g–1 dry weight) (Sadia Haleema *et al*., 2014). The content of total available carbohydrate in *S.trilobatum* 25 ± 0.78 g/100g was lower than the fig and mulberries (Sadia Haleema *et al*., 2014).

Mineral composition

Minerals play several important roles in human physiology and biochemistry as co-factors for enzymes, and are related to energetic efficiency, fertility, mental stability and immunity (Mayer, 1997). The results regarding the mineral and trace elements level in the *Solanum trilobatum* studied show that the magnesium has the highest concentration (194 ±0.05mg/100g). (Adepoju, 2009) analysed the mineral composition from three wild fruits such as *Sponias mombim, Diallum guineese* and *Mordii whytii* in Nigeria. In all three fruits magnesium was higher and *S. mombin* fruit contains the higher value of magnesium (465.0 ± 21.21mg/100g). Mg plays a major role in relaxing muscles along the airway to the lung thus allowing asthma patients to breathe easier. The daily value for Mg is 400mg. It plays fundamental roles in most reactions involving phosphate transfer, believed to be essential in the structural stability of nucleic acid and intestinal absorption while deficiency of magnesium in man is responsible for severe diarrhoea, migraines, hyper-tension, cardiomyopathy, arteriosclerosis and stroke (Bello *et al*., 2008).

Table 1. Moisture and nutrient profile of *Solanum trilobatum* (means ± standard deviation; n = 3)

Parmeters	Compositions(g/100g)
Moisture	80 ± 0.56
Protein	5.5 ± 0.89
Carbohydrate	25 ± 0.78
Ash	18.6 ± 0.12
Fiber	3.3 ± 0.55

Table 2. Macro and Micro elements (mg/100g dry weight) in *Solanum trilobatum* fruit (mean ± standard deviation n = 3)

Mineral Element	Estimated Quantity in ash mg/100 mg
Sodium	28 ± 0.06
Potassium	0.73 ± 0.04
Phosphorus	0.02 ± 0.01
Zinc	BDL
Calcium	60 ± 0.03
Magnesium	194 ± 0.05
Iron	0.34 ± 0.08

Similarly calcium is a major component of bone and assists in tooth development (Brody, 1994). In our finding, the calcium was reported in 60 mg/100g and higher Calcium in *Mordii whytii* wild fruit (300.0 mg/100g) was reported (Adepoju, 2009). The recommended daily calcium intake for adult range from 1000 mg to 1500 mg. It is also reccomended to take supplements with food to aid in absorption. Compared with other metals the calcium ion and most of its compound have low toxicity. Sodium has the highest concentration 28mg/100g in *Solanum trilobatum* (Table 2). (Agrahar-Murugkar *et al*., 2005) studied the nutritive value of wild edible fruits, *Solanum xanthocarpum* contain higher amount of sodium. Sodium is important for fluid distribution, blood pressure, cellular work and electrical activity. Potassium is essential for the ability of skeletal and smooth muscles to contract. Because of this, an adequate intake of potassium is important for regular digestive and muscular functioning. The quantity of potassium in *Solanum trilobatum* (0.73 ± 0.04). Iron (Fe) content was (0.34 ± 0.08 mg/100g) in *Solanum trilobatum*. An adequate level of Fe is required for haemoglobin formation in blood, while excessive intake can result in hemochromatosis. Iron containing enzymes and proteins participate in many oxidation and in transport. In our observation phosphorous was reported in (0.02 ± 0.01). These minerals act as cofactors for many enzymes in the human body (Akpanabiatu *et al*., 1998). In our finding, the mineral profile of the *S.trilobatum* fruit was recommended for asthma patients.

Conclusion

Solanum trilobatum fruits was studied for nutritional and mineral composition by following standard proximate

analyses. Our findings show that *Solanum trilobatum* fruits are promising sources of essential micronutrients and macronutrients such as Na, K, Mg, Ca, P and Fe. Further research should therefore be conducted on fruits *Solanum trilobatum* and the results of such studies should be disseminated to the public. This will ensure dietary diversity and pharmaceutical security in different parts of the world.

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REFERENCES

Adepoju. 2009. Proximate composition and micronutrient potentials of three locally available wild fruits in Nigeria. *Afric. J. Agric Research,* 4(9) 887-892.

Agrahar-Murugkar, D. and Subbulakshmi, G. 2005. Nutritive value of wild edible fruits, berries, nuts, roots and consumed by the khasi tribes of India. *Eco. Food Nutr.,* 44 207-223.

Akpanabiatu M.I., Bassey N.B., Udosen E.O., Eyong E.U. 1998. Evaluation of some minerals and toxicants in some nigerian soup meals, *J. Food compos*. *Anal*., 11: 292– 297.

Anju puri, R., Sahai, Kiran L. Singh, R.P. Saxena, J.S. Tandon, K.C. Saxena. 2000. Immunostimulant activity of dry fruits and plant materials used in Indian traditional medical system for mothers after child birth and invalids. Journal of Ethnopharmacology, 71;89 – 92

Anon., Official methods of analysis, Assoc. Off. Anal. Chem. (AOAC), 15th ed., Wash., DC, U.S.A., 1995.

AOAC. Official Methods of Analysis. 15th Edn., Association of Official Analytical Chemists, Washington D.C. 1990.

Bello, M.O., Falade, O.S., Adewusi, S.R.A., Olawore, N.O. 2008. Studies on the Chemical Compositions and Anti-nutrients of some lesser known Nigerian Fruits. *African Journal of Biotechnology,* 7:3972 – 3979.

Brody T. 1994. Nutritional biochemistry, Acad. Press, San Diego, CA, U.S.A., pp. 555– 556.

Dhasarathan. P. and M.V. Jeevitha, 2008. Lighty George and C. Padmalatha. Immunomodulation of Carbosulfan following subchronic exposure in Swiss albino mice. *Poll. Res.,* 27 (2) 77-81.

Govindhan S, Viswanathan S, Vijasekaran V and Alagappan R. 2004. Further studies on the clinical efficacy of Solanum trilobatum in brochial asthma. *Phytotherapy Research*, 18 805 – 809.

Humphry C.M., Clegg M.S., Keen C.L., Grivetti L.E. 1993. Food diversity and drought survival, The Hausa example, *Int. J. Food Sci. Nutr*., 44;1–16.

Kjeldahl J. 1983. Determination of protein nitrogen in food products, *Encyc. Food Agric*., 28;757–765

Mayer A. M. 1997. Historical changes in the mineral content of fruits and vegetables. *British Food Journa*., 99: 207-211.

Mohana P.V and Devi K.S. 1996. Cytotoxic potential of the preparation from *Solanum trilobatum* and the effect sobatum on tumor reduction in mice. Cancer letter 110; 71 -76.

Omobuwajo T.O., Omobuwajo O.R., Sanni L.A. 2003. Physical properties of calabash nutmeg (*Monodora mristica*) seeds, *J. Food Eng*., 57; 375–381

Ozer B.K. and Derici B. 1998. A research on the relationship between aflatoxin and ochratoxin a formation and plant nutrients, *Acta Hortic*., 480; 199–206.

Patel P.R., Gol N.B., Rao T.V.R. 2011. Physiochemical changes in sunberry (*Physalis minima* L.) fruit during growth and ripening, Fruits 66: 37–46.

PheBe D. and YeiKheng T. 2011. Physicochemical characteristics of dabai (*Canarium odontophyllum* Miq.) fruit, Fruits 66: 47–52.

Ravindran, C., B. Senthil Kumar and B.N.S.Murthy. 2004. Medicinal Plants. Therapeutic properties of fruits. Agro bios Newsletter, 1(9) 50-52.

Sadia Haleema, Mushtaq A, Shazia S, Ahmad Zuhairi A, Lee KT, Muhammad Z, Asghari B. 2014. Nutrient and mineral assessment of edible wild fig and mulberry fruits. *Fruits,* 69: 159–166

Shahjahan M, Sabitha KE Mallika Jainu M and Shyamala Devi CS. 2004. Effect of *Solanum* trilobatum against carbon tetrachloride induced hepatic damage in albino rats. *Indian J.Med. Res*., 120; 194 -198.

Yunfeng Li, Changijiang, Guo, Jijun Yang, Jingyu Wei, Jing Xu and Shuang Cheng, 2006. Evaluation of antioxidant properties of pomegranate peel extract in comparison with pomegranate pulp extract. *Food Chemistry*, 96(2) 254-26

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