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Research Paper

Nutritive Value of Strobilanthes Auriculata Nees (Acanthaceae) a Pliestial Plant of Manipur, Northeast India

Botany

KEYWORDS : Pliestial, Meetei, Tanins, macro-elements, micro-element, Nitrogen

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ABSTRACT

Strobilanthes auriculata Nees a pliestial plant of Manipur flowered in 2011after a gap period of 8 years. Interestingly, the inflorescence of the plant is harvested and used as food as there is a taboo that it protects form certain ailments by the Meetei of Manipur. Inflorescence was analysis for their proximate composition, tannins and minerals. Values for amino acids, protein, crude lipids and crude fiber are given. The decreasing of essential macro elements concentration is Ca>Mg>N>P and micro elements are Fe>Zn>Mn>Co>Cu.

INTRODUCTION

Strobilanthes auriculata Nees, is pliestesial plant in part of its range (Wood 2003). Deb (1961) reported it from Moreh area of Manipur but the mass flowering of *Strobilanthes auriculata* Nees in 2011 was reported by Ningombam (2012). Locally, known *Kumtrukpee* the species flowered last during 2003 and start flowering in 2010 and mass flowering in 2011 in all the hills and hillocks of Manipur in moist dry deciduous forest type and they occupied more than 60 percent of shrubby regime (Ningombam 2012). Typically the lifespan of a single *S. auriculata* bloom lasts between 50 to 75 days and its mass blooming usually extends from mid- September to November-end. After this once in a lifetime mass flowering, the bush finally dies out. The inflorescence has an aroma and is rich in pollen and nectar attracting many pollinators.

Indigenous food not only gives its own unique taste and flavour but also provides dietary diversity and household food security. Indigenous and traditional foods form an intrinsic part of the diet of *Manipuris* and the people of North-east (Singh 2011). The indigenous people used to collect the inflorescence of *S. auriculata* in the flowering year as rare indigenous food plant as there is a taboo that it protects from several ailments. The people used the inflorescence in the form of condiments cooked or steam, add to meals and also as medicinal purpose.

Considering the significance of *S. auriculata* to local people of *Meetei,* it was selected for the present study. The study is an attempt for proper taxonomic identification and also to analyze a proper nutritive assessment of the particular species.

MATERIALS AND METHODS

Strobilanths auriculata is collected from the wild during the mass flowering seasons and brought to the laboratory from the different districts of Manipur. Identification of the specimens were collected on the basis of local name and identified for its scientific name consulting (Clarke 1984; Kanjilal 1934-1940; Deb 1961; Prain 1903; Ningombam 2012) and herbarium at Department of Life sciences, Manipur University, Canchipur, Manipur.

Household surveys were conducted using through formal and informal interviews with traditional healers, elderly local persons from 30 localities in 17 villages of Manipur regarding the mode of consumption of the plant.

The Inflorescence were separately dried in the oven and powdered in grinder to carry out the phytochemical analyses. For the analyzing the biochemical constituents of the plant sample different methods were adopted. Total Free Amino Acid was estimated following the method of Moore and Stein (1948). The protein content was estimated by the method of Lowry et al. (1951). Estimation of total sugar was performed following Dubois et al., (1951). The Total phenol content was estimated by using Folin-Ciocalteau reagent (FCR) (Thimmaiah, 1999). The tannins in the plant sample are estimated by Folin Denis method which is based on the non-stoichiometric oxidation of the molecules containing a phenolic hydroxyl group (Thimmaiah, 1999). The crude fibre and lipid are estimated by the method of Chopra and Kanwar (1980). The Total Nitrogen was estimated by using Micro Kjeldal Method (Gupta, 2006).

Estimation of Minerals: Wet diacid digestion method (Capar et al., 1978) was used for different mineral analysis except for Nitrogen. Total Phophorous was estimated by using Vanado Phosphomolybdate yellow colour method in a Spectrophotometer following Gupta (2006). The macroelements Ca, Mg, Mn and Zn, and microelements viz., Fe, Co and Cu were analyzed by using Parkin Elmer atomic absorption spectrophotometer, Analyst AA-200. The minerals contents importance and deficient were recorded with table given by Evans & Solberh, 1998.

RESULTS AND DISCUSSION

Strobilanthes auriculata Nees in Wallich, Pl. Asiat. Rar. 3: 86. 1832. *Strobilanthes auriculata* var. *edgworthiana* (Nees) C. B. Clarke; *S. auriculata* var. siamensis C. B. Clarke; *S. edgeworthiana* Nees; *S. siamensis* C. B. Clarke. *Strobilanthes auriculatus* ; *Strobilanthes auriculata* var. *bracteolate* C.B. Clarke in Hook. F., Fl. Brit. Ind. 4: 453 (1884). Type: India, Meghalaya, Khasi Hills, Hooker & Thomson (Lectotype K (!), sheet with original collection label of 26 July 1850).

Subshrubs, much branched, weakly to strongly anisophyllous. Stems quadrangular, sometimes zigzag, glabrous or sparsely hirsute, geniculate at node. Leaves sessile; lower leaves nearly equal, lanceolate- oblong, acuminate at apex, auriculate at base, pubescent; the upper leaves unequal, cordate, perfoliate, margin serrate or entire, both surfaces sparsely pilose, abaxially pale green, adaxially green, secondary veins 9-15 on each side of midvein. Inflorescences axillary or terminal, spikes 5-9 cm long, sometimes branched; peduncle 2-5 cm long, 4-angled, sulcate, bracteates; flowers on inflorescence dense in on a axis and interrupted, remote towards base; bracts the low most 2-3 pairs sterile and remote, nearly cordate, acute, reflexed, 1-2 × ca. 1.5 cm; floral bracts imbricate, broadly ovate to obovate-spatulate, 7-9 mm long, often becoming recurved, persistent. Calyx 5-8 mm long, gland-tipped pilose, 5-lobed almost to base; lobes linear, unequal with 2 slightly shorter than others, margin usually ciliate, apex sub-acute. Corolla pale purple to violet, funnel-shaped, 1.5-2 cm long, curved; tube basally cylindrical and narrow for ca. 4 mm then weakly to strongly bent, abruptly in-

flated, and widened to ca. 1 cm at mouth; limb weakly 2-lipped, lower lip 3-lobed, upper lip 2-lobed; lobes ca. 4 mm. Stamens 4, included; filaments glabrous, shorter pair ca. 2 mm long, longer pair ca. 4 mm long; anther thecae oblong, ca. 1.2 × 1 mm long. Ovary glabrous; style ca. 3.2 cm long. Capsule as long as calyx, lanceolate, narrowed towards base, ca 8 × ca. 2 mm, glabrous, 4-seeded at the middle, apex apiculate.

Phenology :
Flowering and fruiting in September - February.

Distribution:
Found in all the open areas hills of Manipur which 500-1300m. It is reported from Tripura, West Bengal, Assam and Northeast India and from other countries like China, Bangladesh, Malaysia, Myanmar, Vietnam, Cambodia, Nepal, Pakistan and Thailand.

Photo plate 1. Showing the inflorescence of *Strobilanthes auriculata* **(Kumtrukpee)**

Ethnobotanical uses
The *Meetei* community in Manipur used to cooked the inflorescence with indigenous small fish curry (*Gnatakpa thongba*) taken as food. In other methods the inflorescence is steam (*Paknam*) and taken orally to increase stamina and immunity against diseases. For medicinal purposes about 150g of inflorescence and equal quantity of *Phlogocanthus thyrsiformis* leaves are boiled together and the decoction mixed with honey is taken to increase immunity against cardiovascular diseases.

Biochemical analysis
The Proximate composition of the *S. auriculata* inflorescence has been reported in Table-1. The content of total soluble protein is highest and the lowest content is observed in crude.

Constituents	S. auriculata
Total free amino acids	2.25 mg/100g
Total soluble protein	8.40 mg/100g
Tannin	4.80 mg/100g
Crude lipid	0.99 mg/100g
Crude fiber	0.14 mg/100g

Table 1: Showing the average mean chemical contents of *S. auriculata* **in mg/100g.**

The presence of high quantity of tannin in the inflorescence interferes with the digestive system (Savelkoul et al. 1992), the presence of tannin in the food sometimes gives body and fullness of flavor to the food (Meyer 1987). Naturally high tannin content is desirable for slight astringency (Valier 1951). The presence of crude fiber helps to lowers serum cholesterol levels (Jimoh & Oladiji 2005)

Mineral contents
The Minerals composition of the plants reported on dry weight basis is given in Table -2. The macronutrients in decreasing order are Calcium, magnesium, Nitrogen was present in higher amounts but the presence of Phophorus (0.005 mg/100g) is very less.

Constituents	S. auriculata	Importance (Evans & Solberh, 1998)
Nitrogen %	1.596 mg/100g	Synthesize amino acids
Phosphorous %	0.005 mg/100g	Diuretic medications
Calcium	700.00 mg/100g	Primary structural bone
Magnesium	436.00 mg/100g	Protein synthesis, DNA and RNA
Iron	225.00 mg/100g	Increase disease immunity response
Cobalt	1.50 mg/100g	Essential ingredients of B12 vitamin
Copper	0.50 mg/100g	Heart and muscle damage when deficient
Zinc	34.0 mg/100g	Taste and as enzyme component of alcohol
Manganese	4.0 mg/100g	Fat metabolism

Table 2: Showing the average mean mineral contents (mg/100g) of *Strobilanthes auriculata* **inflorescence with its importance.**

Conclusion
The detection of high value of total free amino acids, soluble proteins along and the minerals contents may be the reason for its ethno-botanical significance of the plant under study.

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REFERENCE

Capar, S.G., J.T. Tanner, M.H. Friedman and K.W. Boyer, 1978. Multielement analysis of animal waste and sewage sludge. Environ. Sci. Technol., 12:785-790. | Chopra, S.L. and Kanwar, J.S. 1980. In: Analytical agricultural Chemistry. Kalyani Publishers, New Delhi, 337-346. | Clarke, C.B. 1884. Acanthaceae, In J.D. Hooker (ed.). Flora of British India, Vol. 4: 453, Lovell Reeve, London. | Deb, D.B.1961. Acanthaceae, In: Dicotyledonous plants of Manipur territory. Bull. Botanical Survey of India. 3: 338 – 341. | Dubois, M. Gilles K., Hamilton, J.K. Rebers, P.A. and Smith, F. 1951. A Calorimetric Method for the Determination of sugars. Nature, Pp. 167-168. | Evans, L and Solberh E. 1998. Minerals for plants, Animals and Man. Alberta Agriculture, Food and Rural development. Agdex 531-3. (Revised) | Gupta, P.K. 2006. Soil, Plant, Water and Fertilizer Analysis. Agrobios Agro House, Behind Nasraru Cinema Chopsail Road, Jodhpur (India). Pp. 241. | Jimoh, F.O. and Oladiji, A.T. 2005. Preliminary Studies on Piliostigma thonningii seeds: Proximate analysis, mineral composition and phytochemical screening. African J Biotech, 4(12):1439-1442 | Kanjilal, U.N.; Das, A.; Kanjilal, P.C. & R.N. De. 1982. Acanthaceae. In: Flora of Assam. (Caprifoliaceae to Plantaginaceae). Govt. press of Assam, India. 3: 408 – 458. (Repr.) | Lowry, O.H., Resebrough, N.J., Farr, L. A. and Randall, R.J. 1951. Protein measurement with the Folin-Phenol reagent. J. Biol. Chem., 193:265-275. | Meyer LH. 1987. In: Food chemistry. CBS Publishing and distributers, New Delhi, India. | Moore, S. and Stein, W.H. 1948. Photometric method for use in the chromatography of amino acids. J Biol Chem, 176: 367-388. | Ningombam, D.S. 2012. Systematic study of the plant species under Acanthaceae family in the valley districts of Manipur. (Indian ETD Respository @ INFLIBNET). http: //hdl.handle.net/10603/9283. | Prain, D. 1903. Acanthaceae. In: Bengal Plants. (Apocynaceae – Selaginelliaceae). Sri Gouranga press private Ltd. Calcutta. 2: 800. (Repr.) | | Savelkoul FHMG, Van Der Poel AFB & Taminga S. 1992. In: Plant foods for Human nutrition 42: 71-85. | Singh, A.V. 2011. A study on the Ethnobotanical. Phytochemical and the socio-economical relevance of Houttuynia cordata Thunb. In Manipur. 20: 908-922. | Thimmaiah, S.R. 1999. Standard Methods of Biochemical Analysis. Kalyani Publishers, New Delhi – 110002. | Valier P. 1951. Alcoholic Beverages In. Food and Food products, Interscience Publishers Inc, New York, USA. | Wood. J.R.I. & Scotland, R.W. 2003. The 2-lipped species of Strobilanthes (Acanthaceae). Vol. 58. No. 1. Pp. 83 -129. |