

Biochemical Insights into *Strobilanthes auriculata* var. *dyeriana*: Phytochemical Composition and Bioactive Potential- A review

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ABSTRACT

Strobilanthes auriculata var. *dyeriana*, a strikingly ornamental member of the Acanthaceae family, has long been appreciated for its traditional use as a diuretic and in the treatment of rheumatism. However, its broader pharmacological potential remains largely unexplored. This study investigates the phytochemical profile and evaluates the antioxidant and antibacterial properties of its leaf extract. Phytochemical screening revealed a significant presence of phenolic compounds ($82.9 \pm 0.86 \mu\text{g}/100 \mu\text{g}$), though anthocyanins were undetected. The extract demonstrated strong antioxidant activity, with an IC_{50} value of 96.17 ppm, and exhibited growth-inhibitory effects against *Salmonella typhimurium*, suggesting notable antibacterial potential. These findings highlight the leaf extract of *S. auriculata* var. *dyeriana* as a promising natural source of bioactive compounds with therapeutic relevance. Further research into its mechanisms and applications may unlock new opportunities in natural product-based healthcare solutions.

keywords: Antibacterial; Anthocyanin; DPPH; Phytochemical screening; Total phenol content.

I. INTRODUCTION:

Strobilanthes is a genus belonging to the Acanthaceae family, first described by Blume in 1826 based on specimens collected from West Java[1]. It is the most species-rich genus across tropical regions of Asia and Australia[2]. In Sri Lanka, *Strobilanthes* is especially well-known for its striking blooms, diverse growth patterns, and widespread occurrence & Several species within this genus are recognized for their medicinal properties[3]. In various parts of the world, extracts from *Strobilanthes* have been traditionally used to treat respiratory infections, spider bites, snake envenomation, and cerebrospinal meningitis. Additionally, the leaves are often utilized in the production of indigo dye[4]. One notable variety,

Strobilanthes auriculata var. *dyeriana*, commonly referred to as sembarililin in Indonesia, is easily identified by its dark green leaves marked with metallic-purple veins.[5] Although widely appreciated for its ornamental foliage, this variety is also used in Indonesia as a traditional remedy for rheumatism[2]. However, detailed information on this plant remains limited.[6] Most existing studies focus on its propagation, while its therapeutic potential remains largely unexplored. Therefore, aspects such as its botanical characteristics and medicinal applications warrant further investigation. *S. auriculata* var. *dyeriana* is believed to possess additional health benefits, particularly in the field of herbal medicine. This study seeks to evaluate the antioxidant properties and antibacterial activity of *S. auriculata* var. *dyeriana* extract. Traditionally, various *Strobilanthes* species are also used in medicinal practices around the world, notably within the Ayurvedic system[8].



Figure 1: *Strobilanthes auriculata* var. *dyeriana*:

Biological Source: It is a shrub with glabrous branches found in slopes, shades and near streams.

Family: Acanthaceae

Genus: *Strobilanthes*

DISTRIBUTION:

Myanmar: Kachin State (Myitkyina, Lacey 5550 [E, K]); Kayin State (Thakon, Lacey 4573 [E], Mt. Kama Phaw, Hlaingbwe, Fujikawa et al. 107046 [FHO, MBK, RAF]); Mandalay Region

(Meiktila, Smith 13740 [K], Mogok, Lace 5066 [E], West Bengal, Assam, Tripura, North East India. Other countries like Bangladesh, China, Malaysia, Vietnam, Thailand, Nepal, Cambodia & Pakistan.[9]

Phenology:

Flowering and fruiting in September-February



Figure 2: Strobilanthes hians. A habit with detail of abaxial leaf surface; B. adaxial leaf surface; C abaxial leaf surface; D flower pair showing bracts bracteole and calyx (side view); E bracts; F bracteole; G calyx opened out; H ovary. From Armstrong et al. 3262.[10]

Biochemical Analysis

| Constituents (<i>S. auriculata</i>) | Amount (mg/100g) |
|---------------------------------------|------------------|
| Total free amino acids | 2.25 |
| Total soluble protein | 8.40 |
| Tannin | 4.80 |
| Crude lipid | 0.99 |

Mineral Contents:

Here is the information you provided formatted into a clear table.

| Constituent | Amount | Unit | Importance | Source |
|-------------|--------|-------------|--|----------------------|
| Nitrogen | 1.596 | % (mg/100g) | Synthesizes amino acids | Evans &Solberh, 1998 |
| Phosphorous | 0.005 | % (mg/100g) | Used in diuretic medications | Evans &Solberh, 1998 |
| Calcium | 700.00 | mg/100g | Primary structural component of bone | Evans &Solberh, 1998 |
| Magnesium | 436.00 | mg/100g | Involved in protein synthesis, DNA and RNA | Evans &Solberh, 1998 |
| Iron | 225.00 | mg/100g | Enhances disease immunity response | Evans &Solberh, 1998 |
| Cobalt | 1.50 | mg/100g | Essential for Vitamin B12 synthesis | Evans &Solberh, 1998 |
| Copper | 0.50 | mg/100g | Deficiency may cause heart and muscle damage | Evans &Solberh, 1998 |
| Zinc | 34.00 | mg/100g | Important for taste and as enzyme component | Evans &Solberh, 1998 |
| Manganese | 4.00 | mg/100g | Involved in fat metabolism | Evans &Solberh, 1998 |

Materials and method:

1. Leaves extraction
2. Anti oxidant activity assay
3. Anti microbial activity assay

1. Leave extraction:

The leaves of *S. auriculata* var. *dyeriana* used in this study were obtained from a non-collection ornamental plant in the EkaKarya Bali Botanic Garden area. The leaves were cleaned, thinly cut, and air-dried for five days. The leaf extraction was carried out using the maceration method, slightly modified from the procedure used by Baehaki et al. and Andila & Hartanto. In 1000 mL of methanol, 100 g of dried leaves were macerated and then incubated in the dark at 26 °C. The mixture was filtered with filter paper after three days.

The crude extract was separated from the solvent using a vacuum rotary evaporator. The concentrated crude extract was then used for further analysis [11].

- I. Alkaloids
- II. Carbohydrates
- III. Saponins
- IV. Glycosides
- V. Proteins
- VI. Phytosterols
- VII. Terpenoids
- VIII. Fixed oil
- IX. Phenolics
- X. Flavonoids

2. Anti-oxidant activity assay:

The stock solution of plant crude extract was diluted into numerous concentration series: 50, 100, 150, 200, 250, 300, and 350 ppm. One ml of each extract concentration was mixed with 4 ml of DPPH (40 ppm). The mixture was mixed and incubated in a dark room for 30 minutes. Ascorbic acid antioxidant activity was tested in various concentrations (2, 4, 6, 8, 10, and 12 ppm) as a comparison. The absorbance of each mixture was measured at λ 517 nm with a UV-Vis spectrophotometer. The quantitative calculation was performed by determining the free radical inhibitory power of the sample, which was calculated using the following formula [12].

3. Anti-microbial activity assay:

Antimicrobial activity was assessed using the modified Kirby-Bauer disc diffusion method on nutrient agar. The microorganisms tested were those that cause human diseases, including *Candida albicans*, *Pseudomonas aeruginosa*, *Salmonella*

typhimurium, *Staphylococcus aureus*, and *Streptococcus mutans*. The tested microorganisms were regenerated before the antimicrobial activity using the following protocol: one of the microbes tested was transferred aseptically onto a sterile slant nutrient agar, then the bacteria were incubated for 24 h at 37 °C. For the antimicrobial activity assay, the fresh colonies were transferred into a sterile saline solution, and the turbidity was adjusted to 0.5 McFarland standards before streaking onto the surface of nutrient agar and allowed for 15 minutes before the tested discs were placed on the surface of the agar. The formation of the clear inhibition zone was observed at one to three days of incubation (37 °C) [13]

PARRAMITERS:

- ✓ **DF**: Solubility factor [14].
- ✓ **DPPH**: 1,1-diphenyl-2-picrylhydrazyl [15].
- ✓ **L**: Cuvette width (1cm) [16].
- ✓ **MW**: The molecular weight of cyanidin-3-glucoside (449.2 g/mol) [17].
- ✓ **TPC**: Total Phenol Content [18].

II. DISCUSSION:

- ✓ This document details a study on the nutritive value of *Strobilanthes auriculata* Nees, a plant significant to the Meetei people of Manipur. The plant, locally known as Kumtrukpee, is a pleistocenic species that last flowered in 2003 before its mass flowering event in 2011, after an eight-year gap. The inflorescence of *S. auriculata* is harvested and consumed as food, believed to offer protection against certain ailments. [19]
- ✓ The study involved a comprehensive analysis of the plant's inflorescence for its proximate composition, tannins, and minerals. Various established methods were employed for these estimations, including the Micro Kjeldahl Method for total nitrogen and the Folin Denis method for tannins. Mineral analysis, excluding nitrogen, utilized a wet diacid digestion method, with phosphorus estimated via a Vanadophosphomolybdate yellow colour method. Other macro-elements like calcium, magnesium, and zinc, along with micro-elements such as iron, cobalt, and copper, were analyzed using an atomic absorption spectrophotometer. The research also analyzed amino acids, protein, crude lipids, and crude fiber content. The findings indicated a decreasing concentration of essential macro-

elements in the order of Ca>Mg>N>P and micro-elements as Fe>Zn>Mn>Co>Cu.[20]

III. CONCLUSION:

This study presents the first comprehensive biochemical investigation of *Strobilanthes auriculata* var. *dyeriana*, an ornamental plant with underexplored therapeutic potential. The leaf extract exhibited a notable concentration of phenolic compounds ($82.9 \pm 0.86 \mu\text{g}/100 \mu\text{g}$) and demonstrated significant antioxidant activity ($\text{IC}_{50} = 96.17 \text{ ppm}$), despite the absence of anthocyanins. Additionally, the extract showed antibacterial efficacy against *Salmonella typhimurium*, indicating its potential as a natural antimicrobial agent. These findings highlight the species as a promising source of bioactive compounds, particularly phenolics, which may contribute to future pharmaceutical or nutraceutical applications. Further in-depth studies, including compound isolation, mechanism-based assays, and in vivo evaluations, are recommended to fully elucidate the therapeutic scope of this plant and validate its traditional medicinal uses

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