

## *Strobilanthes auriculata* Nees: a lesser known plietesial flora from Manipur, North East India

*Strobilanthes* Blume of family, Acanthaceae comprises 450 species<sup>1,2</sup>. In India, 148 species are reported of which 72 are endemic<sup>3,4</sup>. They are poorly known and rarely collected due to their plietesial flowering pattern. While some of the *Strobilanthes* species bloom yearly, many of them are reported as pluriannual and monocarpic with flowering period ranging from 3 to 16 years<sup>5</sup>. They are also reported to be mostly found at high altitudes and assumed to be restricted, rare or extinct<sup>6</sup>. Specific characters such as 2-lipped calyx, 2-seeded capsule, extended anther connective or presence of only two fertile stamens were used to recognize this genus. Few or no modern collections of *Strobilanthes* species are reported from North East India, the Golden Triangle, mountains of Sulawesi and Northern Sumatra due to their physical or political difficulties of access<sup>7</sup>. Manipur in North East India lies between 94.31'–94.78'E and 23.83'–25.68'N. The state falls under the Indo-Burma Biodiversity Hotspot and is home to 13,500 plant species which constitute approximately 2.3% of the world in total.

*Strobilanthes auriculata* Nees, commonly known as Eared Leaf Coneflower is a plietesial plant<sup>8</sup>. It is locally known as 'Kumtrukpee' in Manipur. Along the foothills of the Himalayas, *S. auriculata* was reported from Punjab to Darjeeling but apparently absent further east. It was reported to occur further south in Bihar, then in Meghalaya, Nagaland and Manipur in



**Figure 1.** *Strobilanthes auriculata* Nees in natural habitat (inset: Inflorescence) at Kaina, Thoubal district, Manipur, India.

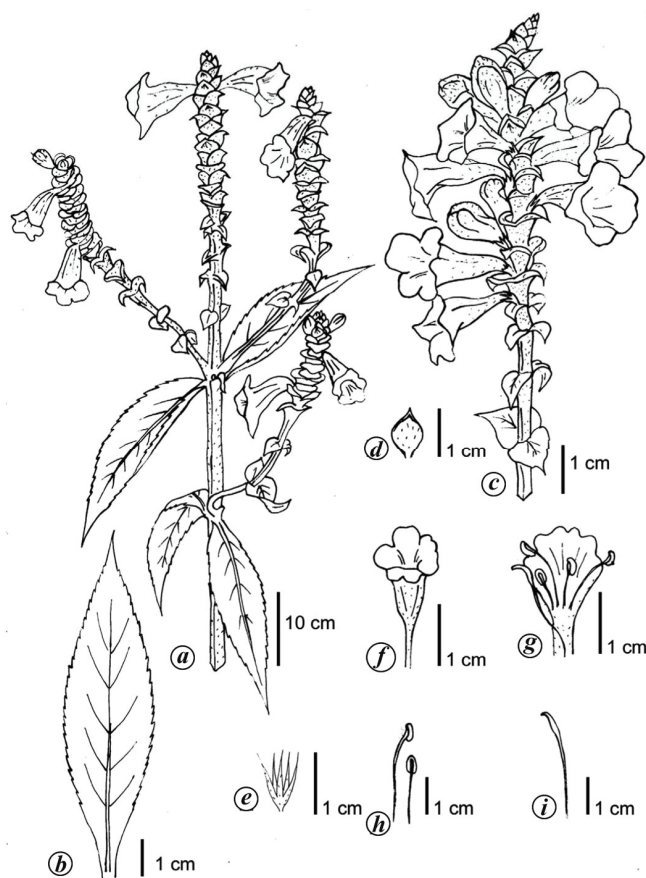
NE India<sup>9</sup>. This plant flowers irregularly in some parts of its range<sup>8</sup>. Considering unobvious morphological affinity of the genus *Strobilanthes*, its plietesial flowering pattern and lesser availability of information from North East India, the present study was carried out to collect *S. auriculata* in Manipur.

A line transect of 1000 m by 5 m on both sides with nested quadrats of 5 × 5 m<sup>2</sup> at every interval of 200 m was used to assess plants of *S. auriculata* in Manipur. Herbarium was prepared following Jain and Rao<sup>10</sup> and deposited at Plant Bioresources Division, Institute of Bioresources and Sustainable Development (IBSD), Takyelpat, Manipur, India bearing herbarium accession number 13 and collection number 14.

*Strobilanthes auriculata* Nees in Wallich, *Pl. Asiat. Rar.* 3: 86. 1832.

Synonym: *Perilepta auriculata* (Nees) Bremek. *Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Sect. 2.* 41: 194. 1944.

Weakly to strongly anisophyllous shrubs 0.4–0.8 m tall, much branched. Stems four-angled, sparsely hirsute (glabrous), geniculate at node. Leaves sessile; leaf blade oblong-oblancheolate, rarely ovate for small leaves, 2–11 × 1.2–3.5 cm, both surfaces sparsely pilose, abaxially pale green when young, adaxially green, secondary veins 10–13 on each side of midvein, base attenuate, cuneate, auriculate, margin serrate, apex acuminate. Inflorescences axillary, flowers on inflorescence dense on an axis and interrupted, remote towards base; spikes, 4.5–10.2 cm, sometimes branched; peduncle 2–4 cm, 4-angled, sulcate, bracteate; sterile bracts ovate, 0.7–1.0 cm; floral bracts imbricate, obovate-spatulate, 4–8 mm, 10–16 in numbers, often



**Figure 2.** *Strobilanthes auriculata* Nees. *a*, Whole plant; *b*, leaf; *c*, inflorescence; *d*, bract; *e*, calyx; *f*, flower; *g*, flower dissected; *h*, stamens; *i*, pistil. Scale bars in cm (drawing by Rajkumari Jashmi Devi).

becoming recurved, persistent, densely villous and ciliate, apex usually apiculate, bracteoles absent. Calyx 6–10 mm, 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, 1.4–2 cm long. Stamen, epipetalous, 4 numbers, didynamous, 2 long, 2 short, anther 2 lobed.

Phenology: Flowering and fruiting in September–February<sup>11</sup>.

Habitat: Terrestrial, red soil

Specimen examined: India, Manipur, Thoubal district, Kaina, 1101 m asl, 24.67293N, 94.011881E, dated 27 November 2019.

Distribution: China (Yunnan, Guangxi), India (C-, E-, N- & NE-India, Subtropical Himalayas, Upper Gangetic Plains), Vietnam, Myanmar (widespread), Nepal, Laos, Thailand, Bangladesh.

Gregarious flowering of *S. auriculata* was observed in the hills of Kaina, Thoubal district (1101 m asl), Manipur during last week of November 2019 (Figure 1). An illustration was drawn for *S. auriculata* collected from Kaina, Manipur (Figure 2). Plants of *S. auriculata* bearing inflorescence with no intact flower were also recorded in the hills of Heijang, Kangpokpi district (1078 m asl), Manipur during the first week of February 2019.

Deb reported *S. auriculata* from Chandel district, Manipur in 1961 however he did not report mass flowering<sup>12</sup>. Ningombam<sup>13</sup> mentioned this plant as plietesial in Manipur with flowering period of eight years. He reported that last flowering occurred in 2003, 2010 and mass flowering in 2011. The present study confirmed eight-year plietesial cycle of *S. auriculata* in Manipur. This plant is reported to be plietesial in some areas with no report from Burma or Thailand<sup>14</sup>. Its plietesial nature was believed to be similar with *S.*

*wallichii* that is plietesial in Western Himalayan but not further east<sup>8</sup>. Variation in flowering of plietesial *Strobilanthes* was also reported in *S. consanguineus* and *S. kunthianus*<sup>15,16</sup>. Periodical mass-flowering in *Strobilanthes* was reported to evolve independently or via a change in few genes or through multiplication of life cycle<sup>17–19</sup>. It was also reported to occur due to the adaptive evolution of floral traits facilitating mast seeding in some endemic *Strobilanthes* species of Western Ghats<sup>20</sup>. The present study will be useful in understanding plietesial *Strobilanthes* in India and factors determining its plietesial nature.

1. APG IV, *J. Linn. Soc., Bot.*, 2016, **181**, 1–20.
2. Mabberley, D. J., *Mabberley's Plant-Book*, Cambridge University Press, Cambridge, 2017, 4th edn, p. 1102.
3. Karthikeyan, S., Sanjappa, M. and Moorthy, S., *Flowering Plants of India – Dicotyledons (Acanthaceae – Avicenniaceae)*, Botanical Survey of India, Kolkata, 2009, vol. 1, p. 365.
4. Singh, R. K. and Diwakar, P. G., *Indian J. For.*, 2007, **30**, 553–555.
5. Janzen, D. H., *Annu. Rev. Ecol. Evol. Syst.*, 1976, **7**, 347–391.
6. Scotland, R. W., *Bot. J. Linn. Soc.*, 1998, **128**, 203–210.
7. Wood, J. R. I. and Scotland, R. W., *Kew Bull.*, 2009, **64**, 3–47.
8. Haines, H. H., *The Botany of Bihar and Orissa*, Adlard & Son, West Newman Ltd, London, 1922, vol. 4, p. 678.
9. Wood, J. R. I. and Scotland, R. W., *Kew Bull.*, 2003, **58**, 83–129.
10. Jain, S. K. and Rao, R. R., *A Hand Book of Field and Herbarium Methods*, Today and Tomorrow's Printers and Publishers, New Delhi, 1977.
11. [http://www.efloras.org/florataxon.aspx?flora\\_id=2&taxon\\_id=242425784](http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=242425784)
12. Deb, D. B., *Dicotyledonous Plants of Manipur Territory*, Botanical Survey of India, 1961, pp. 338–341.

13. Ningombam, D. S. and Singh, P. K., *Nebio*, 2013, **4**, 45–57.
14. Wood, J. R. I., *Edinb. J. Bot.*, 1994, **51**, 175–273.
15. Bowden, E., *J. Bombay Nat. Hist. Soc.*, 1950, **49**, 576.
16. Jose, F. C., *J. Bombay Nat. Hist. Soc.*, 2013, **110**, 87–88.
17. Moylan, E. C., Bennett, J. R., Carine, M. A., Olmstead, R. G. and Scotland, R. W., *Am. J. Bot.*, 2004, **91**, 724–735.
18. Kakishima, S., Yoshimura, J., Murata, H. and Murata, J., *PLoS ONE*, 2011, **6**, e28140.
19. Veller, C., Nowak, M. A. and Davis, C., *Ecol. Lett.*, 2015, **18**, 653–659.
20. Sharma, M. V., Kuriakose, G. and Shivanana, K. R., *Bot. J. Linn. Soc.*, 2008, **157**, 155–163.

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