

New Distributional Record of *Gaultheria Griffithiana* Wight in Singalila National Park, Darjeeling District, West Bengal



Sulaxana Baraily, Projjwal Chandra Lama, Satyam Tamang

Abstract: This study reports the first confirmed new distributional record of *Gaultheria griffithiana* Wight (Ericaceae), a medicinally crucial evergreen shrub, in the Singalila National Park of Darjeeling District, West Bengal, India. Though earlier records mentioned the presence of this species in the Darjeeling region, the data for the precise location were lacking. The post-2017 administrative reorganisation has elucidated that previous findings fall within the Neora Valley National Park of Kalimpong district in West Bengal. This species was collected during the field survey conducted in May 2024 at Sano Gairi, near Jarayo Lake, with elevations ranging from 2,638.47 to 2,675 m in Singalila National Park. It led to the identification of the collected species as *G. griffithiana*, confirmed through morphological analysis and comparison with the eKew herbarium image and the North Bengal University herbarium specimen. For authentication, the prepared herbarium specimens were deposited in the Botanical Survey of India (BSI), Sikkim Himalayan Regional Centre (accession no. 0306), and Llyod Botanical Garden (accession nos. LB014682 and LB014684). Comparative studies with specimens from Neora Valley National Park in Kalimpong district revealed notable variation in leaf size and distribution density. This finding extends the known distribution of *G. griffithiana* within West Bengal and fills a significant biogeographical gap in its range. Given its ethnomedicinal importance, it is used in treating rheumatoid arthritis; it is also the source of anti-inflammatory and antioxidant compounds. This new record underscores the rich biodiversity of Singalila National Park and highlights the importance of continued floristic exploration for conservation and bioprospecting efforts in fragile Himalayan ecosystems.

Keywords: *Gaultheria Griffithiana*, Singalila, Neora, Darjeeling, Kalimpong, West Bengal, Sparsely Distributed, Ethnomedicinal, Conservation, New Distributional Record.

Nomenclature:

BSI: Botanical Survey of India

I. INTRODUCTION

The genus *Gaultheria* L. belongs to the tribe Gaultherieae within the family Ericaceae [9], and more than

20 species are found in India [3]. *Gaultheria griffithiana* Wight is an evergreen shrub known as Griffith's Wintergreen. This species was first described by Robert Wight in the Journal of the Asiatic Society of Bengal in 1847, later known as the Journal of Natural History. Globally, it is found in Nepal, India, Bhutan, the Tibetan Plateau, East Himalaya, Indo-China, Myanmar (Hengduan Mountains), Vietnam and China [8] and [4]. In India, it is found in Sikkim, Assam, and Arunachal Pradesh. *G. griffithiana* thrives in temperate biomes, typically inhabiting high-altitude regions ranging from 2,000 to 3,000m. This species is recognised for its robust leaves and bell-shaped, white to greenish flowers. Besides its morphological features, evolutionary relationships within the *Gaultheria* genus have been investigated through plastid genome analyses of its members [7], [8], and [16]. Regarding its ethnomedicinal importance, *Gaultheria* has long been utilised in traditional medicine, particularly for treating rheumatoid arthritis [1] and [14]. Particularly, in China, the root of *G. griffithiana* is used to dispel wind and eliminate dampness [10]. Most species within this genus contain a volatile oil, commonly known as wintergreen oil, which is primarily composed of methyl salicylate and derivative compounds similar to aspirin. This oil exhibits potent analgesic and anti-inflammatory effects [10]. Molecular docking and network pharmacology analyses have demonstrated the effectiveness of salicylate-rich fractions of *Gaultheria* in reducing joint inflammation [1]. Furthermore, several studies indicate that some *Gaultheria* species are characterised by high concentrations of phenolic compounds, which have been shown to provide beneficial antioxidant, anticancer, and anti-inflammatory effects [10] and [11].

II. MATERIAL AND METHODS

The Singalila National Park is in the Darjeeling district of West Bengal, India, with 27°13'15" to 28°01'46" N latitude and 88°01'51" to 88°07'05" E longitude (Figure 1: a and b). This magnificent park acts as a natural boundary, seamlessly linking the significant mountain landscapes of Sikkim in the northwest and the charming terrains of Nepal to the east. Covering an extensive area of 78 square kilometres [13], the Singalila National Park is distinguished for its exceptional geographic and climatic diversity, which creates a vibrant mosaic of eco-zones. The park features two main vegetation zones: lush temperate forests and rugged sub-alpine landscapes. In these temperate woodlands, visitors can admire the vibrant blooms of more than five species of *Rhododendron*, the towering.

The forms of Abies, the sturdy oaks of Quercus, and

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the glossy leaves of *Castanopsis* create a stunning display of nature's artistry that attracts adventurers and natural enthusiasts. During a field visit to the Singalila National Park in May 2024, we encountered an interesting plant at an elevation of 2,638.47 – 2,675 m (Figures 2 and 3), whose leaves emitted a scent like *Gaultheria fragrantissima* when crushed, and the flowers resembled those of *Gaultheria nummularioides* and *Vaccinium dunalianum*. In the following year, we conducted a field survey in May at the Neora Valley National Park, and a similar species was found at elevations of 2,315 – 2,351 m (Figures 4 and 5). The samples collected from two locations (Singalila and Neora Valley) were compared for their morphological characteristics. In the Singalila National Park, the plant was sparsely distributed in a few sites (Figures 2 and 3). However, the distribution was dense at Chodapheri, Mulkharka and along the route to Rachella Pass and Alubari camp in the Neora Valley region (Figures 4 and 5). Moreover, the size of the leaves varied in the Neora Valley (16 – 18 x 5 – 8 cm) compared to that in the Singalila National Park (7 – 10 x 3 – 5 cm) (Figures 6, 7 and 8). The taxonomic study was conducted on the collected specimens, which were identified by referring to Flora of British India, Vol. 3, Flora of Bhutan, Vol. 2 and Flora of China, Vol. 14 and authenticated through Flora of Nepal and World Flora Online [5] and [15]. The specimen was then compared with the eKew herbarium image [6] and the North Bengal University herbarium for authentication. The herbarium specimens were prepared using the standard method [2]. The voucher specimen was submitted and authenticated by the Botanical Survey of India (BSI), Sikkim Himalayan Regional Centre (Figure 6), with accession no. 0306. Then, herbarium specimens, one sample from Singalila and another from Neora Valley, were submitted to the Loyd Botanical Garden with accession numbers LB014682 and LB014684 (Figures 7 and 8).

III. RESULT AND DISCUSSION

Gaultheria griffithiana Wight was first described by Wight in Calcutta in 1847 (*J. Nat. Hist.*, 8: 176) and illustrated in *Icon. Pl. Ind. Orient.* 4 (1): t. 1197, 1850. It has also been referenced by C. B. Clarke in *Hook. f.'s Fl. Brit. India* 3: 458 (1882), Kanjilal et al.'s *Fl. Assam* 3: 148 (1939), Hara in *Hara et al.'s Enum. Fl. Pl. Nepal* 3: 55 (1982), Rae in *A. J. C. Grierson & D. G. Long's Fl. Bhutan* 2 (1): 388 (1991), Ruizheng & P. F. Stevens in *Wu et al.'s Fl. China* 14 (part-3): 258 (2005). The type specimen was collected from Bhutan at elevations ranging from 7,000 to 7,800 feet.

A hanging/upright shrub growing from rock crevices 0.6 – 1.8 m, found rarely as an epiphyte. The stem is green, cylindrical, heavily branched, and smooth, with dark green, smooth branches. The leathery leaves are oblong or lanceolate, measuring 7 – 12 x 3 – 5 cm, with serrated margin, broad cuneate bases with an angle of 55° – 62°, and caudate to acuminate tips with acumen 1.5 – 2 cm long with an angle of 45° – 50°; they are dark green and smooth on top, lighter green and punctate underneath, with prominent reticulate venation of 4 – 8 pairs of lateral veins. Petioles are stout, marginal, 5 – 7 mm long, and smooth on top. Axillary raceme inflorescence with rachises 4 – 8 cm long supporting 14 – 18 tiny, minutely yellowish/ greenish coloured flowers.

Flowers measure 6 – 12 mm; pedicels are greenish- white, 2 – 5 mm long, with a smooth or slightly hairy covering. The basal bracts are light green, ovate, approximately 2.5 x 2 mm, ciliated at edges, acuminate; two opposite bracteoles are broad ovate, 2 x 1.5 mm, ciliated and acuminate. The calyx lobes are light green, five united at the base, ovate-triangular, 2 x 1 mm, ciliated at the edges, and acuminate. The corolla is globose-campanulate, light yellow/ greenish yellow, measuring 4 – 7 x 3 – 4 mm, smooth; lobes are broadly ovate, about 1 x 1.5 mm. There were 10 stamens, 1.5 – 2.5 mm long, either loosely epipetalous or free, with light yellow filaments 1 – 2 mm long that are either smooth or pilose, dilated in the middle; anthers are oblong, approximately 1 mm or minute, smooth, with two apical tiny awns. The pistil is approximately 2.8 mm; spherical, light green ovary, 5-chambered with many ovules. The style is approximately 1.6 mm long and smooth, with a truncate stigma. The fruit is rounded or globose, dark purple and has bracts, measuring 4 – 7 mm in diameter. (Figures 9 – 16).

A. Distribution: Bhutan, Nepal, Southwest China, Myanmar, and the Eastern Himalayas in India - specifically Sikkim, Darjeeling, and Kalimpong in West Bengal and Arunachal Pradesh.

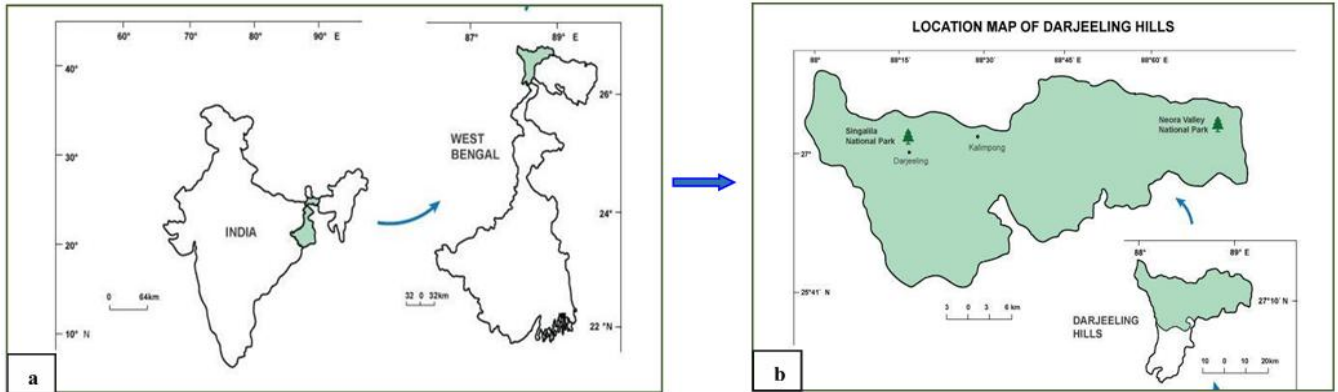
B. Flowering: April – June, peak in May; Fruiting: June – October, peak in August.

C. Vernacular Names: In Darjeeling: Patpatay & in Kalimpong: Linchebong

D. Location: Jaraiyo Pokri Bawangoat in the Singalila National Park, Darjeeling district, GPS: 27°6'45" North latitude and 88°4'54" East longitude at an elevation of 2638.47 – 2676 m (Figures. 2 and 3); Chodapheri, Mulkharka, and along the route to Rachella Pass and Alubari camp in the Neora Valley National Park, Kalimpong district, GPS: 26°59'740" North latitude and 88°09'913" East longitude at an elevation of 2315 – 2351m (Figures. 4 and 5).

IV. CONCLUSION

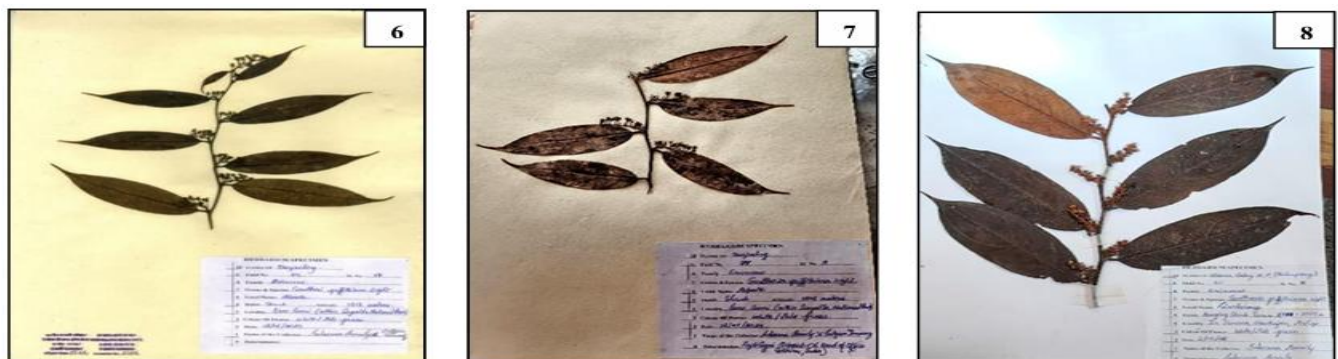
According to its distribution, *Gaultheria griffithiana* Wight is a newly recorded species (family Ericaceae) from Singalila National Park in the Darjeeling district, West Bengal, India. In his thesis, P.C. Rai has documented the same species from the Neora Valley region, Kalimpong district [12] Furthermore, many authors have previously mentioned the findings of this species in Darjeeling, but the exact locations are not specified. The Darjeeling district was geographically divided into the Darjeeling and Kalimpong districts on 07th February 2017, with the Neora Valley falling under the Kalimpong district. The earlier findings, which claimed the existence of *G. griffithiana* in Darjeeling, can now be reconsidered. We can now consider that *G. griffithiana* was previously recorded only in the Kalimpong district. Therefore, we can ascertain that *G. griffithiana* is a new finding in the Singalila National Park, located within the Darjeeling district. Thus, our recent findings fill the research gap in the understanding of species distribution in the Darjeeling District. On comparing the species from two different ranges, we found that the leaves are significantly larger in the



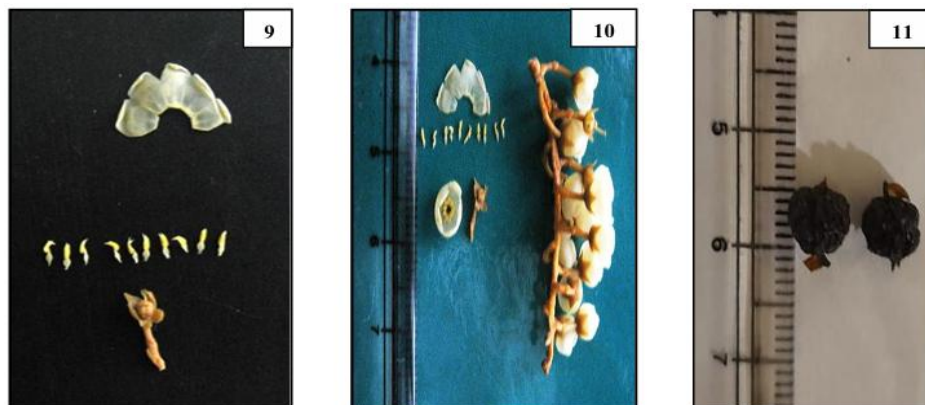
[Fig.1: (a and b): Location map of Darjeeling Hills]

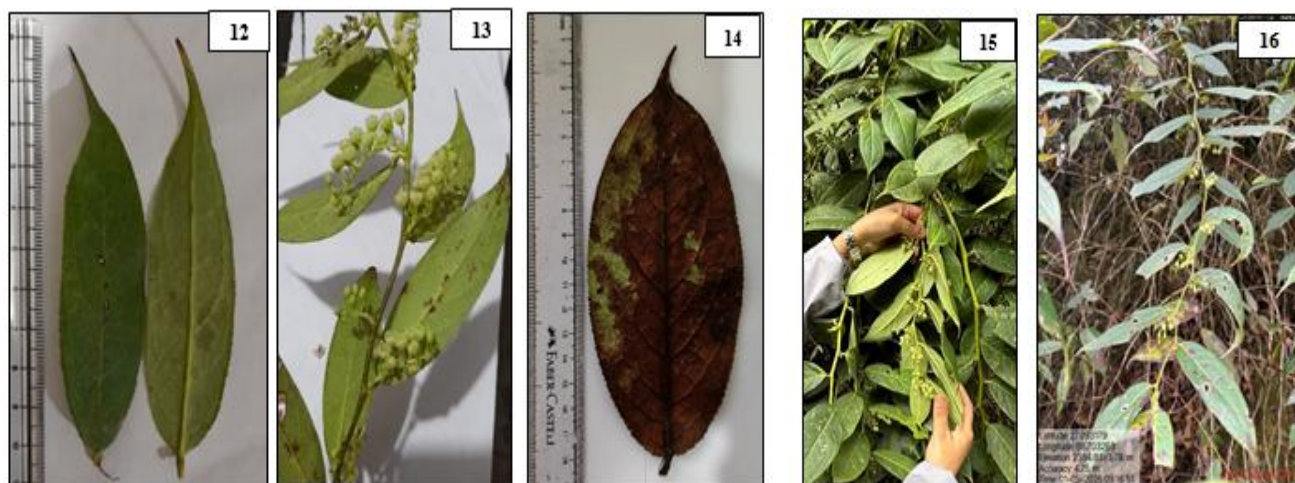


[Fig.2 – 5: GPS Locations of Singalila National Park (2 & 3); Neora Valley National Park (4 & 5), Where the Occurrence of *Gaultheria Griffithiana* was Observed]



[Fig.6 – 8: Herbarium Specimens Deposited – 6 & 7 (Collected from Singalila National Park); 8 (Collected from Neora Valley)]





[Fig. (9-16): Morphology of *Gaultheria Griffithiana* Wight; Specimen Collected from Singalila National Park (9 – 13) and Neora Valley National Park (14 – 16)]

the specimen collected in Neora Valley National Park. It might be due to the microclimate variation at the Neora Valley National Park with respect to other areas. In most parts of the Neora Valley, tourist influx is limited and vehicles are restricted, keeping the area undisturbed and pollution-free. This contrasts with the Singalila National Park, where the development of tourist vehicles and homestays disturbs the area's ecosystem. At the same time, conserving *G. griffithiana* Wight is vital in the Singalila range, and related measures are needed. Additionally, a more detailed study of the ecological aspects, focusing on the current distribution and conservation status of *G. griffithiana* Wight in these two regions, should be conducted.

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The reference [12] (Rai, P. C. (2001). Thesis entitled Survey of the Flora of Neora Valley National Park in Darjeeling, West Bengal (India). University of North Bengal. pp. 273 – 274. <http://hdl.handle.net/10603/147141>) could not be removed despite being older than ten years. This 2001 thesis is the only available source documenting the occurrence of *Gaultheria griffithiana* in Neora Valley National Park, Kalimpong Subdivision, under the old Darjeeling District before February 7, 2017, when Kalimpong was declared a separate district. This historical data is vital for providing context and authenticating the

significance of our findings as a 'new distributional record.' Without this primary historical reference, the foundational context for our study would be incomplete.

DECLARATION STATEMENT

Some of the references cited are older, noted explicitly as [12]. However, these works remain significant for the current study, as they are pioneering in their fields.

After aggregating input from all authors, I must verify the accuracy of the following information as the article's author.

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- **Data Access Statement and Material Availability:** The adequate resources of this article are publicly accessible.
- **Author's Contributions:** The authorship of this article is contributed equally to all participating individuals.

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