

Gregarious flowering in *Sinarundinaria griffithiana* (Munro) Chao & Renvoize, Mizoram, India

Sinarundinaria griffithiana (Munro) Chao & Renvoize is endemic to Southeast Asia, naturally occurring in India, Bhutan, Tibet, Laos and Myanmar¹. In India, it occurs in the highlands of Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland and West Bengal^{2–6}. The species grows well at an altitudinal gradient between 900 and 2200 m amsl on hilly slopes with good soil conditions⁶. The distribution of the species is found to be mainly controlled by elevation and annual precipitation. In a previous study, discriminant analysis of the bioclimatic variables for *S. griffithiana* showed a narrow climatic niche for the species and indicated its vulnerability to climate change⁷. In Mizoram, it is locally known as ‘phar’.

S. griffithiana is erect, caespitose with short internodes, yellow–green colour

culms hollow from the inside and encircled by conical spines ~2 cm long with a basal ring made up of tawny hairs¹ (Figure 1). The culms are 3–10 m tall, 2.5–3 cm in girth with internode length of 7.5–22 cm. Culm sheath is striate, covered with dark brown hair longer than the internodes, 15–30 cm long and 10–12.5 cm broad. The leaves are 10–20 cm long, 1–2.5 cm broad, linear–lanceolate, acuminate, thin, becoming narrow at the base into a short petiole. Main vein is pale and shining; secondary and intermediate veins 4–5 pairs each, transverse veinlets conspicuous. Sheath striate, glabrous.

The species has been less utilized in economic activities due to its limited range of distribution. However, in its natural range of occurrence (i.e. Arunachal Pradesh, Meghalaya and Nagaland), it is commonly used as a fencing material⁶ and the slit pieces are used for tying thatches in the construction of native houses². In the high-altitudinal areas in Mizoram, where *S. griffithiana* grows naturally, it is used for fencing, house construction, as a source of fibre, scaffolding, etc. The species is also preferred for use in the Mizo ethnic dance ‘Cheraw’ (also known as bamboo dance) due to its high resistance to bursting. However, due to the limitations in its

availability, it is seldom used during rehearsals, but only for the main event.

Bamboo species are known to remain in the vegetative form for prolonged periods. Flowering time in bamboos differs with species; for example, the majority of species flower at every 45–50 years interval, while certain others flower after a gap of 100 years followed by mass death⁸. However, the vegetative stage has still not been described for *S. griffithiana*. The earliest record of flowering in *S. griffithiana* was reported from undivided Assam (now part of Meghalaya) during 1835 and 1910 (ref. 9). In Europe, where it was introduced, it flowered gregariously during 1967 (ref. 10). The first gregarious flowering of *S. griffithiana* in Mizoram was recorded in 1954 (ref. 11) ensued by a sporadic flowering event at the Hrangturzo area in 2008 (ref. 6).

Based on information received from the villagers, extensive ground surveys were conducted during 2019–2021 to record the gregarious flowering of *S. griffithiana* from different parts of Mizoram (Figure 2). Additionally, information on different events was gathered by interviewing local informants. The initial stage of flowering was observed in January 2019. Mass flowering followed by death of the clumps



Figure 1. Culm of *Sinarundinaria griffithiana* encircled by conical spines at the internode.



Figure 2. Flowering of *S. griffithiana* at Phawngpui National Park, Mizoram, India.

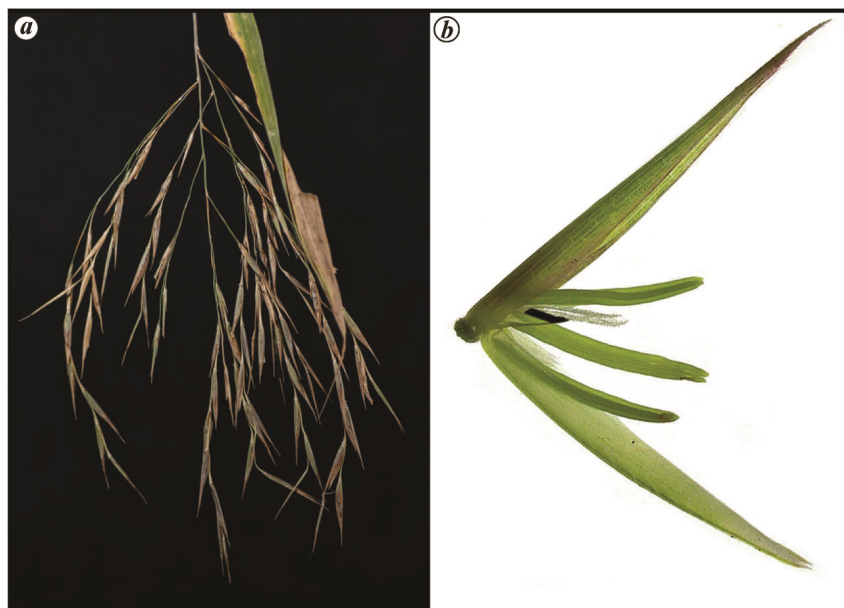
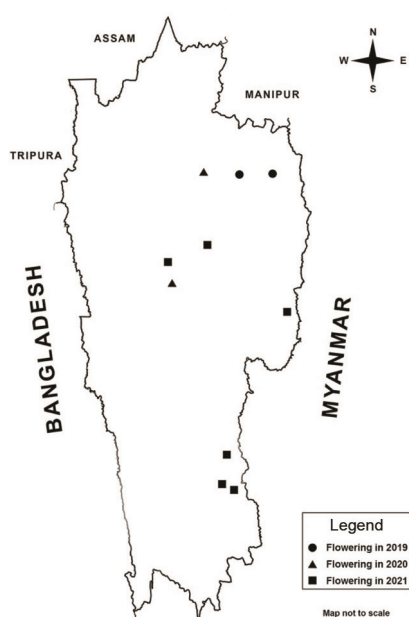


Figure 3. Inflorescence of *S. griffithiana*. *a*, Flowering twig; *b*, close-up of gynoecium and androecium.

Table 1. Localities where gregarious flowering of *Sinarundinaria griffithiana* (Munro) Chao & Renvoize was observed

Location	District	Year of flowering	Geo-coordinates	Current status
Mawmrang Tlang	Khawzawl	2019	23°49'17"N, 93°05'16"E	Flowering completed, regeneration initiated
Lengteng Tlang	Khawzawl	2019	23°49'27"N, 93°15'04"E	Flowering completed, regeneration initiated
Chalfilh Tlang	Aizawl	2020	23°50'55"N, 92°55'49"E	Flowering completed
Sailam	Aizawl	2020	23°21'04"N, 92°47'38"E	Flowering completed
Phawngpui National Park	Lawngtlai	2021	22°41'26"N, 93°02'55"E	Flowering
Niawh Tlang	Siaha	2021	22°29'03"N, 93°04'23"E	Flowering
Tlangpuikawn	Siaha	2021	22°29'42"N, 93°01'23"E	Flowering
Hmweifang	Aizawl	2021	23°45'11"N, 92°45'11"E	Flowering
Tawi Wildlife Sanctuary	Saitual	2021	23°32'20"N, 92°57'12"E	Flowering
Sazêp	Champhai	2021	23°14'20"N, 93°18'58"E	Flowering

**Figure 4.** Map of Mizoram showing the flowering sites of *S. griffithiana* (Munro) Chao & Renvoize.

was first observed in 2019 at two locations, namely Mawmrang Tlang and Lengteng Tlang. In 2020 flowering was observed at Chalfilh Tlang and Sailam. In 2021, the flowering wave covered the entire natural habitat in the state (Figures 3 a and 4). Flowering was observed at an altitude ranging from 1184 (Niawh Tlang area) to

2122 m amsl (Phawngpui National Park area) (Table 1). The flowering is of dichogamous and protogynous; the gynoecium matures earlier than the androecium so as to prevent self-pollination; the androecium matures approximately after 3–4 days (Figure 3 b).

The post-flowering regeneration of the species is uncertain due its limited distributional range, narrow climatic niche and specific ecosystem requirements. Increasing anthropogenic activities in its natural habitat can aggravate the situation and adversely affect the natural regeneration of this species. Therefore, it is recommended that the Forest Department collect seeds of *S. griffithiana* from the flowering sites and germinate them in a nursery for further plantation. This event of flowering has provided the opportunity for ecologists to conduct research on different aspects of the species, like flowering phenology and ecosystem functioning.

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