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Cover: A digital art of water birds of Noyyal River and its wetlands in Coimbatore District by Megha A. Kashyap.



Extended distribution of *Trillium govanianum* Wall. ex D. Don (Melanthiaceae), an endangered species from Arunachal Pradesh, India

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The Indian Himalayan region (IHR) is known for its rich biodiversity, where a large number of threatened plant species have been reported (Mehta et al. 2021). A large number of endemic species have been found to occur from the western to eastern Himalayan regions of India. Apart from its natural beauty and mountainous terrain, it is home to various rich cultural heritage with diverse ethnic groups and languages coexisting in the region. Moreover, the state of Arunachal Pradesh which falls under the eastern Himalaya region is considered a major hub of plant diversity (Choudhury et al. 2009). A large number of both endemic and medicinally important plant species have been recorded from Arunachal Pradesh, India (Paul et al. 2005; Sarma et al. 2023). Despite the rich biological diversity of the state, the biodiversity is yet to be explored and not properly

documented.

The genus *Trillium* L. (Melanthiaceae) is represented by 38 species from North America and 11 species from Asia (POWO 2023) from which two species, viz., *Trillium govanianum* and *Trillium tschonoskii* are endemic to the Indian Himalayan region (Kubota et al. 2006; Chauhan et al. 2019, 2020). So far, the species has been recorded from other regions of Asia like Japan, which has recorded the highest number of species of this genus *Trillium* (11 species; Chauhan et al. 2019, 2020). Among the two species of *Trillium* in India, is *T. govanianum* Wall. ex D. Don is a long perennial herb with an underground medicinally important rhizome (Kubota et al. 2006). The species is commonly known as ‘Nag Chhatrī’ in India, which is native to the Himalayan region, including India, Nepal, Bhutan, China (Tibet), and Pakistan (Fukuda

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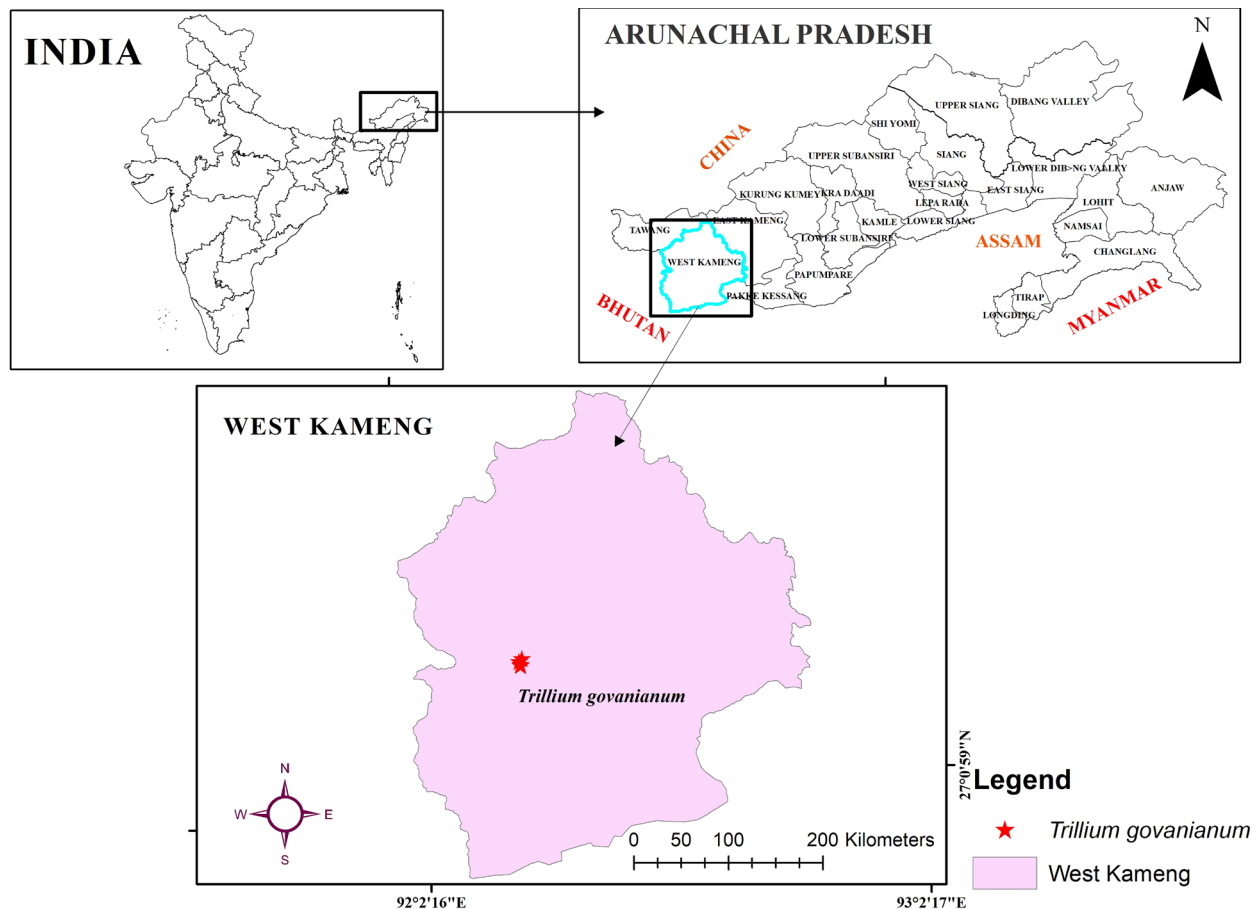


Figure 1. Distribution record of *Trillium govanianum* in Arunachal Pradesh, India.

2001; Roskov et al. 2018). The species mostly grow in the temperate and sub-alpine regions at an altitude of 2,400–3,500 m (Uniyal & Datta 2012; Sharma et al. 2018). The species distribution is restricted to distinct pockets in the Himalaya due to specialised ecological needs (Chauhan et al. 2020). In the Indian Himalaya, the species is known from Uttarakhand (Gangotri, Govind Pasu Vihar, Harsil, Kedarnath, Munsiyari, Pindari, Panchachuli, Raithal, Sukhi, Sayara, Sunderdunga, and Tehri-Garhwal in Bhagirathi Valley), Himachal Pradesh (Kullu, Shimla, Kinnaur, and Lahul Spiti), Jammu & Kashmir (Doda & Kishtwar, Bandipora district, Fatehpur, Gulmarg, Kanzalwan, Pahalgam, Poonch, Gurez, Sonamarg, Machil, Sinthan top, Lidderwat, Bangus, and Ramnagar forest range), and Sikkim (Chauhan & Bisht 2020). The population of *T. govanianum* species has drastically decreased from its natural habitat within the Himalayan region since 2010 due to its high medicinal properties which are very similar to *Paris polyphylla* Smith (Ajuha 2013). The rhizome of this species is used to treat different ailments such as inflammation, menstrual, and sexual illness and possesses other properties such

as anti-inflammatory, antifungal, and anticancer (Pant & Samant 2010; Rahman et al. 2017; Singh et al. 2017; Chauhan et al. 2019; Chauhan & Bisht 2020). Over the past few years, high demand for rhizomes in the commercial market resulted in unsustainable harvesting and over-exploitation by the local inhabitants of the Himalayan region. Therefore, the population status of the species *T. govanianum* is considered 'Endangered' under criterion A4cd as per the IUCN Red List of Threatened Species (Chauhan & Bisht 2020). While exploring medicinal plant diversity in Arunachal Pradesh from April 2022 to May 2023, an interesting species was recorded at Mandala, West Kameng District, Arunachal Pradesh. Scrutiny of relevant taxonomic literature (Hajra et al. 1996; Wu & Raven 2000), the species is identified as *Trillium govanianum*. The identity has been confirmed through consultation of protologue and image of the type specimen (E00318412image!). Even though this part of the eastern Himalaya has been aptly surveyed botanically by different botanists since the period of Griffith (1836), Hooker (1892), Ward (1929), Ward (1930), Bor (1938), none of them reported the existence of the

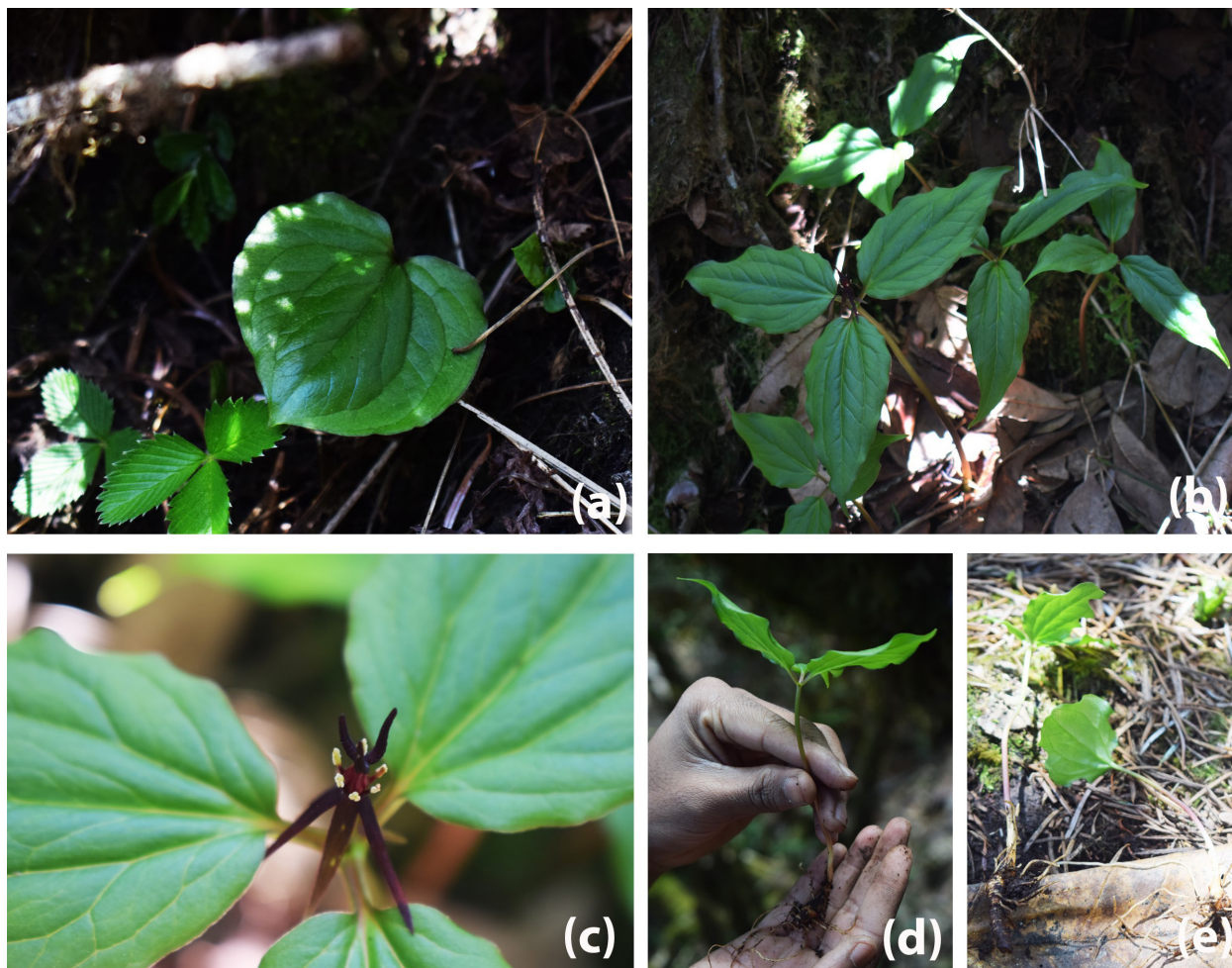


Image 1. *Trillium govanianum* Wall. ex D. Don: a–b—plants in habitat | c—flowers | d–e—rhizomes. © Bikash Kalita.

species under study in the state of Arunachal Pradesh, India. The present study also revealed that the species *T. govanianum* is one of the major associated species of *P. polyphylla* in the Mandala region. The details of information regarding the distribution of this species in the Sikkim Himalaya region are also limited. Hence, the present collection of the taxon from Arunachal Pradesh is a new record for the state.

Type: India, Himachal Pradesh, Sirmore, G. Govan sn. (E00318412 image!)

Herb, up to 30 cm tall, rhizome up to 2 cm thick, fibrous roots numerous. Leaves 3, petiole 0.3–1.5 cm long; oval to ovate or cordate, 3.5–11 × 3–11 cm, acute to acuminate, glabrous, reticulate venation. Flower solitary, terminal, pedicellate; pedicel 0.8–2.2 cm long, stout. Perianth segments, dark purple, narrowly lanceolate, outer segments broader, inner narrower. Stamens six, in two whorls, shorter than the perianth; filaments up to 4 mm long; anthers 4–5 mm long, basifixed, curved, longitudinally dehiscent. Ovary purple, 3-locular; styles

3, linear. Fruit berry, ovoid-globose, red, 1–2 cm in diameter; seeds many, oblong, small.

Flowering: April–May

Fruiting: May–June

Ecology: The species is mostly distributed under shady, moist, and low humid areas at an altitude 3,100–3,250 m along with *Paris polyphylla* Sm., *Senecio diversifolius* Wall., *Fragaria nubicola* Lindl. ex Lacaita

Distribution: India (Arunachal Pradesh, Mandala, West Kameng, 27.274° N, 92.258° E, elevation 3,154 m; Sikkim, Himachal Pradesh, Jammu & Kashmir, Uttarakhand); Afghanistan; Bhutan; China (Tibet [or Xizang] Guizhou); Nepal; Pakistan (Figure 1).

Specimen Examined: INDIA: Mandala, West Kameng, Arunachal Pradesh 27.274° N, 92.258° E, elevation 3,154 m, April 2022, B. Kalita (GUBH 20632; 07 September 2022).

Note: The species is listed as ‘Endangered’ in the IUCN Red List (3.1 version; Chauhan & Bisht 2020). The present investigation revealed that the occurrence of

the species is very rare, and the population is confined to only one locality in Arunachal Pradesh with a few individuals. The species shares the same habitat with *Paris polyphylla* in the high-altitude areas in the state, which is a fragile habitat. Therefore, for the conservation of this taxon along with other high-altitude medicinal plants, the habitat of this species needs to be declared a conservation site. A distribution map is also provided for the conservation management of this taxon.

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