

Smilacaceae

of the Indian Subcontinent



Geetika Sukhramani
Truptimayee Sahu
Ritesh Kumar Choudhary

Agharkar Research Institute

An Autonomous Institute under
Department of Science & Technology (DST)
Govt. of India



विज्ञान एवं प्रौद्योगिकी मंत्रालय
DEPARTMENT OF
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Dedicated to the Unsung Field Taxonomists

In the quiet corners of the world, amidst the diversity of lifeforms and the hidden depths of ecosystems, there exists a cadre of unsung heroes-taxonomists.

They help us comprehend the rich variety of life on Earth by precisely naming, describing, and classifying organisms.

Their determination to understand the diversity of life often goes unnoticed, but their impact is immeasurable. With painstaking precision, they breathe life into the intricate web of our planet's flora and fauna.

This book is dedicated to the taxonomists who labor in the shadows, carefully documenting and preserving the threads that bind us to the natural environment.

Your work is the foundation upon which our understanding of life on Earth is built, and your unwavering dedication to taxonomy enriches us all.

With heartfelt gratitude, we honor your valuable contributions.

May your passion continue to inspire curiosity, conservation, and a deeper connection to the world around us.



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Smilax perfoliata Lour.

Director's Message

I am delighted to congratulate Dr. Ritesh Kumar Choudhary on publishing his seminal work, “The Smilacaceae of the Indian Subcontinent.” As the Director of Agharkar Research Institute, I take great pride in its enduring legacy of actively documenting India's rich biodiversity since its establishment in 1946.

Dr. Choudhary's comprehensive exploration of the taxonomic status and classification of the *Smilax* plant group, specifically indigenous to the Indian subcontinent, is a testament to our commitment to understanding and preserving our nation's biological resources. This work not only contributes to the protection of intellectual property and prevention of biopiracy but also serves as a valuable resource for the preservation of endangered species and the exploration of natural resources for societal use.

The inclusion of colour photographs, distribution maps, and detailed information on phenology, ecology, and etymology in this publication showcases a remarkable dedication to providing a thorough understanding of each species. Despite its high level of technicality, the book's compact size makes it an excellent reference for taxonomists and a practical field guide for enthusiasts and foresters.

I sincerely thank Dr. Ritesh Kumar Choudhary, Geetika Sukhramani, and Truptimayee Sahu for their timely and significant contribution to illustrated revisions. I am confident that this work will be warmly received by scholars, environmental enthusiasts, foresters, and students worldwide, further enhancing the reputation of the MACS-Agharkar Research Institute as a leader in biodiversity documentation.

Congratulations once again, and I look forward to the continued success of our institute in advancing scientific knowledge and environmental conservation.



Prashant K. Dhakephalkar
Director, Agharkar Research Institute
Department of Science and Technology,
Government of India



Smilax munita S.C. Chen

Foreword

Within the vast realm of botanical inquiry, some plant families have consistently engrossed the minds of botanists, ecologists, and individuals with a deep appreciation for nature. The family Smilacaceae exemplifies the remarkable variety and adaptability of plant species. The *Smilax* family, which consists of armed or unarmed climbing or twining shrubs, has successfully adapted to the complicated ecosystems of the Indian subcontinent, a wide region for its remarkable biodiversity. This scholarly endeavour takes us on a fascinating trip through the green landscapes of the Indian subcontinent, including the dense jungles of the northeast Indian regions of the Eastern Himalayas. Through careful research and detailed descriptions, the authors bring to life the complex taxonomic relationships, morphological adaptations, and ecological roles that *Smilax* species in this area play. Moreover, it reminds us of the urgent need to conserve these remarkable plants and their habitats in the face of increasing environmental challenges.

As we delve into the pages of this book, we embark on a voyage of discovery, guided by the authors' expertise and deep reverence for the natural world. It is a testament to the power of science and the beauty of our planet. I am sure that "Smilacaceae of the Indian subcontinent" will spur a new generation of botanists, conservationists, and nature lovers to continue exploring and protecting our beautiful natural heritage.

After undertaking extensive field surveys in various parts of India and consulting herbarium specimens, the authors exerted great effort to investigate the Smilacaceae of the Indian subcontinent. The taxonomic description with diagnostic characters, the distribution pattern of each species with point location maps, field photographs, line drawings, key characters, and the medicinal and economic significance of all species render this work extraordinarily valuable.

I commend the authors for their outstanding contribution to botany and thank them from the bottom of my heart for sharing their expertise and enthusiasm with the world. This book should serve as a beacon of inspiration and a call to action, imploring us to appreciate and protect the magnificent biodiversity of the Indian subcontinent and beyond.



Dr. Arun K. Pandey

Former Professor of Botany
University of Delhi, Delhi, India



Smilax glabra Roxb.

Introduction

Smilacaceae is a widely distributed monocotyledonous family of angiosperms, distributed across the tropics, subtropics, and temperate regions of the World (Chen et al. 2006a; Ferrufino-Acosta 2010; Qi et al. 2013; Banki et al. 2024; POWO 2024; **Fig. 1**). The family members are characterized by their dioecious climbing and shrubby habit with stoloniferous or tuberous rhizomes, reticulate leaf venation, paired petiolar tendrils, umbellate inflorescence, and fleshy berries. Originally proposed by Ventenat in 1799, the family has undergone significant nomenclatural changes with regards to its taxonomic placement since its establishment. However, despite being variously placed under different orders, namely Liliales, Dioscorales, Asparagales or Smilacales, recent molecular systematic studies have suggested its placement within the order Liliales, closely related to the families such as, Philesiaceae, Ripogonaceae, and Liliaceae *s. str.* (Chase et al. 1995; Qi et al. 2013; Kim et al. 2013; APG IV 2016). The Ripogonaceae and Philesiaceae members, characterized by climbing and woody habits, are predominantly found in the southern hemisphere, while Liliaceae members, with a non-climbing habit, are from the northern hemisphere. In contrast, the Smilacaceae family is notable for its cosmopolitan distribution, spanning both the northern and southern hemispheres and encompassing both climbing and non-climbing habits. This unique distribution makes Smilacaceae a valuable system for understanding the evolution and northward migration of Liliales from their southern ancestors (Vinnersten & Bremer 2001; Qi et al. 2013). Furthermore, Smilacaceae is known for its controversies surrounding its constituent genera. Traditionally, it consisted of three genera *Smilax* L., *Heterosmilax* Kunth, and *Ripogonum* J.R. Forst. & G. Forst. (De Candolle 1878; Koyama 1960a; Mabberley 1997; Conran 1998). However, *Ripogonum* was treated under Ripogonaceae by Conran & Clifford (1985), Takhtajan (1997), and Chen et al. (2006b). Further molecular studies suggested the placement of *Heterosmilax* as a section within *Smilax*, indicating *Smilax* as the sole genus of the family (Cameron & Fu 2006; Chen et al. 2006a; Qi et al. 2013; Wong et al. 2023). In *Species Plantarum* (1753), Linnaeus described and named 13 species of *Smilax*. Subsequently, Kunth (1850) and De Candolle (1878) published the monographic accounts on the genus which further contributed to the understanding of the genus.

De Candolle divided the genus into four different sections, namely *Nemexia* Raf. (A. DC.), *Coilanthus* A. DC., *Eusmilax* A. DC., and *Pleiosmilax* (Seem.) A. DC. based on the perianth characters and number of stamens or ovules. Although the estimates for the size of the genus were more than 350 species worldwide (Lawerence 1951; Heywood 1993; Takhtajan 1997), the studies on Smilacaceae (Andreato 1980, 1995; Chen & Koyama 2000; Cameron & Fu 2006; Ferrufino 2010; Govaerts 2013) have indicated that more than 40% of the species can be treated as synonyms, leaving only ca. 262 species currently recognized in the family.

The genus *Smilax* with approximately 262 species exhibits incredible diversity, featuring a wide variety of habitats. Several taxonomic studies have been conducted on Smilacaceae in Asia and America by different workers, namely Koyama (1960, 1963, 1975), Noltie (1994), Chen & Koyama (2000), Dassanayake (2000), and Ferrufino-Acosta (2010). Despite some taxonomic explorations, particularly in the Eastern Himalayas, the taxonomy of the family in the entire Indian subcontinent remains poorly studied. The Eastern Himalayas and the Western Ghats are two of the prominent biodiversity hotspots among the four found within the Indian subcontinent (Myers et al. 2000), highlighting the remarkable floral diversity in these regions. Furthermore, the fact that *Smilax* are dioecious, have occasional flowering and exhibit broad variations makes classification challenging. This complexity and uncertain taxonomic status of several species make it challenging to identify them reliably (Cameron & Fu 2006; Ferrufino-Acosta 2010; Martins et al. 2013; Baruah et al. 2017). The present study is an attempt to document the diversity of Smilacaceae in the Indian subcontinent, aiming to contribute to the understanding of this family in a region of great ecological importance.

Known for its remarkable morphological diversity, *Smilax* encompasses features, such as climbing or erect stems, woody or herbaceous nature, tuberous or stoloniferous rhizomes of medicinal significance, armed or unarmed stems, and flowers borne on single or compound umbels in leaf axils (Chen & Koyama 2000; Qi et al. 2013; Sofiah & Sulistyaningsih 2019). Moreover, leaves with stipular tendrils display significant variation in terms of size, shape, apex, base, texture, petiole length, costae number, and pattern. The taxonomic classification of *Smilax* species requires a comprehensive evaluation of both vegetative and reproductive characters. The reproductive features, such as inflorescence

type, perianth state, floral bud morphology, and length of filament of stamens, hold substantial importance in taxonomic delimitation, as most of the available taxonomic keys for identifying *Smilax* species rely on the reproductive characters. Additionally, combination of vegetative characters, such as habit, stem and branch texture, the presence or absence of prickles, leaf morphology, and other relevant traits are pivotal contributors in achieving a thorough and precise identification of *Smilax* species (Sukhramani & Choudhary 2023a).

In recent years, there has been momentum for understanding *Smilax* in the Indian subcontinent. Several new distributional records and novel species have been reported from India and the genus is being extensively explored for its significant bioactivities throughout the Indian subcontinent (Baruah et al. 2011; Aftab et al. 2012; Baruah & Borthakur 2013a, b, 2014; Baruah et al. 2018; Banjara et al. 2023; Nath et al. 2023).

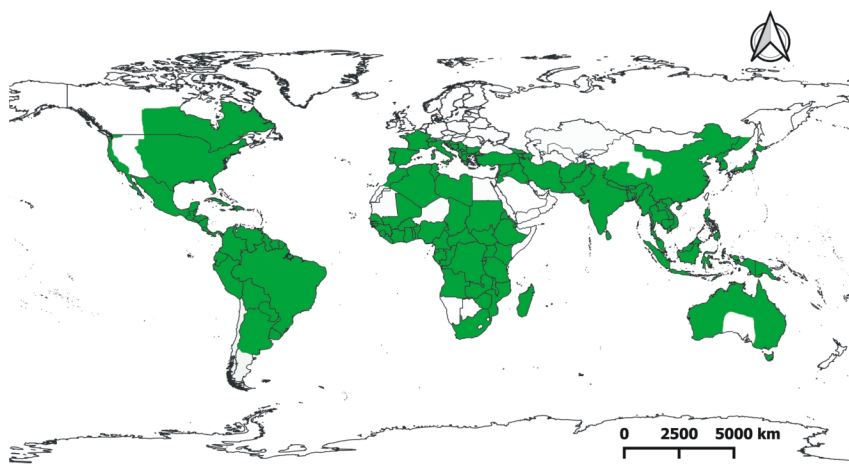


Figure 1: Worldwide distribution of the family Smilacaceae (shown in green).

Distribution of *Smilax* in the Indian subcontinent

The Indian subcontinent comprises seven countries, namely Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka (Grimmett et al. 2016; Deshpande et al. 2019; Kumar 2019). *Smilax* is represented by 36

taxa (35 species and one subspecies) in the Indian subcontinent. India, in particular, shows an extensive array of 34 taxa including 33 species and one subspecies, majorly distributed in the Eastern Himalayas and Western Ghats (Sukhramani & Choudhary 2023a). Bhutan and Nepal, entirely containing the stretch of Eastern Himalayas harbour 15 and 19 taxa, respectively (Noltie 1994; Shrestha et al. 2018; Ghimire et al. 2021; POWO 2023). Bangladesh, Pakistan, and Sri Lanka are known to shelter around 15, four, and three species of *Smilax*, respectively (Dassanayake 2000; Aftab et al. 2012; POWO 2023). Notably, no *Smilax* have been reported in the Maldives. The Indian subcontinent harbours five endemic taxa of the genus namely *S. elegans* subsp. *osmastonii* (F.T. Wang & Tang) Noltie, *S. minutiflora* A. DC., *S. sailenii* Sarma, S. Baruah & Borthakur, *S. turbans* F.T. Wang & Tang, and *S. wightii* A. DC. *Smilax wightii* stands out as a distinctive model with disjunct distribution in both the Eastern Himalayas and southern India. The overall distribution of *Smilax* in the Indian subcontinent is provided here in a map prepared based on the data gathered from our own sampling, literature, and herbarium records (Fig. 2).

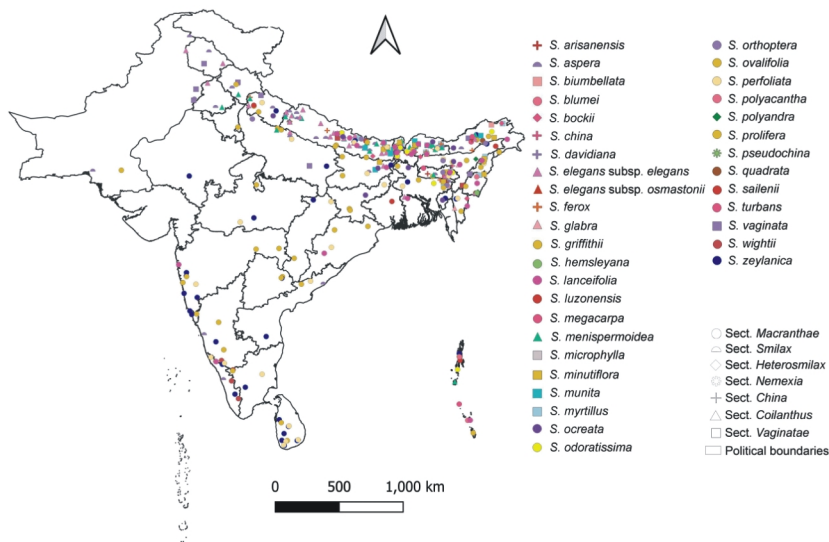


Figure 2: Map representing the distribution of *Smilax* species in the Indian subcontinent. Sections and species are represented in different shapes and colours, respectively.

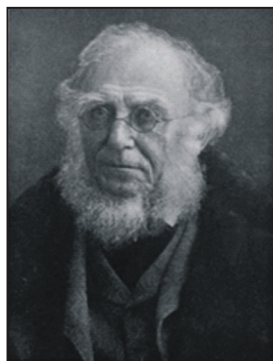
Studies on *Smilax* in the Indian subcontinent: A brief history

Despite its great economic and medicinal significance, a thorough taxonomic study on the Smilacaceae of the Indian subcontinent is hitherto unavailable. Nonetheless, some taxonomic reports and checklists have been published across the Indian subcontinent, specifically in Bangladesh, Bhutan, India, Nepal, Pakistan, and Sri Lanka. Bangladesh reports 15 *Smilax* taxa from the country (Ahmed 2008; Aftab et al. 2012; Pasha & Uddin 2013). In Bhutan, Noltie (1994) reported 14 taxa of Smilacaceae. He presented a taxonomic key for the *Smilax* taxa in Bhutan, including plants from Sikkim and Darjeeling parts of India. Additionally, he proposed new taxa, combinations, and synonyms within *Smilax* from the Eastern Himalayas and Southwest China. The findings were accompanied by detailed nomenclatural notes, species descriptions, information on locality, and phenology.

Presently, the majority of our knowledge on the Smilacaceae of the Indian subcontinent comes from the research carried out by three contributors; the particulars of these contributions are presented below:

Joseph Dalton Hooker

The pioneering work on the Indian Smilacaceae appeared in the Flora of British India by Joseph Dalton Hooker (1892), who recognized a total of 33 *Smilax* and one *Heterosmilax* species under the tribe Smilaceae of the family Liliaceae. He did not follow the sectional treatment by De Candolle, but rather divided the genus *Smilax* into two sections based on the floral characters (bud shape, perianth state, number of ovules): **Sect. I: *Coilanthus*** with globose buds, incurved tepals, and solitary ovules, represented by four species; **Sect. II: *Eusmilax*** with oblong or clavate buds, recurved tepals, and one or two ovules, represented by 29 species.



Courtesy: picryl.com

Tetsuo Koyama

Tetsuo Koyama (1960a, 1963, 1975, 1983, 1984) made significant contributions to the understanding of the taxonomy of the Smilacaceae family. Koyama (1960) revised the Asiatic species of *Smilax* and divided



the genus into six sections, namely *Pleiosmilax*, *Smilax* (L.) T. Koyama, *Macranthae* Kunth, *Coilanthus* A. DC., *China* T. Koyama, *Coprosmanthus* Torr., based on the floral characters, type of inflorescence, and habit. Realizing the importance of the Indian Smilacaceae, Koyama (1963) quoted ‘...as the **Smilaces of the Himalayas are phytogeographically closely related to those of China, Japan, and Indo-China, a final decision on many Asiatic species will not be possible without the solution of Indian**

species’. He revised the taxonomy of Indian *Smilax* largely based on the herbarium holdings, most of which were Koelz’s collections from Assam, and reported 24 species and 2 varieties. He classified them into four sections, **Sect. I: *Macranthae*** with compound inflorescence, recurved tepals, oblong or clavate buds and pedunculate umbels. The section was further divided based on the width of petiolar wings into two series, namely Ser. I: *Macranthae*, represented by nine species, and Ser. II: *Perfoliatae*, represented by four species. **Sect. II: *Smilax*** with compound inflorescence, recurved tepals, oblong or clavate buds and sessile umbels, represented by a single species. **Sect. III: *China*** with simple inflorescence, ovoid or globose buds, campanulate, yellow-green perianth and linear-elongate filaments, represented by three species, and **Sect. IV: *Coilanthus*** with simple inflorescence, ovoid or globose buds, spreading, purple perianth and connate-short filaments, represented by eight taxa. This sectional classification formed the fundamental basis of our current comprehension of *Smilax* of the Indian subcontinent. Notably, Koyama (1975, 1983) also contributed to the taxonomy of Smilacaceae of Thailand, Cambodia, Laos, and Vietnam.

Sanjib Baruah

Sanjib Baruah made substantial contributions to the study of Smilacaceae in the Indian subcontinent over the past ten years. His doctoral research focused on the taxonomy and distribution of *Smilax* in Assam, India. He described *Smilax sailenii* (Baruah et al. 2018), reported *S. china* L. from India for the first time (Baruah et al. 2011), revised the genus for Assam (Baruah et al. 2022), which included 11 species of *Smilax* and one species of *Heterosmilax*, and reported several new distributional records namely

Smilax arisanensis Hayata, *S. aspericaulis* Wall. ex A. DC., *S. glabra* Roxb., *S. lanceifolia* Roxb., *S. ocreata* A. DC., and *S. zeylanica* L. for Assam (Baruah & Borthakur 2013a, b, 2014; Baruah et al. 2022). In addition, a taxonomic assessment of *Smilax glabra*, *S. macrophylla* Roxb., *S. prolifera* Roxb., and *S. orthoptera* A. DC. was conducted by Baruah et al. (2012) based on foliar epidermal structure. Baruah (2016) also carried out a taxonomic study and habitat distribution modelling for the reintroduction of *Heterosmilax japonica* Kunth.



Courtesy: Dr. Sanjib Baruah

Furthermore, he studied the petiole anatomy of 11 *Smilax* and one *Heterosmilax* species from Northeast India (Baruah et al. 2017). Baruah made a remarkable contribution to the study of *Smilax* through systematic collection, cultivation, and upkeep of several *Smilax* species at the NEDFi Research and Development Centre situated in Khetri, Assam, India (**Fig. 3**).

Furthermore, Dr. G.V.S. Murthy revised the ‘Smilacaceae of India’ as part of the ‘Flora of India’ project led by the Botanical Survey of India. Despite the completion of this significant work, it remains unpublished as of our latest communication with the researcher.

The Smilacaceae family exhibits considerable diversity in Northeast India and the Western Ghats. While various regional revisions and taxonomic accounts have emerged over time, a comprehensive and detailed overview of Smilacaceae in India is still conspicuously absent. The checklist and floristic records of Nepal documented approximately 19 taxa of *Smilax* (Shrestha et al. 2018; Ghimire et al. 2021). Additionally, Ghimire et al. (2021) provided a taxonomic account of four *Smilax* species from Kailash Sacred Landscape Nepal. This account included a concise description, habitat information, distribution details, local names, ethnobotanical uses, etc. for these four species. The floristic studies conducted in Pakistan reported four *Smilax* species, accompanied by a taxonomic key for identification. It provided a brief description and information on phenology, type, distribution, and habitat (eFloras 2008). Dassanayake (2000) reported three *Smilax* taxa in the Flora of Ceylon, providing a key to species, detailed descriptions, ecological insights, vernacular names, and additional notes. Taken together, none of the studies give a comprehensive picture of the Smilacaceae in the Indian subcontinent.

In this study, we present a comprehensive estimate of the distribution of 35 species and one subspecies of *Smilax* within the Smilacaceae family across the Indian subcontinent. Our assessment is based on a meticulous review of relevant literature, extensive field surveys, and a thorough examination of herbarium specimens.



Figure 3: Species of *Smilax* growing at NEDFi Research and Development Centre in Khetri, Assam, India.

Medicinal and Economic Uses

Commonly known as *Sarsaparilla* or Greenbriers, *Smilax* species have been used in folk medicine since the sixteenth century and in beer brewing (Sofiah & Sulistyaningsih 2019). The therapeutic qualities of *Smilax* species have made them highly prized in traditional medicine for centuries. Majority of them share steroidal saponins, phytosterols, flavonoids, and triterpenoids as key components (Cáceres et al. 2012; Raúl et al. 2017). Their immunomodulatory, anti-oxidant, anti-convulsant, anti-microbial, anti-cancer, anti-diabetic, and other biological properties are well-documented. So, they are used to treat syphilis, rheumatism, diabetes, cancer, skin disorders, ulcers, gout, infertility, and eye illnesses (Raúl et al. 2017; Zubair et al. 2017). Some of the other uses include making candied fruit and steroidal hormones (Tobias 2007; Sofiah & Sulistyanningsih 2019). Many *Smilax* species are used as vegetables in various parts of the world. This includes their roots, leaves, tendrils, and shoots (Baruah et al. 2011; Upreti et al. 2012; Baruah et al. 2013c; Shrestha 2013; Singh 2016).

Extracts prepared from the rhizomes are used in beer brewing due to the saponin content of *Smilax* which contributes to the foaming properties of these drinks, while the stems are used in crafts or as a toothbrush to cure toothache (Morgan 2001; Ferrufino-Acosta 2010; Sulistyaningsih et al. 2018; Sofiah & Sulistyaningsih 2019; Paneru et al. 2020). *Smilax aspera* L. is believed to treat syphilis, diabetes, and rheumatism (Bhatta 2021) whereas, *S. china* is the accepted botanical source of *Chopchini*, an herbal drug in Ayurveda, used as an aphrodisiac, sudorific, demulcent, and alternative (Srivastava 1971; API 2011; Jyothi et al. 2012). One of the widespread species in India, *S. zeylanica* is used as an alternate source for *Chopchini*. It is believed to cure dysentery, gonorrhoea, venereal diseases, rheumatism, arthritis, etc. (Kekuda et al. 2018). Similarly, *S. glabra* is believed to possess anti-cancer activity in combination with *Nigella sativa* L. and *Hemidesmus indicus* (L.) R. Br. by the communities of Sri Lanka (Iddamaldeniya et al. 2006). The boiled leaf extracts of *S. lanceifolia* are commonly used as an herbal tea in Cachar, Assam. A list of various biological activities and uses of 18 *Smilax* species is provided in Table 1.

Cytological Studies

Cytological features hold substantial importance in both evolutionary and taxonomic contexts, serving as key indicators for genomic events, including but not limited to polyploidy. Several cytogenetic studies on *Smilax* have detailed karyotype characterization and chromosome numbers within the genus. Among the *Smilax* species investigated to date, the most prevalent basic chromosome number is $n=16$ (Vijayavalli & Mathew 1989; Fu et al. 1993, 1995; Huang et al. 1997). Nevertheless, other studies on *Smilax* species worldwide have identified different basic numbers, such as $n=13$, $n=14$, and $n=15$ (Vijayavalli & Mathew 1989; Fu & Hong 1990; Pizzeria et al. 2019). Other polyploids, like $n=32$, 48, 64 have also been reported in some *Smilax* species (Vijayavalli & Mathew 1989; Huang et al. 1997; Sun et al. 2015).

Despite a relatively high number of karyological studies in Brazil (Pizzai et al. 2019), and China (Fu & Hong 1990; Fu et al. 1993, 1995; Huang et al. 1997; Kong et al. 2007; Sun et al. 2015, 2016), the karyomorphology of *Smilax* species in the Indian subcontinent has been comparatively limited. Table 2 presents the available data on the chromosome count of *Smilax* species found in the Indian subcontinent.

Name of the species	Medicine																														Food
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
<i>Smilax aspera</i> L.	+	+	-	-	-	-	-	+	+	+	+	+	-	-	+	+		+	+	+	-	-	-	-	+	+	+	+	+	+	+
<i>Smilax bockii</i> Warb. ex Diels	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
<i>Smilax china</i> L.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Smilax davidiana</i> A. DC.	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Smilax ferox</i> Wall. ex Kunth	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Smilax glabra</i> Roxb.	-	+	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Smilax hemslayana</i> Craib	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Smilax lanceifolia</i> Roxb.	+	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Smilax lazomenis</i> Presl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Smilax megacarpa</i> A. DC.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+
<i>Smilax menispermoides</i> A. DC.	-	+	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Smilax microphylla</i> Wright	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Smilax ocreata</i> A. DC.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+
<i>Smilax odoratissima</i> Blume	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+
<i>Smilax ovalifolia</i> Roxb.	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Smilax perfoliata</i> Lour.	-	+	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Smilax wightii</i> A. DC.	-	+	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Smilax zeylanica</i> L.	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Table 1: Biological activities and uses of *Smilax* species. 1. Analgesic, 2. Anticancer, 3. Anticholinesterase, 4. Antiepileptic, 5. Anthelmintic, 6. Antihyperlipidemic, 7. Antihyperuricemic, 8. Anti-inflammatory, 9. Antimicrobial, 10. Antioxidant, 11. Depurative, 12. Diaphoretic, 13. Diuretic, 14. Pesticidal activity, 15. Asthma, 16. Blood purifier, 17. Cardiac problems, 18. Diabetes, 19. Dysentery, 20. Gastric problems, 21. Gum diseases, 22. Infertility, 23. Jaundice, 24. Kidney and Gallstones, 25. Rheumatic arthritis, 26. Skin diseases, 27. Syphilis, 28. Tonic, 29. Venereal diseases, 30. Food

Table 2: Chromosome count reported for *Smilax* species occurring in the Indian subcontinent.

Sr. No	Species	Gametophytic count (n)	Sporophytic count (2n)	Origin of material	Reference
1	<i>Smilax aspera</i> L.	16	32	India	Vijayavalli & Mathew (1989)
2	<i>Smilax arisanensis</i> Hayata	16	32	China	Fu et al. (1993)
3	<i>Smilax bockii</i> Warb. ex Diels	16	32	China	Fu et al. (1995)
4	<i>Smilax china</i> L.	16	32, 64, 96	China and Japan	Huang et al. (1997)
5	<i>Smilax ferox</i> Wall. ex Kunth	16	96	China	Huang et al. (1997)
6	<i>Smilax menispermoides</i> A. DC.	16	32	China	Fu et al. (1995)
7	<i>Smilax myrtillus</i> A. DC.	16	32	China	Fu et al. (1995)
8	<i>Smilax ovalifolia</i> Roxb.	16	64, 96, 128	India	Vijayavalli & Mathew (1989)
9	<i>Smilax wightii</i> A. DC.	16	32	India	Vijayavalli & Mathew (1989)
10	<i>Smilax zeylanica</i> L.	16	32	India	Vijayavalli & Mathew (1989)

Seed Morphology

Seed morphology constitutes a fundamental aspect of plant taxonomy, offering crucial information for the classification and identification of species. The seed morphology and seed coat micromorphological characters of six *Smilax* species were studied using Light Microscope (Leica M205C stereomicroscope) and Scanning Electron Microscope (SEM, Model: EVO 50, Carl Zeiss, Germany). The fruits were peeled, and the seeds were extracted, followed by washing with clean water. The seeds

were observed under a stereomicroscope to observe the external morphology such as shape, colour, and size of the seeds. For SEM, the washed seeds were directly mounted on aluminum stubs, using double-sided carbon tape, and gold-coated using an Emitech sputter coater. Samples were coated with gold for approximately 10 minutes at 15 kV. The seeds were observed using SEM at 15–20 kV acceleration voltage at 6–8 mm. The images and working distance were captured directly using SmartView software. The findings of this study revealed six different types of ornamentation, which were inconsistent with the sections classified by Koyama. Our results, as presented in **Table 2** and **Fig. 4**, align with Chen et al. (2007), indicating inconsistency in ornamentation types with the sections of the genus. Nevertheless, the data holds significance in identifying closely related species within the genus. The nomenclature for seed coat surface and shape was adopted from Chen et al. (2007).

Table 3: Seed morphology and seed surface characters of six *Smilax* species.

Species name	Length × breadth (mm)	Colour	Shape	Ornamen tation	Figure
<i>Smilax bockii</i> Warb. ex Diels	1.5 × 1.2	creamish white	sub-spheroidal	rugulate	4A, B
<i>Smilax elegans</i> Wall. ex Kunth	1.1 × 0.8	creamish-brown	ellipsoid	reticulate, lumina nearly quadrate or irregular	4C, D
<i>Smilax lanceifolia</i> Roxb.	0.6 × 0.8	dark-brown	sub-spheroidal	foveolate	4E, F
<i>Smilax ocreata</i> A. DC.	1.4 × 1.6	brown	sub-spheroidal	reticulate, lumina rounded or polygonal	4G, H
<i>Smilax orthoptera</i> A. DC.	1.6 × 1.6	yellowish-brown	spheroidal	rugulate	4I, J
<i>Smilax perfoliata</i> Lour.	1.25 × 1.5	yellowish-brown	sub-spheroidal	slightly wrinkled	4K, L

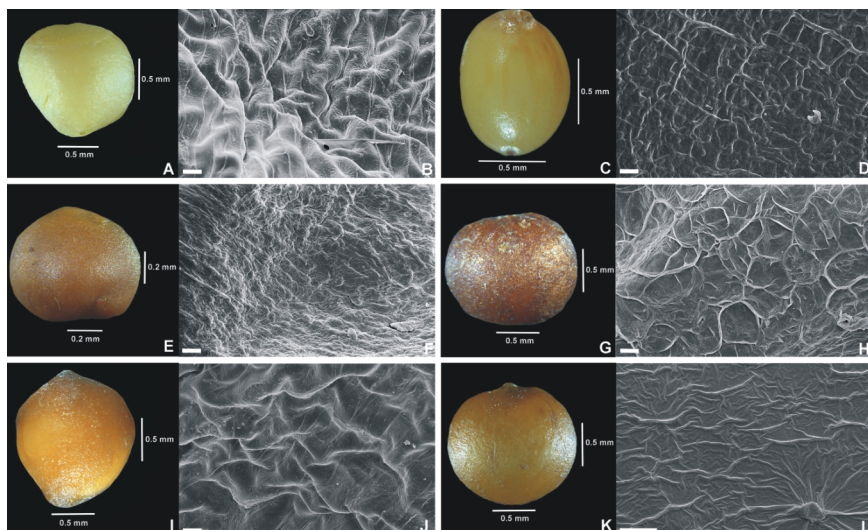


Figure 4: Micrographs of seeds using light microscopy and seed coat characteristics using Scanning Electron Microscopy. A, B: *Smilax bockii*; C, D: *S. elegans*; E, F: *S. lanceifolia*; G, H: *S. ocreata*; I, J: *S. orthoptera*; K, L: *S. perfoliata*.

Materials and Methods

The present work is based on extensive literature survey, scrutiny of the herbarium specimens, and the fresh collections made by the authors during 2021–2024. The literature survey included the recent taxonomic treatments, checklists, and national, state, and local Floras (Hooker 1892; Collett 1901; Bamber 1916; Rao & Sreeramulu 1920; Fischer 1956; Maheshwari 1963; Babu 1977; Rao & Razi 1981; Manilal & Sivarajan 1982; Balakrishnan 1983; Matthew 1983; Bakshi 1984; Chowdhery & Wadhwa 1984; Sharma et al. 1984; Ugemuge 1986; Manilal 1988; Ramachandran & Nair 1988; Bhargavan 1989; Vajravelu 1990; Pandey 1991; Singh 2001, 2002, 2016; Kothari & Moorthy 1993; Mohanan & Henry 1994; Noltie 1994; Deshpande et al. 1995; Srivastava 1996; Chauhan 1996; Lakshminarasimhan 1996; Bhattacharyya & Sarkar 1998; Dassanayake 2000; Dixit & Srivastava 2001; Sarma & Sarkar 2002; Panda & Das 2004; Khanna et al. 2005; Paria & Chattopadhyay 2005; Pradhan et al. 2005; eFloras 2008; Haines 1924; Rao & Kumari 2008; Almeida 2009; Chowdhery et al. 2009; Ganeshaiah 2012; Pusalkar 2012; Benjamin & Murthy 2013; Manikandan & Lakshminarasimhan 2013; Pal 2013; Dash &

Singh 2017; Jayanthi & Singh 2017; Karthigeyan 2017; Shrestha et al. 2018; Ghimire et al. 2021; Baruah et al. 2022). The Floras of countries neighbouring the Indian subcontinent, namely Cambodia, China, Laos, Taiwan, Thailand, and Vietnam, were also consulted (Koyama 1975, 1978, 1983; Chen & Koyama 2000) for a better understanding of the morphological variations. The notable contributions of Hooker (1892), Koyama (1963), Noltie (1994), and Baruah et al. (2011–2022) in the Indian subcontinent were considered as a baseline for this work. Various national and international herbaria (A, AHMA, ARUN, ASSAM, BM, PBL, BSHC, BSI, CAL, CALI, DACB, DD, E, G, GH, L, K, KATH, MICH, NBU, NY, P, SING, US), were either consulted virtually or in person. The type and general herbarium specimens were critically examined to understand the distribution details and inter- and intra-specific variations of the *Smilax* species in the Indian subcontinent. The investigation of Smilacaceae from countries other than India in the Indian subcontinent relied solely on pursuing a literature review and examining herbarium specimens.

Extensive field surveys were carried out in two key biodiversity hotspots, namely, Eastern Himalayas (encompassing Arunachal Pradesh, Assam, West Bengal, Meghalaya, Nagaland, and Sikkim) and the Western Ghats (spanning Karnataka, Kerala, Maharashtra, and Tamil Nadu) in India. These regions are home to the majority of *Smilax* species found in the Indian Subcontinent. The plants were collected using the following procedure:

- A. Different species and their populations were studied and photographed using a Nikon D780 digital SLR camera in their natural habitats. The diagnostic characters and floral parts were photographed in the field.
- B. The flowers and fruits were preserved in FAA-37% Formaldehyde, Glacial Acetic Acid, and Alcohol in the ratio of 10:5:50.
- C. For each taxon, the twigs (ca. 40 cm long) representing the morphological characters such as stems, leaves, prickles, flowers, or fruits were collected from their natural habitat.
- D. The collected twigs were kept in blotting papers to avoid moisture accumulation and fungal infection with frequent changes until completely dried.

After complete drying, the collected specimens were poisoned using 0.5% HgCl_2 with formaldehyde and 70% alcohol in the ratio of 1:2 and were processed into mounted herbarium sheets following conventional

herbarium techniques (Bridson & Forman 1992). For each taxon, the floral parts were dissected under a Leica Stereo Microscope (M205). The seed surface morphology was studied using a scanning electron microscope. After perusal of the literature and critical examination of various general and type specimens, the identity of the plants was ascertained. The voucher specimens are deposited in the Herbarium of Agharkar Research Institute, Pune (AHMA), and their field numbers are mentioned in the enumeration part of this book. After a thorough review and revision of the final text, AI-assisted tools (OpenAI 2024; QuillBot 2024) were further employed to improve readability and linguistic quality.

Data Presentation in The Book

This book employs conventional plant taxonomy approaches to enumerate *Smilax* species of the Indian subcontinent. The data presented in this study comprises two major parts: introduction and enumeration of species. The introduction discusses the study area, history, key contributors, significance of the genus, and the identification keys to the species. The latter part includes the descriptions and photographs/line drawings for all 36 taxa. These taxa are organized into seven sections (**Fig. 5**), following the classifications of De Candolle (1878), Koyama (1960, 1963, 1975, 1983), and Qi et al. (2013).

1. Sect. *Macranthae* Kunth: Represented by a total of 18 species, distributed throughout the Indian subcontinent.
2. Sect. *Smilax* (L.) T. Koyama: Monotypic, represented by *Smilax aspera*, distributed throughout the Indian subcontinent.
3. Sect. *Heterosmilax* (Kunth) Judd: Represented by two species, distributed in Bhutan, India, and Nepal.
4. Sect. *Nemexia* (Raf.) A. DC.: Monotypic, represented by *Smilax pseudochina*, distributed in Bangladesh.
5. Sect. *China* T. Koyama: Represented by four species, distributed in Bangladesh, Bhutan, India, and Nepal.
6. Sect. *Coilanthus* A. DC.: Represented by four taxa, distributed throughout the Indian subcontinent, except Sri Lanka.
7. Sect. *Vaginatae* T. Koyama: Represented by six species, distributed throughout the Indian subcontinent, except Sri Lanka.

Taxa under each section are arranged alphabetically. Accepted names for all

36 taxa are given in bold, followed by their protologue citation. The abbreviations for author citation or literature are as per International Plant Names Index (IPNI 2024), sometimes with slight modifications for readers's convenience. These are followed by important synonyms that connect the taxa to regional and local Floras. Enumeration of the species includes a detailed description and distribution map, followed by information about its type, diagnostic characters, phenology, distribution, etymology, and relevant notes (if any) based on field surveys, herbarium, and literature records. The distribution within the Indian subcontinent is delineated, with states and provinces indicated within round brackets, while the global distribution is provided inside square brackets. The book also provides a list of specimens that were examined to understand the morphology of the taxa. They are arranged country-wise, followed by the location, collector name, collection number, and the acronym of the herbarium where the specimen is deposited. The abbreviations *s. coll.*, *s. loc.*, and *s. n.* signify the absence of information regarding the collector, location, and collection number, respectively. The distribution map for each taxon is derived from the geographical coordinates obtained through field surveys, herbarium records, and literature sources. The taxonomic descriptions employ terminologies derived from the earlier publications of De Candolle (1878), Hooker (1892), and Koyama (1963). Numbers included in brackets like 8–12 (20) refer to exceptional limits.

The book provides photographic plates, including images of habit, habitat, vegetative key characters, inflorescence, flowers, dissected floral parts, and fruits. The dissected flower parts obtained from the preserved specimen could perhaps indicate a change in colour. For taxa that have not been gathered during field surveys or are poorly known, the inclusion of an image of the herbarium specimen or line drawings is provided. The authors personally photographed the images either in their natural habitat or under a microscope; any pictures taken by others are explicitly credited in the captions. Information on the economic and therapeutic uses of each taxon is also included at the end.

Key to the Sections in the Genus *Smilax**

- 1a. Inflorescence compound with (1) 2 to many umbels arranged on a prophyllate common axis; mature buds clavate or linear-oblong 2
- 1b. Inflorescence simple with solitary umbel, usually without a prophyll at base; mature buds ovoid or globose 3

- 2a. Inflorescence a solitary umbel or a raceme with pedunculate umbels on a common axis Sect. *Macranthae*
- 2b. Inflorescence a spike of sessile umbels on a common axis Sect. *Smilax*
- 3a. Perianth segments connate forming a tube-like structure contracted to 3–6-toothed apex; stamens 3–12 Sect. *Heterosmilax*
- 3b. Perianth segments free or rarely connate at base only; stamens 6 4
- 4a. Stems annual and herbaceous Sect. *Nemexia*
- 4b. Stems perennial and becoming woody 5
- 5a. Flowers more than 5 mm across; perianth campanulate when flowers open, yellowish-green; anthers oblong or lanceolate with linear and elongate filaments; pistillate flowers without staminodes Sect. *China*
- 5b. Flowers 2–3 mm across; perianth spreading when flowers open, purple; anthers orbicular to elliptic-orbicular, subsessile; pistillate flowers with staminodes 6
- 6a. Climbers; receptacles globose Sect. *Coilanthus*
- 6b. Shrubs or occasionally climbers; receptacles not as above Sect. *Vaginatae*

*Adopted from Koyama (1960, 1963, 1975, 1983) with modifications

Key to *Smilax* species in the Indian subcontinent

- 1a. Inflorescence compound with (1) 2 to many umbels arranged on a prophyllate common axis; mature buds clavate or linear-oblong 2
- 1b. Inflorescence simple with solitary umbel, usually without a prophyll at base; mature buds ovoid or globose 20
- 2a. Inflorescence a solitary umbel or a raceme with pedunculate umbels on a common axis 3
- 2b. Inflorescence a spike of sessile umbels on a common axis *S. aspera*
- 3a. Petiolar wings well-developed, more than 5 mm wide 4
- 3b. Petiolar wings weakly developed, 0.5–5 mm wide 8
- 4a. Petiolar wings transversely hastate, narrowed to cuneate base, not clasping the branch, and deltoid acute at apex *S. orthoptera*
- 4b. Petiolar wings broadly ovate or obovate, cordate at base, clasping the branch, and gradually narrowed to acute or rounded apex 5
- 5a. Umbels 1–3, all single at one node 6

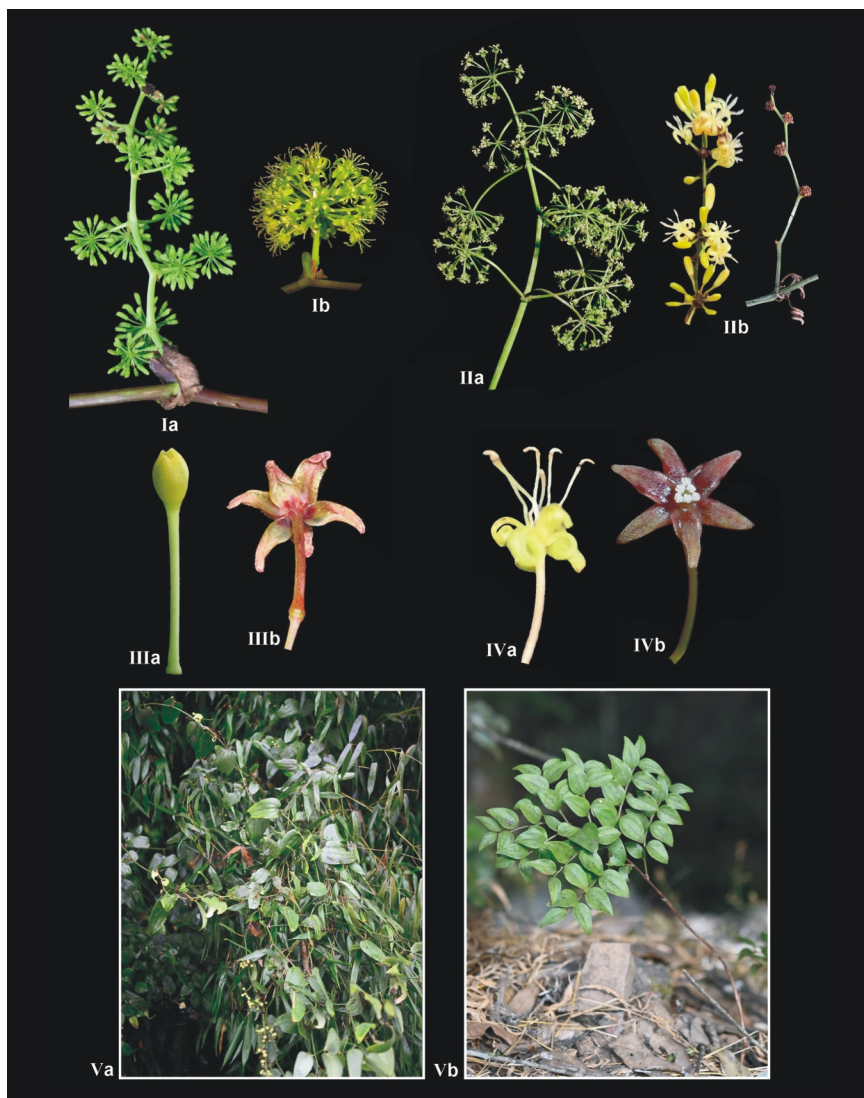


Figure 5: Key characters to the sections in the genus *Smilax* (I) Type of inflorescence: (Ia) compound, (Ib) simple. (II) Type of umbels: (IIa) pedunculate, (IIb) sessile. (III) Perianth segments: (IIIa) connate, (IIIb) free. (IV) Perianth and stamen type: (IVa) yellowish-green tepals and stamens with elongate filaments, (IVb) purple tepals and stamens subsessile. (V) Habit: (Va) Climbers, (Vb) shrubs.

5b. Umbels 7–15, arranged in whorls of 2–4 umbels at 4–6 nodes	7
6a. Leaf blades broadly ovate, 13–25 × 8–17 cm, cordate at base	<i>S. blumei</i>
6b. Leaf blades ovate-elliptic, 12–20 × 5–10 cm, rounded at base	<i>S. ocreata</i>
7a. Leaf blades broadly ovate	<i>S. perfoliata</i>
7b. Leaf blades ovate-elliptic or elliptic	<i>S. prolifera</i>
8a. Umbels 7–15	<i>S. griffithii</i>
8b. Umbels 1–7	9
9a. Stems and branches granulate-verruculose or rough	<i>S. odoratissima</i>
9b. Stems and branches non-granulate and smooth	10
10a. Mature berries 1.5–3 cm in diameter	11
10b. Mature berries less than 2 cm in diameter	12
11a. Stems and branches armed with prickles; leaf blades with 3 costae	<i>S. sailenii</i>
11b. Stems and branches unarmed; leaf blades with 5 costae	<i>S. megacarpa</i>
12a. Leaf blades with 5–9 costae, the median 3 diverging 2–10 mm above the base	13
12b. Leaf blades with 5–9 costae, all diverging at the base	16
13a. Stems and branches densely prickly	<i>S. polyacantha</i>
13b. Stems and branches sparsely prickly	14
14a. Branches sharply quadrangular	<i>S. quadrata</i>
14b. Branches obscurely angular	15
15a. Umbels 1–3; leaf blades broadly elliptic, ovate-elliptic to ovate-oblong, rounded-contracted at base; petioles 0.9–2 cm long	<i>S. zeylanica</i>
15b. Umbels 2–3; leaf blades ovate to orbicular-ovate, cordate at base; petioles 3.5–5 cm long	<i>S. wightii</i>
16a. Leaf blades broadly ovate, orbicular, or broadly elliptic, not more than 1.5 times as long as wide	17
16b. Leaf blades broadly lanceolate, linear-lanceolate, ovate-lanceolate, or narrowly elliptic, 1.5 to 2 times as long as wide	18

- 17a. Inflorescence with strictly 1 umbel on a short axis of 0.5–1 cm long; peduncles 2.5–4 cm long; petioles 1–3 cm long *S. hemsleyana*
- 17b. Inflorescence with 1–3 umbels on a short axis of 1.2–4 cm long; peduncles 1–3 cm long; petioles 0.6–3.2 cm long *S. ovalifolia*
- 18a. Leaf blades broadly lanceolate; inflorescence with strictly 1 umbel *S. lanceifolia*
- 18b. Leaf blades not as above; inflorescence with 1–3 umbels 19
- 19a. Stems angular, never terete; leaf blades linear-lanceolate or ovate-lanceolate with 7 costae; peduncles 0.9–1.2 cm long *S. turbans*
- 19b. Stems terete or subterete; leaf blades oblong-lanceolate or elliptic-lanceolate with 5–7 costae; peduncles 1–1.8 cm long *S. luzonensis*
- 20a. Perianth segments connate forming a tube-like structure contracted to 3–6-toothed apex; stamens 3–12 21
- 20b. Perianth segments free or rarely connate at base only; stamens 6 22
- 21a. Stems angular; petioles 1.5–4 cm; stamens 2–4, stamens 4/5 as long as the perianth *S. bockii*
- 21b. Stems terete; petioles 0.5–2 cm; stamens 6–12, stamens 1/3 or less than the length of the perianth *S. polyandra*
- 22a. Stems annual and herbaceous *S. pseudochina*
- 22b. Stems perennial and becoming woody 23
- 23a. Flowers more than 5 mm across; perianth campanulate when flowers open, yellowish-green; anthers oblong or lanceolate with linear and elongate filaments; pistillate flowers without staminodes 24
- 23b. Flowers 2–3 mm across; perianth spreading when flowers open, purple; anthers orbicular to elliptic-orbicular, subsessile; pistillate flowers with staminodes 27
- 24a. Stems distantly branched; leaf blades with 3 costae; umbels basally prophyllate *S. arisanensis*
- 24b. Stems densely branched; leaf blades with 5 costae; umbels basally non-prophyllate 25
- 25a. Receptacles oblong or ellipsoid *S. ferox*
- 25b. Receptacles globose or sub globose 26
- 26a. Branches strongly zigzag; petiolar wings 1–1.5 mm wide *S. china*
- 26b. Branches nearly straight; petiolar wings 2–3 mm wide *S. davidiana*

- 27a. Plants climbing; receptacles globose 28
- 27b. Plants usually shrubby, occasionally climbing; receptacles not as above 31
- 28a. Umbels almost sessile; petiolar wings narrow, less than 0.5 mm wide, non-auriculate at apex *S. glabra*
- 28b. Umbels pedunculate; petiolar wings narrow, less than 1 mm wide, deltoid at apex 29
- 29a. Branches weakly zigzag; petiolar wings linear-lanceolate; leaf blades light green and not turning grey in dry state; peduncles 2–4 cm long *S. menispermioidea*
- 29b. Branches strongly zigzag; petiolar wings oblong; leaf blades turning dark grey in dry state; peduncles 1–2 cm long 30
- 30a. Leaves papillose beneath; petiolar wings 1–2 mm wide, minutely acute at apex *S. elegans* subsp. *osmastonii*
- 30b. Leaves non-papillose beneath; petiolar wings 3–4 mm wide, deltoid at apex *S. elegans* subsp. *elegans*
- 31a. Climbers with tendrils developed up to 20 cm in length 32
- 31b. Shrubs with erect stems, tendrils none 33
- 32a. Stems and branches armed; leaf blades glaucous beneath; umbels 3–40-flowered; peduncles 2–7 mm long *S. microphylla*
- 32b. Stems and branches unarmed; leaf blades non-glaucous beneath; umbels 6–25-flowered; peduncles 20–50 mm long *S. biumbellata*
- 33a. Stems and branches angular; leaves sessile 34
- 33b. Stems and branches terete; leaves petiolate 35
- 34a. Stems and branches quadrangular and unarmed; leaf blades rhombic-ovate *S. myrtillus*
- 34b. Stems and branches 2 or 3 angled and armed; leaf blades ovate or orbicular *S. munita*
- 35a. Leaf blades lanceolate or ovate-lanceolate, 4–15 × 1.5–5 cm; peduncles 2–6 cm long *S. minutiflora*
- 35b. Leaf blades broadly ovate to ovate-orbicular, 2–6 × 1.5–5 cm; peduncles 0.5–3 cm long *S. vaginata*

Taxonomic Enumeration

Section: *Macranthae* Kunth

1. *Smilax blumei* A. DC. in A. DC. & C. DC., Monogr. Phan. 1: 202. 1878. *S. perfoliata* Blume, Enum. Pl. Javae 1: 18. 1827. *nom. illeg.* (**Fig. 6**)

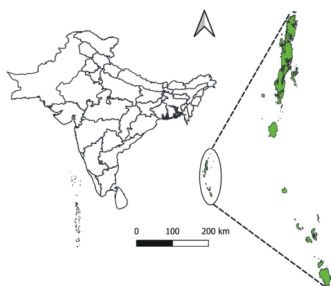
Climber, up to 10 m high; stems terete, smooth, glabrous, armed with straight or curved conical prickles, 1.5–4 mm long, distantly branched, ca. 6 mm thick; branches weakly zigzag, terete, smooth, sparsely armed with straight or curved conical prickles, striated, 3–5 mm thick; internodes 8–15 cm long. Leaves uniform in shape but variable in size; broadly ovate, 13–25 × 8–17 cm, shallowly cordate to rounded at base, acute to acuminate at apex, thin-coriaceous, glabrous, green on upper surface, glaucous on lower surface; costae 5, sometimes 7 including a weak marginal pair not reaching the apex, all diverging at the base, raised on lower surface, distinct on the upper surface, lateral veinlets irregularly divided, forming relatively loose polygonal reticulations; petioles 4.5–7 cm long, rather curved at the middle, winged for 25–35 mm from the base; wings ovate to obovate, auriculate, ca. 7 mm wide, acute at apex; stipular tendrils 5–18 cm long. Inflorescence umbellate; umbels 1–3(10) on a short axis of 1–3 cm long, basally prophyllate; prophylls completely enclosed in the petiolar wings. Staminate umbels 30–50-flowered; pistillate umbels 20–40-flowered; receptacles globose, 5–7 mm in diam.; peduncles 6–10 cm long, bracts rounded-deltoid, ca. 6 mm long; pedicels filiform, 10–18 mm long in staminate umbels, 2.5 cm long in pistillate umbels. Staminate tepals 6; outer tepals oblong, obtuse at apex, 7–10 × ca. 1.5 mm; inner tepals narrow; recurved at anthesis, clavate in bud; stamens 6, inserted, 2.3–2.5 mm long; anthers lanceolate, ca. 1.5 mm long; filaments ca. 0.8 mm long. Pistillate flowers unknown. Berries globose, ca. 10 mm in diam., dark purple at maturity.

Type: Lectotype (designated by Koyama 1960b): Java, *G.L. Blume s. n.* (BO).

Diagnostic characters: Leaf blades broadly ovate, 13–25 × 8–17 cm, glaucous beneath; petiolar wings ovate and well-developed, ca. 7 mm wide.

Phenology: Fls.: November–February; Frts.: March–July.

Distribution: INDIA (Andaman & Nicobar). [AUSTRALIA, MALAYSIA, THAILAND].



Etymology: The species was named in honour of Carl Ludwig von Blume (1796–1862), a German-Dutch botanist who made significant contributions to the study of flora of South Asia.

Specimens examined: Tenasserim & Andamans, *s. loc.*, *Helper* 5450 (K), INDONESIA. Sumatra, Lampung, *M. Jacobs* 8429, 8251 (L), MALAYSIA. Perak, *Dr. King's Collector* 10598 (CAL), THAILAND. Kamala, Ranong, *A.F.G. Kerr* 16539 (L).

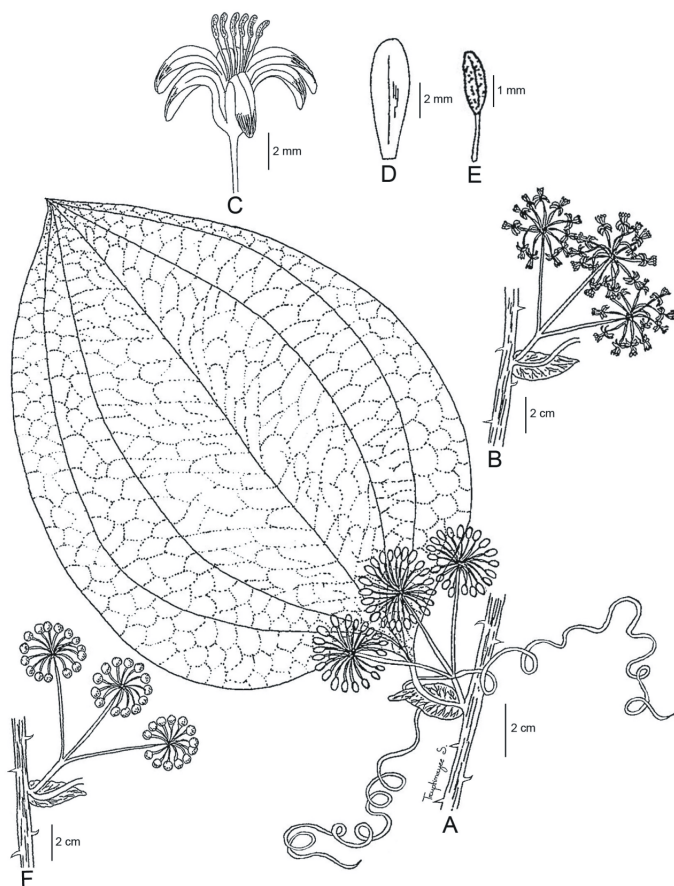


Figure 6: *Smilax blumei* A. DC. – A. branch with pistillate buds; B. staminate inflorescence; C. staminate flower; D. staminate tepal; E. stamen; F. infructescence [Drawn by Truptimayee Sahu from L1453762, and L1453761 (L)].

2. *Smilax griffithii* A. DC. in A. DC. & C. DC., Monogr. Phan. 1: 198. 1878. *S. griffithii* var. *pallescens* (A. DC.) T. Koyama, Advancing Frontiers Pl. Sci. 4: 45. 1963. (Fig. 7)

A woody climber; stems terete, smooth or granulate-verrucose, glabrous or sometimes pubescent, sparsely prickly, 4.5–9 mm thick; branches straight, terete or obtusely angled, smooth or granulate-verrucose, sparsely prickly with straight conical prickles, 1–2 mm long, striated, 3.5–7.5 mm thick; internodes 3–6 cm long. Leaves uniform in shape; ovate-elliptic to ovate, 14–26 × 7–14 cm, cuneate to abruptly contracted at base, acuminate at apex, herbaceous or thin-coriaceous, glabrous, pale green on upper surface, whitish green on lower surface; costae 7, rarely 5 or 9, all diverging at the base, raised on lower surface, lateral veinlets irregularly divided, reticulations weak on the upper surface, but prominent on lower surface; petioles 2–4 cm long, ascending, winged for 10–20 mm from the base; wings obovate, narrow, ca. 4 mm broad, obtuse at apex, more or less caducous; stipular tendrils often develop at maturity, 8–20 cm long, sometimes absent. Inflorescence umbellate; umbels 7–15, grouped in whorls of 2–4 umbels at 4 or 5 nodes on inflorescence axis of 10–15 cm long, basally prophyllate; prophylls ovate, 8–10 mm long, acute at apex. Staminate umbels 20–35-flowered; pistillate umbels 10–20-flowered; receptacles globose, 1.5–2.5 mm in diam.; peduncles 1–3.5 cm long; pedicels 5–12 mm long. Staminate tepals 6; outer tepals oblong-obovate, rounded at apex, 3.5–4.5 × 1–1.5 mm; inner tepals linear and narrow; recurved at anthesis, yellowish-green, obovoid in bud; stamens 6, exserted, 6–6.5 mm long; anthers oblong, ca. 1.5 mm long; filaments 4.5–5 mm long. Pistillate tepals 6; 2.5–3.5 mm long in mature buds; ovary ovoid, 3.5–4.5 mm long; stigmas 3, 0.4–0.6 mm long, recurved. Berries unknown.

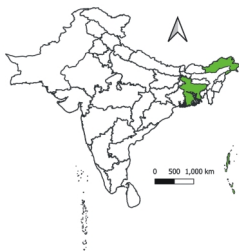
Type: Holotype: MYANMAR. *s. loc.*, *Griffith 5444*, K000820883 (K!).

Diagnostic characters: Woody climber; stems and branches minutely granulate-verrucose; leaves ovate-elliptic with seven costae; inflorescence with 7–15 umbels.

Phenology: Fls.: November–April.

Distribution: BANGLADESH, INDIA (Andaman & Nicobar, Arunachal Pradesh). [MYANMAR, THAILAND].

Etymology: The species was named in honour of William Griffith (1810–1845), a British botanist and naturalist who made noteworthy contributions to the floristic studies in Asia.



Specimens examined: INDIA. Andaman & Nicobar: South Andaman, *K. Thothathri* 10229 (CAL); Arunachal Pradesh: Abor Hills, Rotung, *I.H. Burkill* 36826 (CAL); Lower Dibang Valley, Mehao lake, *M. Bhaumik & M.K. Pathak* 1860 (CAL); Tirap, Khonsa, *R.K. Choudhary & Geetika Sukhramani* 2769, 2770, 2771, 2772 (AHMA); Upper Siang, Nyering - Mankota, *M. Bhaumik* 36812 (ARUN).



Figure 7: *Smilax griffithii* A. DC. — A. habit; B. staminate flowering branch; C. staminate inflorescence; D. staminate umbel; E. staminate flower; F. peduncle and pedicel; G. staminate tepal; H. pistillate flowering branch (inset: armed stem); I. pistillate inflorescence; J. carpel (Photos B, C, D, E, F & G: Dr. Dipankar Borah).

3. *Smilax hemsleyana* Craib, Bull. Misc. Inform. Kew 1912(10): 409. 1912. *S. zeylanica* subsp. *hemsleyana* (Craib) T. Koyama, Fl. Thailand 2(3): 218. 1975. (Fig. 8)

Climber; stems terete to subterete, smooth, glabrous, armed with straight conical prickles, 1–2 mm long, distantly branched, 3–5 mm thick; branches slightly zigzag, terete to subterete, smooth, armed with straight conical prickles, striated, 2–3 mm thick; internodes 2–8 cm long. Leaves variable in size but uniform in shape; broadly ovate-orbicular to ovate to rarely elliptic, 5.5–12 × 2.5–10 cm, truncate to abruptly contracted at cuneate base, shortly acuminate at apex, thick-herbaceous to thin-coriaceous, glabrous; costae 5, including a weak marginal pair, all diverging at the base, strongly raised on lower surface, lateral veinlets oblique, making loose reticulations; petioles 1–3 cm long, straight, winged for 6–10 mm from the base; wings narrow, 0.8–1.2 mm wide, auriculate at apex; stipular tendrils upto 20 cm long. Inflorescence umbellate; umbels solitary on an axis of 0.5–1 cm long, basally prophyllate; prophylls ovate, 5–6 mm long, acute at apex. Staminate umbels 20–40(–60)-flowered, pistillate umbels 25–30(–40)-flowered; receptacles oblong, 3–5 mm long; peduncles 2.5–4.5 cm long, 1 or 2 bracts at the base, bracts ovate, 4–5 mm long; pedicels filiform, 0.8–1 cm long. Staminate tepals 6; outer tepals lanceolate to oblong, obtuse at apex, ca. 5 × 1 mm; inner tepals narrow; recurved at anthesis, white; stamens 6, exserted, 6.6–6.8 mm long; anthers oblong, 0.6–0.8 mm long, curved; filaments ca. 6 mm long. Pistillate tepals 6; outer tepals elliptic to oblong-elliptic, rounded at apex, 4–4.5 × 1–1.7 mm; inner tepals lanceolate, narrow; ovary ovoid, ca. 5 mm long; stigmas 3, ca. 1.5 mm long, recurved; staminodes 3. Berries globose, 6–8 mm in diam.

Type: Lectotype (designated by Kladwong et al. 2018a): THAILAND. Chiang Mai, Doi Suthep, *A.F.G. Kerr* 596, K000292111 (K!).

Diagnostic characters: Leaf blades ovate-orbicular to ovate with truncate to cuneate base; petioles elongate, up to 3 cm long; umbels solitary on a short axis, arising from the prophyllate axil.

Phenology: Fls.: March–May; Frts.: June–September.

Distribution: INDIA (Manipur). [CHINA, MYANMAR, THAILAND].

Etymology: The species was named in honour of William Botting Hemsley (1843–1924), a British botanist who made significant contributions to the study of plants, particularly in China.



Specimens examined: INDIA. Manipur: Poishing, *George Watt* 7423 (K), THAILAND. Chiang Mai, Doi Suthep, *A.F.G. Kerr* 596 (K); *ibid.*, Mae Jam, Karen, *J.F. Maxwell* 98-634 (L).

Notes: *Smilax hemsleyana* closely resembles *S. zeylanica*, exhibiting minute differences, as outlined by Koyama (1975). In the present study, it is observed that the peduncles of *S. hemsleyana* are longer than those of *S. zeylanica*, measuring 2.5–4.5 cm as opposed to 1–2.5 cm.

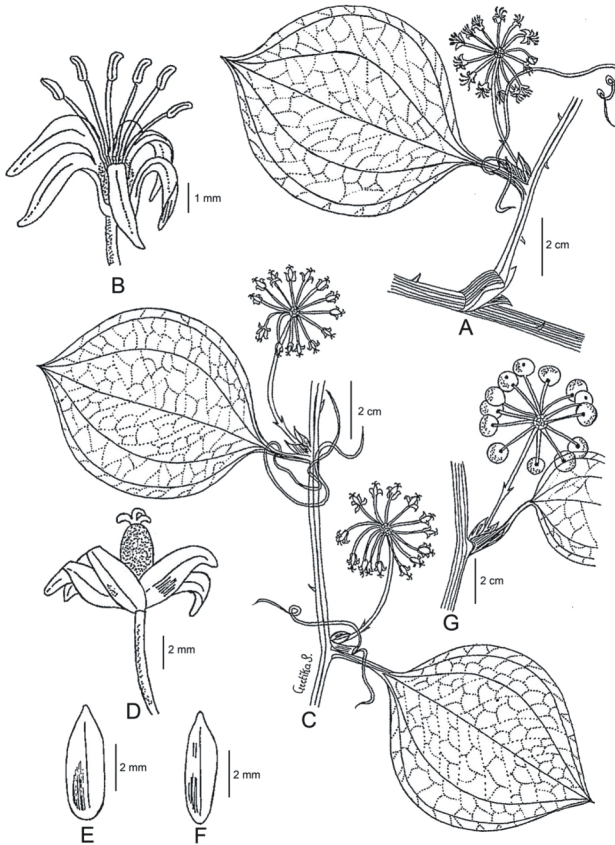


Figure 8: *Smilax hemsleyana* Craib – A. staminate flowering branch; B. staminate flower; C. pistillate flowering branch; D. pistillate flower; E, F. pistillate tepals-outer and inner; G. branch with infructescence [Drawn by Geetika Sukhramani from K000292111, K000292112 (K), and L1463353 (L)].

4. *Smilax lanceifolia* Roxb., Fl. Ind. 3: 792. 1832. (Fig. 9)

Climber; stems terete, smooth, glabrous, unarmed or sparsely armed with straight or curved prickles, distantly branched, 4–6 mm thick; branches slightly zigzag, terete or obscurely angular, smooth, unarmed in flowering branches, non-striated, 2–3 mm thick; internodes 1.5–6 cm long. Leaves variable in size and shape; broadly lanceolate to elliptic-lanceolate to ovate-lanceolate, $5\text{--}17 \times 1.5\text{--}8$ cm, contracted to rounded at base, abruptly caudate at apex, herbaceous to membranaceous to thin-coriaceous, glabrous, slightly shiny above; costae 5, including a weak marginal pair, all diverging at the base, strongly raised on lower surface, lateral veinlets oblique, making loose reticulations; petioles 1–2.5 cm long, curved above the middle, winged for 4–8 mm from the base; wings narrow, 0.5–1 mm wide, sometimes auriculate at apex; stipular tendrils 6–15 cm long. Inflorescence umbellate; umbels solitary on an axis of 0.3–0.7 cm long, basally prophyllate; prophylls broadly ovate, ca. 3 mm long, apiculate at apex. Umbels of either sex 18–40-flowered; receptacles ellipsoid, 3–4 mm in diam.; bracteoles minute; peduncles 1–1.5 cm long, bracts ovate to linear, ca. 2–3 mm long; pedicels capillary to filiform, 1–1.2 cm long. Staminate tepals 6; outer tepals oblong, rounded at apex, $3\text{--}3.5 \times 1\text{--}1.2$ mm; inner tepals narrow; recurved at anthesis, yellowish-green, clavate in bud; stamens 6, exserted, 4–4.2 mm long; anthers elliptic, ca. 1 mm long, white; filaments filiform, ca. 3 mm long. Pistillate tepals 6; outer tepals ovate-oblong, $2\text{--}2.5 \times 1$ mm; inner tepals oblong, narrow; greenish-yellow; ovary ovoid, 2–2.5 mm long; stigmas 3, flat, ca. 0.5 mm long; staminodes 3. Berries globose, 4–6 mm in diam., yellowish-green; seeds 1 or 2, orbicular, red.

Type: Lectotype (designated by Koyama 1983 as “type”, corrected here): *Roxburgh 2567* (K!).

Diagnostic characters: Leaf blades broadly lanceolate, non-glaucous beneath; umbels solitary arising from the prophyllate axil.

Phenology: Fls.: December–April; Frts.: May–November.

Vernacular names: INDIA. Andaman & Nicobar: *Ram datuan*, *Ran pavan* (Hindi); Bihar: *Gootea-shook-china* (Bhojpuri); Mizoram: *Kaiha* (Mizo).

Distribution: BANGLADESH, BHUTAN (Daga, Punakha, Trongsa), INDIA (Andaman & Nicobar,



Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, West Bengal), NEPAL (Bagmati, Gandaki, Koshi). [CAMBODIA, CHINA, LAOS, MALAYSIA, MYANMAR, TAIWAN, THAILAND, VIETNAM].

Etymology: The specific epithet is derived from the Latin words “*lancea*” meaning spear and “*folia*” meaning leaves, which describes the lance-shaped leaf blades of the species.

Specimens examined: INDIA. Arunachal Pradesh: Papum Pare, Lenka village, *M. Bhaumik* 2398 (CAL); East Siang, Rottung, *R.K. Choudhary & Geetika Sukhramani* 2629 (AHMA); Karnataka: Mangalore, Cheneburi, *R.F. Hohenacker* 122 (U); Kerala: Kannur, Paithalmala, *Geetika Sukhramani & Aditi Sarawgi* 1973 (AHMA); Meghalaya: East Garo hills, Rongjeng, *R.K. Choudhary & Geetika Sukhramani* 2686 (AHMA); East Khasi hills, Langkyrdem, *R.K. Choudhary & Geetika Sukhramani* 2666 (AHMA); Jaintia Hills, Jowai, Myntdu valley, *R.K. Choudhary & Geetika Sukhramani* 2654 (AHMA); Mizoram: Lushai Hills, Aizawl, *Walter N. Koelz* 32538 (MICH); Nagaland: Mokokchung, Changki, *R.K. Choudhary & Geetika Sukhramani* 1990, 1991, 1992 (AHMA); *ibid.* *R.K. Choudhary & Geetika Sukhramani* 2218 (AHMA).

Economic/medicinal usage: The boiled leaf extract is commonly consumed in the form of herbal tea used as an energy drink by the forest dwellers in Cachar, Assam (Dattagupta & Gupta 2014). It is also used for the removal of kidney and gall bladder stones by the people of North-East India (Laitonjam & Kongbrailatpam 2010). The root decoction is used for stomach pain and rheumatic complaints in traditional Indian medicine (Raúl et al. 2017).

5. *Smilax luzonensis* C. Presl, Reliq. Haenk. 1: 131. 1827. *S. helferi* A. DC. in A. DC. & C. DC., Monogr. Phan. 1: 176. 1878. (**Figs. 10 & 11**)

Climber; stems terete to subterete, smooth, glabrous, armed with straight conical prickles, 2–3 mm long, distantly branched, 2–5 mm thick; branches straight, terete or obtusely angular, smooth, armed with straight conical prickles, striated, 1–3 mm thick; internodes 2–7 cm long. Leaves rather uniform in shape; elliptic to broadly elliptic, sometimes oblong-lanceolate to elliptic-lanceolate, 6–15 × 2–8 cm, abruptly contracted at ends, rounded at base, mucronate to rounded to emarginate at apex, herbaceous, bright green above, pale or whitish below, but non-glaucous on lower surface; costae 5–7, including a weak marginal pair, all diverging from the base, the median 3 prominently raised on lower surface, distinct on the upper surface, lateral veinlets oblique, forming fine and minute reticulations; petioles



Figure 9: *Smilax lanceifolia* Roxb. — A. habit; B. leaves (a, b. adaxial, abaxial surface); C. branch with staminate buds; D. staminate flowering branch (inset: staminate inflorescence); E. pistillate flowering branch; F. pistillate inflorescence; G. pistillate flower (a. flower, b. outer and inner tepals, c. carpel with arrow indicating staminodes); H. branch with infructescence (inset: berries in umbel). (Photos C & D: Dr. K. Ravikumar).

0.6–3 cm long, strongly curved at the middle, winged for 3–6 mm from the base; wings linear, narrow, 1–1.5 mm wide; stipular tendrils up to 13 cm long. Inflorescence umbellate; umbels 1–3 on a short axis of 1–2.5 cm long, basally prophyllate; prophylls ovate 4–8 mm long, acuminate at apex. Staminate umbels 20–45-flowered; pistillate umbels 15–40-flowered; receptacles subglobose to elongated, 4.0–4.5 mm in diam.; peduncles 1–1.8 cm long, bracts occasionally developing a small leaf blade; pedicels filiform, 1–1.8 cm long. Staminate tepals 6; outer tepals ovate-elliptic, rounded at apex, $4-5 \times 1-1.5$ mm; inner tepals linear and narrow, obtuse at apex; recurved at anthesis, green, clavate in bud; stamens 6, inserted, 3.5–4.5 mm long; anthers oblong, ca. 1 mm long; filaments 2.5–3.5 mm long. Pistillate tepals 6; outer tepals ovate-oblong to ovate-lanceolate, sub-obtuse at apex, $3-3.5 \times 1-1.5$ mm; inner tepals narrow, subobtusate at apex; slightly recurved; ovary ellipsoid, ca. 2×1 mm in diam.; stigmas 3, ca. 1 mm long recurved; staminodes 3. Berries globose, 5–7 mm in diam., yellowish-brown at maturity; seeds 1 or 2.

Type: Lectotype (designated by Sukhramani & Choudhary 2023a): PHILIPPINES. Luzon, *s. coll.*, *s. n.*, PR290785 (PR!).



Diagnostic characters: Leaf blades elliptic to elliptic-lanceolate; umbels 1–3, subtended by a small prophyll in place of scaly bracts at the base of the peduncle.

Phenology: Fls.: September–December; Frts.: January–May.

Distribution: INDIA (Andaman & Nicobar, Arunachal Pradesh, Uttarakhand, West Bengal). [CAMBODIA, INDONESIA, LAOS, MALAYSIA, MYANMAR, PHILIPPINES, THAILAND, VIETNAM].

Etymology: The specific epithet denotes the precise geographical source and pertains to the island of Luzon in the Philippines.

Specimens examined: INDIA. Andaman & Nicobar: South Andaman, Baratang Island, *P. Bagii* 7335 (CAL); *ibid.*, Kadakachang-Hill jungle, *Dr. King's collector s. n.* (CAL); *ibid.*, Wright Myo, *N.P. Balakrishnan & N. Bhargava* 3493 (CAL); Nicobar, Car Nicobar, Kakana, *N.G. Nair* 4443 (PBL); Arunachal Pradesh: East Siang, Sirki falls, *R. Ganesan & Dupzang Lepcha* 8037 (Herbarium ATREE, Bengaluru); West Bengal: Kolkata, *Joh. W. Helfer* 508 (CAL), PHILIPPINES. Bohol, Ubay, *J.V. Santos* 6379 (US).

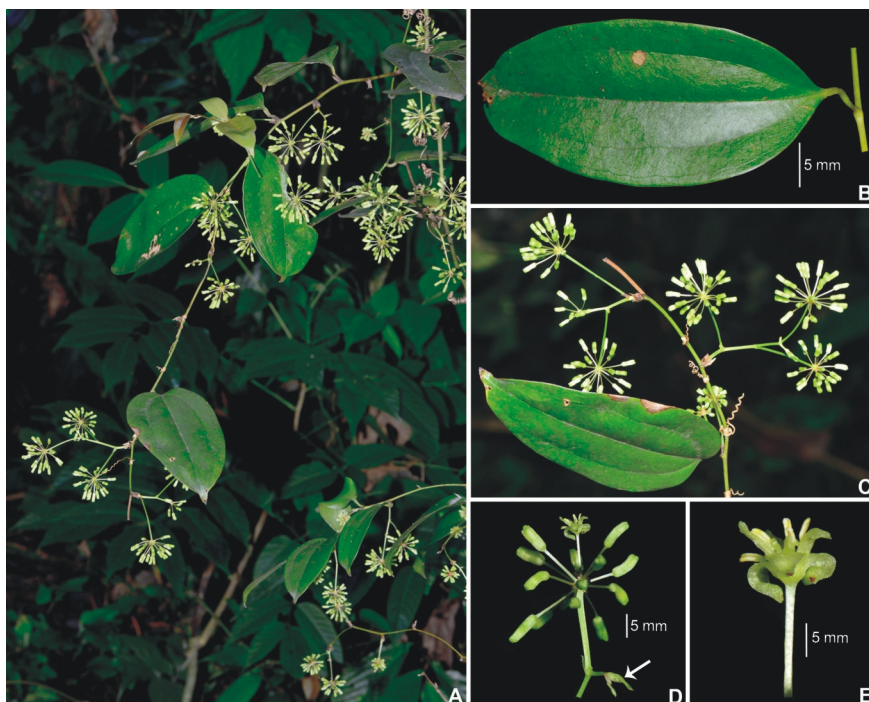


Figure 10: *Smilax luzonensis* C. Presl – A. habit; B. leaf (adaxial surface); C. staminate flowering branch; D. staminate umbel with arrow indicating prophyll; E. staminate flower. (Photos: Dr. R. Ganesan).

6. *Smilax megacarpa* A. DC. in A. DC. & C. DC., Monogr. Phan. 1:186. 1878. (Fig. 12)

Climber; stems terete, smooth, glabrous, unarmed, distantly branched, 4–6 mm thick; branches straight, terete, smooth, unarmed, striated or sometimes non-striated, 2–4 mm thick; internodes 3.5–6 cm long. Leaves variable in size and shape; broadly ovate to ovate-lanceolate to ovate-oblong to elliptic to oblong, 5–25 × 3–14 cm, abruptly contracted to cuneate at base, gradually contracted to short cusp to acuminate at apex, thick-herbaceous to thin-coriaceous, glabrous, slightly shiny and pale beneath; costae 5, including a faint marginal pair, the median 3 diverging 3–10 mm above the base, prominently raised on lower surface, fine but distinct on the upper surface, lateral veinlets weak, forming relatively faint reticulations; petioles 1.8–5 cm long, strongly curved at the middle, brownish-black

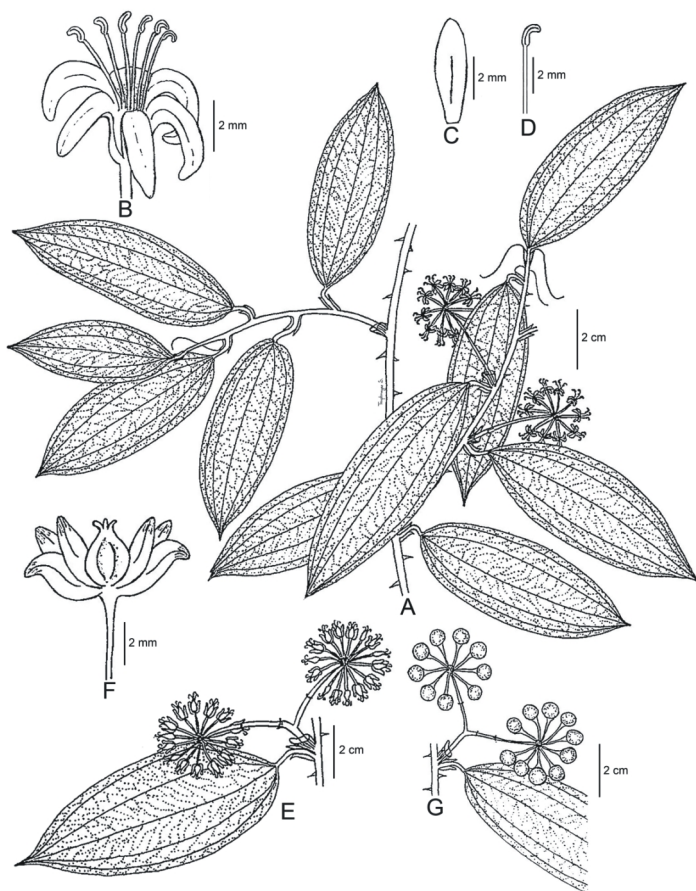


Figure 11: *Smilax luzonensis* C. Presl – A. staminate flowering branch; B. staminate flower; C. staminate tepal; D. stamen; E. pistillate flowering branch; F. pistillate flower; G. branch with infructescence [Drawn by Truptimayee Sahu from CAL0000220089, CAL0000220093, CAL0000223780 (CAL), and PR290785 (PR)].

when dried, winged for 3–10 mm from the base; wings narrow, less than 1.5 mm wide, not auriculate at apex; stipular tendrils 7–20 cm long, sometimes absent on flowering branches. Inflorescence umbellate; umbels 2 or 3 on a short axis of 1–3 cm long or rarely 1, basally prophyllate; prophylls ovate 4–10 mm long, acute at apex. Umbels of either sex 10–25-flowered;

receptacles globose to subglobose, 4–6 mm in diam.; peduncles 1.5–5.5 cm long, bracts deltoid, 2–4 mm long; pedicels filiform in staminate umbels and capillary in pistillate umbels, 1–2 cm long. Staminate tepals 6; outer tepals oblong-lanceolate, rounded to obtuse at apex, $4-5 \times 1-1.5$ mm; inner tepals linear and narrow, subacute at apex; recurved at anthesis, white or greenish-yellow; stamens 6, exserted, 5–5.2 mm long; anthers oblong-lanceolate, 1–1.2 mm long, white; filaments ca. 4 mm long. Pistillate tepals 6; outer tepals elliptic-lanceolate, subacute at apex, $3-4.5 \times 1-1.5$ mm; inner tepals narrow; recurved; ovary ovoid to ellipsoid, 2.5–3.5 mm long; stigmas 3, linear, ca. 2.5 mm long; staminodes 3. Berries globose, 1.5–2 cm in diam., yellow when young and orange-red at maturity; seeds 1–3, lenticular, ca. 7 mm long.

Type: Lectotype (designated by Sukhramani & Choudhary 2022): INDIA. Meghalaya: Khasia, *W. Griffith 5421*, K000820886 (K!).



Diagnostic characters: Climbers with unarmed stems; petioles 2–5 cm long, strongly curved; leaf blades shiny above and acute at ends; berries strikingly large, 1.5–2 cm in diam.

Phenology: Fls.: October–February; Frts.: March–August.

Distribution: INDIA (Andaman & Nicobar, Arunachal Pradesh, Meghalaya). [CAMBODIA, CHINA, INDONESIA, LAOS, MALAYSIA, MYANMAR, PHILIPPINES, THAILAND, VIETNAM].

Etymology: The specific epithet attributes to the sizable fruits, with “*mega*” meaning huge and “*carpos*” meaning fruit in Greek.

Specimens examined: INDIA. Meghalaya: Khasi Hills, Cherrapunji, *Thakur Rup Chand 6386* (MICH); West Garo Hills, Nokrek, *Thakur Rup Chand 2627* (MICH), INDONESIA. Sumatra, Gunung Leuser Nature Reserve, *W.J.J.O. de Wilde & B.E.E. de Wilde-Duyffes 14179* (L); *ibid.*, 15582 (MO), MALAYSIA. Perak, *Dr. King’s collector 5596* (CAL), THAILAND. Chiang Mai, Mae Dtang, *J. F. Maxwell 90-1214* (MO), Malaya, *s. loc.*, *Maingay 1698* (K, CAL).

7. *Smilax ocreata* A. DC. in A. DC. & C. DC., Monogr. Phan. 1: 191. 1878. *S. roxburghiana* Wall. ex Hook.f., Fl. Brit. India 6: 311. 1892. (**Fig. 13**)

Climber; stems terete, smooth, glabrous, armed with straight conical prickles, 1–2 mm long, distantly branched, 5–7 mm thick; branches weakly

zigzag, terete or obtusely angular, smooth, sparsely prickly with straight conical prickles, sometimes striated, 1–4 mm thick; internodes 3–8 cm long. Leaves uniform in shape but variable in size, ovate-elliptic, 12–20 × 5–10 cm, rounded at base, acute at apex, coriaceous, glabrous, slightly shiny above, glaucous beneath; costae 5–7, including a weak marginal pair, the median 3 diverging 8–10 mm above the base and prominently raised on lower surface, distinct on the upper surface, lateral veinlets straight or

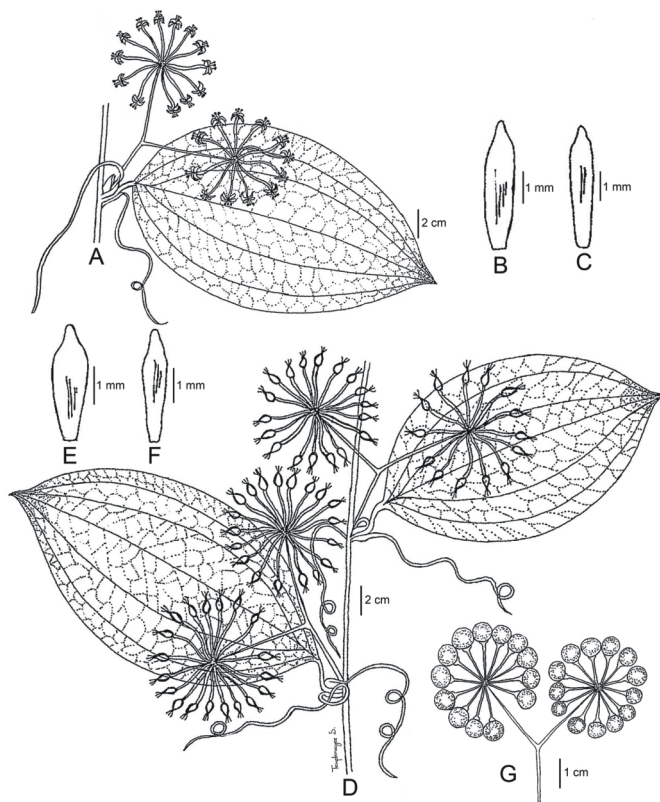


Figure 12: *Smilax megacarpa* A. DC. – A. staminate flowering branch; B, C. staminate tepals-outer and inner; D. pistillate flowering branch; E, F. pistillate tepals-outer and inner; G. infructescence [Drawn by Truptimayee Sahu from CAL0000223825 (CAL), K000292126 (K), MO-3484671, and MO-3484666 (MO)].

obliquely diverging, forming relatively weak reticulations; petioles 1.5–3 cm long, slightly curved above the middle, winged for 7–15 mm from the base; wings broadly ovate, auriculate, upto 12 mm wide, acute at apex, cordate base clasping the stem or branch; stipular tendrils 6–18 cm long. Inflorescence umbellate, umbels 1–3 on an axis of 2.5–4 cm long, basally prophyllate; prophylls ovate, ca. 10 mm long, acute at apex. Umbels of either sex 20–60-flowered; receptacles ellipsoid to elongate, ca. 3 mm long; peduncles 1.5–3.5 cm long, bracts linear, 3–4 mm long; pedicels 1–1.5 cm long. Staminate tepals 6; outer tepals oblong, obtuse to rounded at apex, $3.5\text{--}4.5 \times 1\text{--}1.5$ mm; inner tepals narrow; strongly recurved at anthesis, clavate in bud, yellowish-green to reddish-green; stamens 6, exserted, 6–7 mm long; anthers oblong, recurved, 1–2 mm long, cream-coloured; filaments filiform, ca. 5 mm long. Pistillate tepals 6; outer tepals ovate-oblong to ovate-lanceolate, obtuse or rounded at apex, $2.5\text{--}3.5 \times 1\text{--}1.2$ mm; inner tepals narrow; recurved at maturity, yellowish-green to reddish-green; ovary ellipsoid to ovoid, $1.5\text{--}2.5 \times \text{ca. } 1$ mm; stigmas 3, 0.2–1 mm long; staminodes 3. Berries globose, 8–12 mm in diam., green turning red at maturity; seeds 1 or 2, orbicular, ca. 5 mm across, red.

Type: Lectotype (designated by Kladwong et al. 2018a): INDIA. Uttarakhand: Sarju valley, Kumaon, *R. Strachey & J.E. Winterbottom* 5, K000820890 (K!).

Diagnostic characters: Leaf blades ovate-elliptic; petiolar wings ovate and well-developed, ca. 12 mm wide, cordate at base; inflorescence with 1–3 umbels.

Phenology: Fls.: April–August; Frts.: July–November.

Vernacular names: INDIA. Assam: *Phelangtung* (Karbi).

Distribution: BANGLADESH, BHUTAN, INDIA (Arunachal Pradesh, Assam, Bihar, Jharkhand, Meghalaya, Sikkim, Tripura, Uttarakhand, West Bengal), NEPAL. [CHINA, MALAYSIA, MYANMAR, VIETNAM].

Etymology: The specific epithet “*ocrea*” in Latin denotes the presence of petiolar wings, which function as a sheath or covering for the petiole.

Specimens examined: INDIA. Arunachal Pradesh: West Kameng, Khoitam, *R.K. Choudhary & Geetika Sukhramani* 2730, 2731 (AHMA); Jharkhand: Parasnath, *J.D. Hooker* 616 (K); Meghalaya: East Khasi Hills, Cherrapunji, *Walter N. Koelz* 33588 (MICH); *ibid.*, Puriang, *R.K. Choudhary & Geetika Sukhramani*



2652 (AHMA); *ibid.*, Pynursla, Risawkur village, R.K. Choudhary & Geetika Sukhramani 2290, 2291 (AHMA); Jaintia hills, Jowai, Myntdu valley, R.K. Choudhary & Geetika Sukhramani 2656 (AHMA); South Garo Hills, Kalu Songmong, R.K. Choudhary & Geetika Sukhramani 2685 (AHMA); Sikkim: North Sikkim, Naga-Namgor, R.K. Choudhary & Geetika Sukhramani 1955 (AHMA); West Sikkim, Kaluk, R.K. Choudhary & Geetika Sukhramani 1949 (AHMA); *ibid.*, Rinchenpong, R.K. Choudhary & Geetika Sukhramani 1944, 1945 (AHMA)

Economic/medicinal usage: Traditionally, the plant serves as a general health tonic and used in the treatment of various ailments including skin problems, syphilis, etc. It is also used as a flavouring agent in root beers (Talukdar 2021). Roots are used to treat urinary diseases by the Karbi tribe of Assam (Baruah 2022).

Notes: Koyama (1960, 1975, 1983), Karthikeyan et al. (1989), and Kladwong et al. (2018a) considered *Smilax ocreata* A. DC. conspecific with *S. perfoliata* Lour. However, Koyama (1963), Chen & Koyama (2000), and Dassanayake (2000) treated it as a distinct species. Based on our examination of the type specimens and fresh specimens collected during our fieldwork, we determine that *S. ocreata* should be treated as a distinct species from *S. perfoliata*. Despite its strong resemblance to *S. perfoliata*, it can be differentiated by its consistent ovate-elliptic leaves and inflorescences composed of 1–3 umbels. To find the synonymy of *Smilax roxburghiana* Wall. ex Hook.f., please see Koyama (1963).

8. *Smilax odoratissima* Blume, Enum. Pl. Javae 1: 19. 1827. *S. aspericaulis* Wall. ex A. DC. in A. DC. & C. DC., Monogr. Phan. 1: 195. 1878. (**Figs. 14 & 15**)

Climber; stems subterete to obtusely angular, densely verruculose, covered with rounded warts, 2–8 mm in diam., armed with straight or recurved prickles, 2–5 mm long, distantly branched, 3–7 mm thick; branches slightly zigzag, subterete to angular, granulate-verruculose, armed with recurved prickles or sometimes unarmed, striated, 2–3 mm thick; internodes 2–8 cm long. Leaves variable in size and shape, lanceolate-elliptic to ovate-lanceolate to ovate-elliptic to oblong to oblong-lanceolate, sometimes ovate-orbicular, 5–19 × 2–10 cm, rounded to contracted at base, subacute to acuminate at apex, sometimes contracted at mucronate apex, thick-herbaceous to coriaceous, glabrous, green on upper surface, slightly pale beneath; costae 5, including a weak marginal pair, rarely up to 7, the median

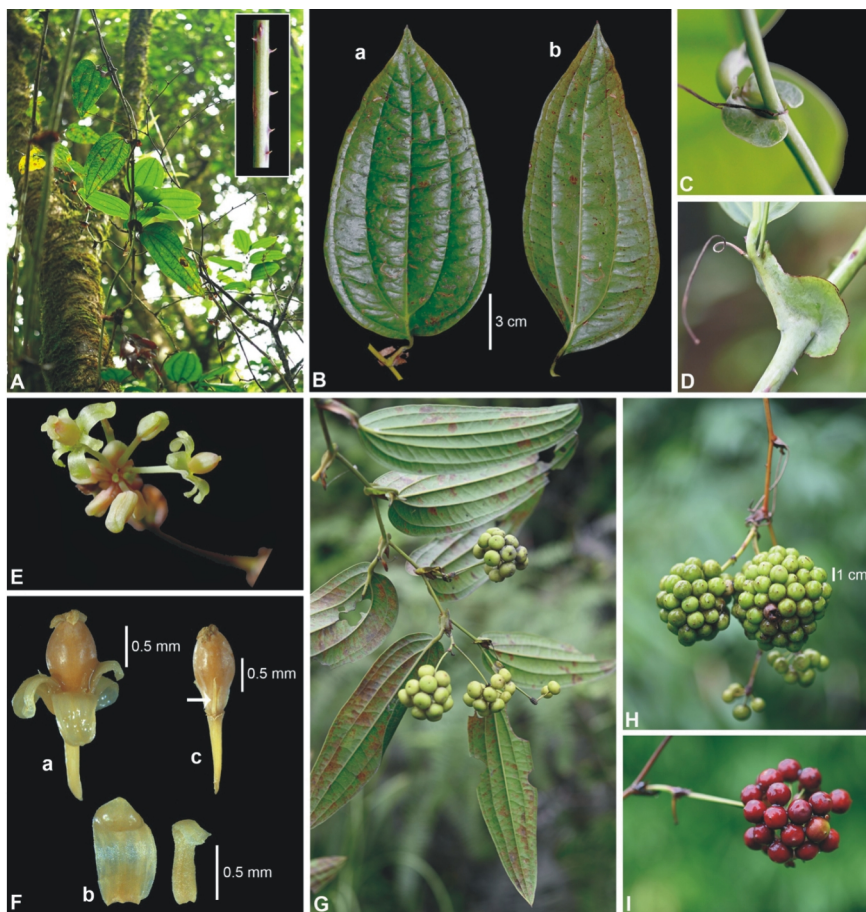


Figure 13: *Smilax ocreata* A. DC. – A. habit (inset: armed stem); B. leaves (a, b. adaxial, abaxial surface); C, D. ovate petiolar wings; E. pistillate umbel; F. pistillate flower (a. flower, b. outer and inner tepals, c. carpel with arrow indicating staminodes); G. branch with infructescence; H. infructescence with young berries; I. infructescence with mature berries.

3 diverging 3–8 mm above the base, prominently raised on lower surface, fine but distinct on the upper surface, lateral veinlets obliquely diverging, forming relatively faint reticulations; petioles 0.8–2 cm long, lower one-third granulate, curved above the middle, winged for 5–6 mm from the base; wings oblong, auriculate, narrow, 1–2.5 mm wide, acuminate at apex;

stipular tendrils 6–18 cm long. Inflorescence umbellate; umbels 1–3, sometimes up to 7 on a short axis of 2–6 cm long, basally prophyllate; prophylls ovate, 2–5 mm long, acute at apex. Umbels of either sex 8–30-flowered; receptacles compressed to flat to sometimes globose, 1–3 mm long or ca. 2 mm in diam.; peduncles 1.2–2 cm long; pedicels 0.5–2 cm long. Staminate tepals 6; outer tepals oblong to lanceolate, obtuse at apex, $4\text{--}6 \times 1\text{--}1.5$ mm; inner tepals linear and narrow; recurved at anthesis, pale yellow; stamens 6, exserted, 4–5.5 mm long; anthers linear to oblong, 1–1.5 mm long, curved, white; filaments 3–4 mm long. Pistillate tepals 6; outer tepals ovate-lanceolate, obtuse at apex, $3\text{--}3.5 \times 1\text{--}1.5$ mm; inner tepals linear and narrow; reflexed at maturity; ovary ovoid, $1\text{--}1.5 \times 1\text{--}1.2$ mm; stigmas ca. 1 mm long; staminodes 3. Berries ovoid-globose to pear-shaped, 5–7 mm in diam., dark blue to purplish-black at maturity; seeds 1–3, ca. 5 mm across, reddish brown.

Type: Neotype (designated by Sulistyaningsih et al. 2021): Java, *Blume* 463, L1462698 (L!).



Diagnostic characters: Stems and branches striated-angular and granulate-verruculose; leaf blades ovate-oblong to elliptic; petioles granulated.

Phenology: Fls.: October–February; Frts.: January–May.

Vernacular names: INDIA. Andaman & Nicobar: *Ram datun* (Hindi), NEPAL. *Dathun* (Nepali).

Distribution: BANGLADESH, BHUTAN (Daga, Paro), INDIA (Andaman & Nicobar,

Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim, West Bengal), NEPAL. [CHINA, JAPAN, MALAYSIA, MYANMAR, PHILIPPINES, TAIWAN, THAILAND, VIETNAM].

Etymology: The specific epithet attributes to the plant's potent aroma, which can be described as a pleasant or intense scent (=odor), as denoted in Latin.

Specimens examined: BHUTAN. *s. loc.*, *J. Parker s. n.* (U), INDIA. Andaman & Nicobar: South Andaman, Dhanikhari, *N.G. Nair* 834 (L); Nagaland: Mokochung, Changki, *R.K. Choudhary & Geetika Sukhramani* 2208, 2225 (AHMA); Sikkim: East Sikkim, Hanuman Tok, *R.K. Choudhary & Geetika Sukhramani* 1939, 1940 (AHMA); South Sikkim, Tendong Reserve Forest, *B. K. Shukla* 20304, 20681, 21050 (BSHC); West Sikkim, Pelling, *D. Banerjee* 3521

(BSHC); West Bengal: Alipurduar, Jaldapara National Park, Chilapatha, *K. Kavhigeyan* 61322 (CAL); Darjeeling, Rangli Rangliot, *R.K. Choudhary & M.M. Sardesai* 1915, 1916 (AHMA); *ibid.*, Singalila forest, *R.K. Choudhary & M.M. Sardesai* 1909 (AHMA).

Economic/medicinal usage: In traditional practices, the root paste is used as a hemostatic by indigenous communities of Bangladesh (Faruque et al. 2018). Stem is used for brushing teeth and treating gum conditions such as pyorrhoea and gingivitis by the traditional practitioners in Darjeeling (Bantawa & Rai 2009).

Notes: For synonymy and discussion, refer Sukhramani & Choudhary (2023a).

9. *Smilax orthoptera* A. DC. in A. DC. & C. DC., Monogr. Phan. 1: 192. 1878. (Figs. 16 & 17)

Climber; stems terete to subterete, smooth, glabrous, armed with straight conical prickles, 1–3 mm long, distantly branched, 3–4 mm thick; branches slightly zigzag, terete to subterete, smooth, sparsely prickly with straight conical prickles, striated, 1.5–2.5 mm thick; internodes 3–13 cm long. Leaves variable in size, ovate-lanceolate to ovate-oblong, 11–30 × 3–14 cm, undulate margins when dried, briefly acute to rounded at base, acute to acuminate to caudate at apex, herbaceous to coriaceous, glabrous, light green on upper surface, glaucous on lower surface; costae 5, including a weak marginal pair, the median 3 diverging 8–16 mm above the base and prominently raised on lower surface, distinct but not prominent on the upper surface, lateral veinlets obliquely diverging, forming relatively loose reticulations; petioles 1.5–4 cm long, strongly striated, rather curved, brownish-black when dried, winged for 5–15 mm from the base; wings hastate, auriculate, ca. 7 mm wide, acute at apex, certainly not clasping the stem or branch; stipular tendrils 6–20 cm long, sometimes absent on flowering branches. Inflorescence umbellate; umbels 1–3 on a short axis of 1–6 cm long, basally prophyllate; prophylls ovate to ovate-lanceolate, 1.5–6 mm long, acute at apex. Umbels of either sex 20–60-flowered; receptacles flat and elongate in staminate umbels, 5–8 mm long; receptacles ellipsoid to subglobose in pistillate umbels, ca. 6 mm in diam.; peduncles 2–7 cm long, bracts ovate, 4–7 mm long; pedicels filiform to capillary, 1–2 cm long. Staminate tepals 6; outer tepals oblong to oblong-lanceolate, obtuse at apex, 4–6 × 1–1.8 mm; inner tepals linear and narrow; strongly recurved at anthesis, clavate in bud; stamens 6, exserted, 11–11.5 mm long; anthers oblong and recurved, 0.8–1.2 mm long, creamish-white;



Figure 14: *Smilax odoratissima* Blume – A. habit (inset: vegetative branch); B. leaves (a, b. adaxial, abaxial surface); C. verruculose stem; D. staminate flowering branch; E. staminate inflorescence. (Photos D & E: Dr. N. Sasidharan).

filaments filiform, 10–11 mm long. Pistillate tepals 6; ovate to ovate-oblong, obtuse at apex, 4–5 × 1–1.5 mm; inner tepals linear and narrow; recurved at maturity, pinkish-green; ovary ovoid, 3–4 × 1–1.5 mm; stigmas 3, ca. 2 mm long, recurved; staminodes 3. Berries ovoid-globose, 7–9 mm in diam., green when young.



Figure 15: *Smilax odoratissima* Blume – A. pistillate flowering branch; B. pistillate flower; C. carpel; D. infructescence; E. staminate flowering branch; F. staminate flower; G, H. staminate tepals-outer and inner; I. stamen [Drawn by Geetika Sukhramani from BSHC00035566 (BSHC), CAL0000217527, CAL0000217528 (CAL), P02064479 (P), and U1737989 (U)].

Type: Holotype: INDIA. Meghalaya: Khasia, *J.D. Hooker & T. Thomson 18, K000820887* (K!).



Diagnostic characters: Leaf blades ovate-oblong to elliptic; petiolar wings inversely hastate, ca. 7 mm wide; umbels 1–3; pistillate flowers pinkish-green.

Phenology: Fls.: February–May; Frts.: May–August.

Vernacular names: NEPAL. *Kukurcina* (Nepali).

Distribution: BANGLADESH, BHUTAN (Trongsa), INDIA (Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim, West Bengal), NEPAL. [MYANMAR].

Etymology: The specific epithet is derived from the Greek words “*ortho*” meaning straight and “*ptera*” meaning wing, which describes the straight petiolar wings of the species.

Specimens examined: INDIA. Arunachal Pradesh: Lower Siang, Likabali, *R.K. Choudhary & Geetika Sukhramani 2795* (AHMA); Assam: Jorhat, Mariani, Akahika, *R.K. Choudhary & Geetika Sukhramani 2632, 2633, 2634* (AHMA); Kamrup, Khetri, NEDFi, *R.K. Choudhary & Geetika Sukhramani 2242* (AHMA); Tinsukia, Monkhoodli, *R.K. Choudhary & Geetika Sukhramani 2241* (AHMA); Meghalaya: East Khasi hills, Nongpoh, Walter *N. Koelz 22525, 22551* (MICH); Nagaland: Mokokchung, Changki, *R.K. Choudhary & Geetika Sukhramani 1989, 1993, 1994, 2223, 2231* (AHMA); West Bengal: Darjeeling, Ging, *R.K. Choudhary & M.M. Sardesai 1928* (AHMA); *ibid.*, Siliguri, *R.K. Choudhary & M.M. Sardesai 1929, 1930* (AHMA), NEPAL. Kathmandu: Bagmati zone, Nagarjung hill, *D.H. Nicolson 2942* (US).

10. *Smilax ovalifolia* Roxb., Fl. Ind. 3: 794. 1832. (Fig. 18)

Climber; stems terete, smooth, glabrous, armed with curved conical prickles, 1–1.5 mm long, distantly branched, 6–8(–10) mm thick; branches slightly zigzag, terete, smooth, armed with curved conical prickles, slightly striated, 4–5 mm thick; internodes 4.5–15 cm long. Leaves variable in size but uniform in shape, broadly ovate to orbicular to ovate-orbicular, 8–25(–35) × 6–14(–29) cm, cuneate to shallowly cordate at base, abruptly contracted to mucronate apex, thick-herbaceous to thin-coriaceous, glabrous, shiny on upper surface, slightly pale on lower surface; costae 5–7,

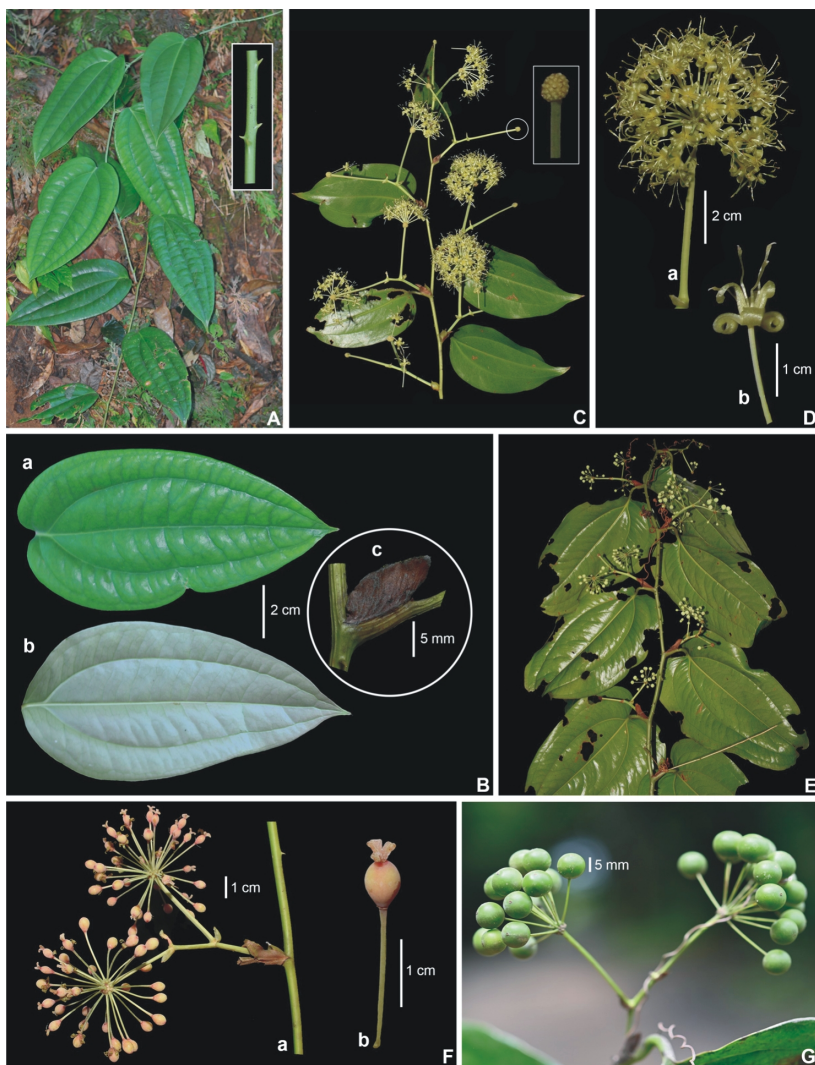


Figure 16: *Smilax orthoptera* A. DC. – A. habit (inset: armed stem); B. leaves (a, b. adaxial, abaxial surface, c. hastate petiolar wings); C. staminate flowering branch (inset: receptacles); D. staminate umbel (a. umbel, b. flower); E. pistillate flowering branch; F. pistillate inflorescence (a. inflorescence, b. carpel); G. infructescence. (Photos C, D, E & F: Dr. Dipankar Borah).

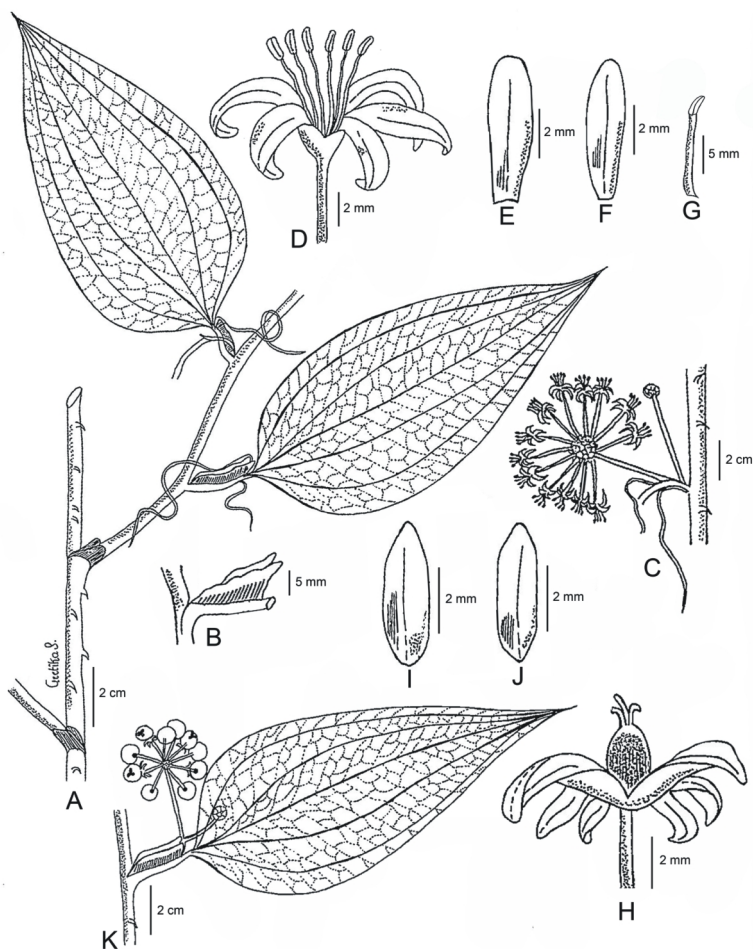
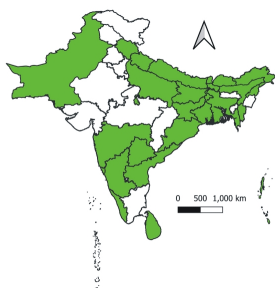


Figure 17: *Smilax orthoptera* A. DC. – A. vegetative branch; B. lateral view of petiolar wings; C. staminate flowering branch; D. staminate flower; E, F. staminate tepals-outer and inner; G. stamen; H. pistillate flower; I, J. pistillate tepals-outer and inner; K. branch with infructescence [Drawn by Geetika Sukhramani from MICH1492594 (MICH), US03940895, and US03940899 (US)].

including a weak marginal pair, all diverging at the base, or the median 3 diverging 1–1.2 cm above the base, strongly raised on lower surface, lateral veinlets obliquely diverging, making faint but dense reticulations; petioles

0.6–3.2 cm long, curved at the middle, winged for 10–14 mm from the base; wings narrow, less than 1 mm wide, not auriculate at apex; stipular tendrils up to 20 cm long. Inflorescence umbellate; umbels 1–3 on a short axis of 1.2–4 cm long, basally prophyllate; prophylls broadly ovate, 4–5 mm long, acute to acuminate at apex. Umbels of either sex 10–35-flowered; receptacles globose, 4–5 mm in diam. in staminate umbels and ca. 7 mm in diam. in pistillate umbels, both showing narrow bracteoles; peduncles 1–3 cm long, bracts ovate, ca. 3 mm long; pedicels 1–1.5 cm long. Staminate tepals 6; outer tepals oblong, obtuse at apex, 5–5.8 mm \times 1.2–1.5 mm; inner tepals narrow; recurved at anthesis; stamens 6, exserted, 8–8.5 mm long; anthers linear, 1.2–1.4 mm long; filaments ca. 7 mm long. Pistillate tepals 6; outer tepals linear-oblong, 4–5 \times ca. 1 mm; inner tepals narrow; ovary ovoid; staminodes 3. Berries globose to subglobose, 8–12 mm in diam., red at maturity; seeds 1 or 2.

Type: Lectotype (designated by Koyama 1983 as “type”, corrected here): *Roxburgh 997* (K).



Diagnostic characters: Stems and branches terete; leaf blades broadly ovate to orbicular-ovate, mucronate at apex; petioles elongate up to 3 cm long; umbels 1–3.

Phenology: Fls.: April–September; Frts.: October–January.

Vernacular names: INDIA. Andhra Pradesh: *Konda tamara*, *Konda dantena* (Telugu); Arunachal Pradesh: *Yorit* (Adi); Assam: *Tikonibarua* (Assamese); Bihar: *Kumarika* (Bhojpuri); Goa: *Kaval-kamti* (Konkani); Gujarat: *Sarsaparila* (Gujarati); Jharkhand:

Ranpawan (Santal), *Ramdatan* (Bangla); Karnataka: *Kaaduhambutaavare* (Kannada); Kerala: *Karivilanti* (Malayalam); Maharashtra: *Ghotvel* (Marathi); Manipur: *Keisumla* (Manipuri); Mizoram: *Kaihapui* (Mizo); Odisha: *Mootrilata*, *Mitri*, *Rajdantini*, *Muter* (Odia); Punjab: *Ushba* (Punjabi); West Bengal: *Kumarika*, *Ramdatun* (Bangla), *Chobchini*, *Jangliaushbah*, *Bhitura* (Hindi), *Atkir* (Santal); Tamil Nadu: *Kattukkoti*, *Ayadi*, *Malaittamalai*, *Tirunamappalai*, *Kal tamarai* (Tamil); NEPAL. *Kukur dyoti* (Nepali).

Distribution: BANGLADESH (Rangpur), BHUTAN, INDIA (Andaman & Nicobar, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Maharashtra, Mizoram, Nagaland,

Odisha, Sikkim, Telangana, Uttarakhand, Uttar Pradesh, West Bengal), NEPAL (Bagmati, Koshi, Madhesh), PAKISTAN (Sindh), SRI LANKA. [CAMBODIA, CHINA, LAOS, MYANMAR, THAILAND, VIETNAM].

Etymology: The specific epithet refers to the ovate leaf blades (*ovalis*=oval, *folia*=leaves; in Latin).

Specimens examined: Assam: Dibrugarh, Namrup, *R.K. Choudhary & Geetika Sukhramani* 2788 (AHMA); Kamrup, Khetri, NEDFi, *R.K. Choudhary & Geetika Sukhramani* 2252 (AHMA); Jharkhand: Dalma Wildlife Sanctuary, *P. Chakraborty & P. Satyanarayana* 3361, 28833 (CAL); Kerala: Kannur, Paithalmala, *Geetika Sukhramani & Aditi Sarawgi* 1974 (AHMA); Nagaland: Mokokchung, Changki, *R.K. Choudhary & Geetika Sukhramani* 2631 (AHMA); Sikkim: South Sikkim, Melli-Nayabazar Road, *R.K. Choudhary & Geetika Sukhramani* 1941, 1942, 1943 (AHMA); West Bengal: Darjeeling, Teesta valley, *R.K. Choudhary & M.M. Sardesai* 1904 (AHMA).

Economic/medicinal usage: Traditional medical practitioners in Bangladesh employ the roots for wound healing (Bhowmik et al. 2014). Roots are used in the treatment of various conditions such as rheumatism, venereal diseases, skin diseases, uterine diseases, arthritis, dysentery, urinary complaints in different parts of India. In Arunachal Pradesh and Assam (India), indigenous populations utilize the tender stems as toothbrushes to alleviate toothaches (Shah 2015; Baruah et al. 2022). Additionally, ethnic groups in Nepal and local tribes in Arunachal Pradesh utilize the tender shoots and leaves as vegetables (Upreti et al. 2012; Baruah et al. 2013c).

11. *Smilax perfoliata* Lour., Fl. Cochinch. 2: 622. 1790. (Fig. 19)

Climber; stems terete or obtusely angular, smooth, glabrous, armed with curved conical prickles, 1–4 mm long, distantly branched, up to 15 mm thick; branches weakly zigzag, terete or obtusely angular, smooth, sparsely prickly with curved conical prickles, striated, 1.5–5 mm thick; internodes 3–10 cm long. Leaves variable in size, broadly ovate, 7–25 × 5–20 cm, shallowly cordate to sometimes rounded at base, acute to cuspidate at apex, coriaceous, glabrous, slightly shiny above, glaucous beneath; costae 7, including a weak marginal pair, the median 3 diverging 8–15 mm above the base and prominently raised on lower surface, distinct on the upper surface, lateral veinlets straight, forming relatively weak reticulations; petioles 1.5–4 cm long, rather curved, winged for 8–40 mm from the base; wings broadly ovate, auriculate, ca. 12 mm wide, acute at apex, cordate base clasping the stem or branch; stipular tendrils 6–20 cm long. Inflorescence

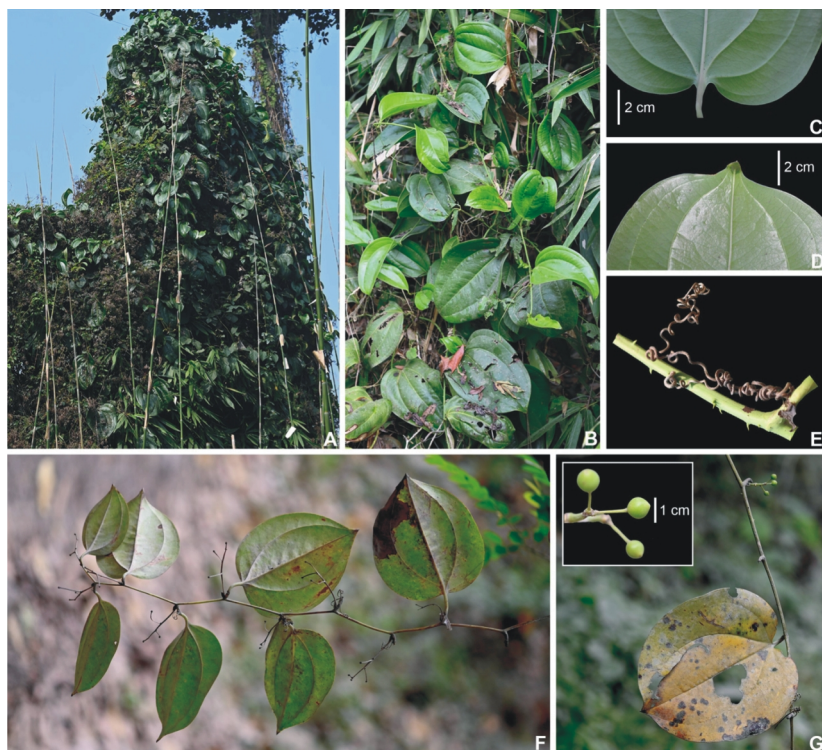


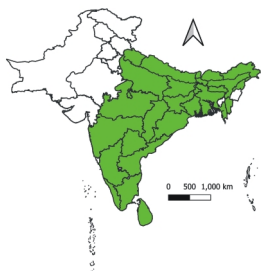
Figure 18: *Smilax ovalifolia* Roxb. A. DC. – A. habit; B. vegetative branch; C. cordate leaf base; D. mucronate apex; E. stipular tendrils; F. pistillate flowering branch; G. branch with infructescence (inset: berries in umbel).

umbellate; umbels 7–15 (2–4 umbels at 4–6 nodes) on a strongly zigzag axis of 9–15 cm long, basally prophyllate; prophylls ovate, ca. 10 mm long, acute at apex. Umbels of either sex 20–60-flowered; receptacles ellipsoid to subglobose, ca. 5 mm in diam.; peduncles 2–4 cm long, bracts linear, 3–4 mm long; pedicels 0.8–1.8 cm long. Staminate tepals 6; outer tepals oblong, obtuse at apex, 5–6 × 1–1.5 mm; inner tepals narrow; strongly recurved at anthesis, clavate in bud, yellowish-green to reddish-green; stamens 6, exserted, 6.5–7 mm long; anthers oblong and recurved, 1.5–2 mm long, cream-coloured; filaments filiform, ca. 5 mm long. Pistillate tepals 6; ovate-oblong to ovate-lanceolate, acute at apex, 4–5 × 1–1.2 mm; inner tepals narrow; recurved at maturity, green; ovary ellipsoid, ca. 2.5 mm × 1 mm; stigmas 3, ca. 1.2 mm long; staminodes 3. Berries globose, 8–12 mm

in diameter, green turning red at maturity; seeds 1 or 2, orbicular, ca. 5 mm across, red.

Type: Lectotype (designated by Koyama 1983 as “type”, corrected here). VIETNAM. Cochinchine, *Loureiro s. n.*

Diagnostic characters: Leaf blades shallowly cordate at base; petiolar wings ovate and well-developed, ca. 12 mm wide, cordate at base; inflorescence with 7–15 umbels.



Phenology: Fls.: February–July; Frts.: August–October.

Vernacular names: INDIA. Andhra Pradesh: *Pirangichekka* (Telugu); Assam: *Tikoniborua* (Assamese); Jharkhand: *Kumarika* (Bangla); Odisha: *Muter*; *Raidanti*, *Ram-datun* (Odia); Uttar Pradesh: *Ram-datun* (Hindi).

Distribution: BANGLADESH (Barisal), BHUTAN (Kurmaed, Trongsa), INDIA (Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya,

Mizoram, Nagaland, Odisha, Sikkim, Tamil Nadu, Telangana, Uttar Pradesh, Uttarakhand, West Bengal), NEPAL (Bagmati, Koshi, Madhesh), SRI LANKA (Central, North Western, Sabaragamuwa, Southern, Uva). [CAMBODIA, CHINA, LAOS, MYANMAR, TAIWAN, THAILAND, VIETNAM].

Etymology: The specific epithet is associated with the stem, which appears to pierce through the leaves (*per*= through, *folia*=leaves; in Latin).

Specimens examined: INDIA. Meghalaya: East Khasi Hills, Bholaganj Bazar, *R.K. Choudhary & Geetika Sukhramani* 2282 (AHMA); Nagaland: Mokokchung, Changki, *R.K. Choudhary & Geetika Sukhramani* 1997, 2000, 2224 (AHMA); Sikkim: West Sikkim, Geyzing, *R.K. Choudhary & Geetika Sukhramani* 1951 (AHMA); Tamil Nadu: Dhimbam-Thalamalai, *Ramesh Dishayen* 662 (HIFP); West Bengal: Darjeeling, Siliguri, University of North Bengal, *R.K. Choudhary & M.M. Sardesai* 1931 (AHMA), NEPAL. Taplejung, Papung, Mechi, *M. Suzuki et al.* 9240183 (E), SRI LANKA. Matara, Anningkanda, *S. Waas* 519 (US).

Economic/medicinal usage: Stems are used for brushing the teeth and strengthening the gums, whereas the tender shoots are used as a blood purifier by the ethnic communities of Assam (Buragohain 2011). In the traditional medical system of Bangladesh, the leaves are utilized for the treatment of diabetes (Aftab et al. 2012), and the young stems are utilized to treat diarrhoea (Howlader et al. 2019). The native communities of Sikkim utilize the roots and stems to treat arthritis (Maity et al. 2003).

Notes: The protologue of *Smilax perfoliata* mentions the habitat in Cochinchine, but lacks specific details regarding the type specimen. Moreover, Koyama (1983), while preparing the account of Smilacaceae for Flora of Cambodia, Laos, and Vietnam mentioned ‘Type: *Loureiro s. n.*, sylvis, Cochinchine’. The use of the term ‘type’ has been corrected here to ‘lectotype’ following the article 9.10 of the Shenzhen Code (Turland et al. 2018). Furthermore, we prudently uphold Koyama's designation, as the examination of the type specimen was hindered by the absence of crucial information such as the collection number and the herbarium where the specimen is archived.

12. *Smilax polyacantha* Wall. ex Kunth, Enum. Pl. 5: 239. 1850. (Fig. 20) Climber; stems terete or obtusely angular, smooth, glabrous, armed with straight conical prickles, 1–3 mm long, densely prickled, distantly branched, 3–5 mm thick; branches weakly zigzag, terete, smooth, armed with closely arranged straight conical prickles, striated, 1–2.5 mm thick; internodes 2–4 cm long. Leaves variable in size but uniform in shape; lanceolate to elliptic-lanceolate to elliptic, 4–20 × 2.5–6.5 cm, acute to cuneate at base, gradually attenuate to acuminate or with a short cusp at apex, thin-coriaceous, glabrous, green on upper surface, pale on lower surface; costae 3, or sometimes 5 including a weak marginal pair, the median 3 diverging 2–4 mm above the base, strongly raised on lower surface, obscure on the upper surface, lateral veinlets oblique, forming faint reticulations; petioles 0.8–2 cm long, curved above the middle, winged for 4–10 mm from the base; wings narrow, ca. 0.8 mm wide, auriculate at apex; stipular tendrils upto 25 cm long, sometimes absent on the flowering branches. Inflorescence umbellate; umbels 1 or 2 on a short axis of 0.5–3 cm long, basally prophyllate; prophylls broadly ovate, 3.5–4 mm long, acute at apex. Umbels of either sex 14–25-flowered; staminate receptacles subglobose to elongate, ca. 2 mm long; pistillate receptacles flat and elongate, ca. 4 mm long; peduncles 1.5–3 cm long, bracts linear, minute, 1–2 mm long; pedicels slender, 1–2 cm long. Staminate buds clavate. Pistillate buds obovoid; ovary ovoid, ca. 2–3 mm in diam.; stigmas 3, ca. 2 mm long, recurved. Berries globose, ca. 5 mm in diam.

Type: Lectotype (designated by Kladwong et al. 2018b): MALAYSIA. Penang: *s. loc.*, *Wallich 5127*, K001104873(K!).

Diagnostic characters: Stems and branches densely prickled; leaf blades elliptic-lanceolate; umbels 1 or 2.

Phenology: Fls.: February–May; Frts.: June–October.

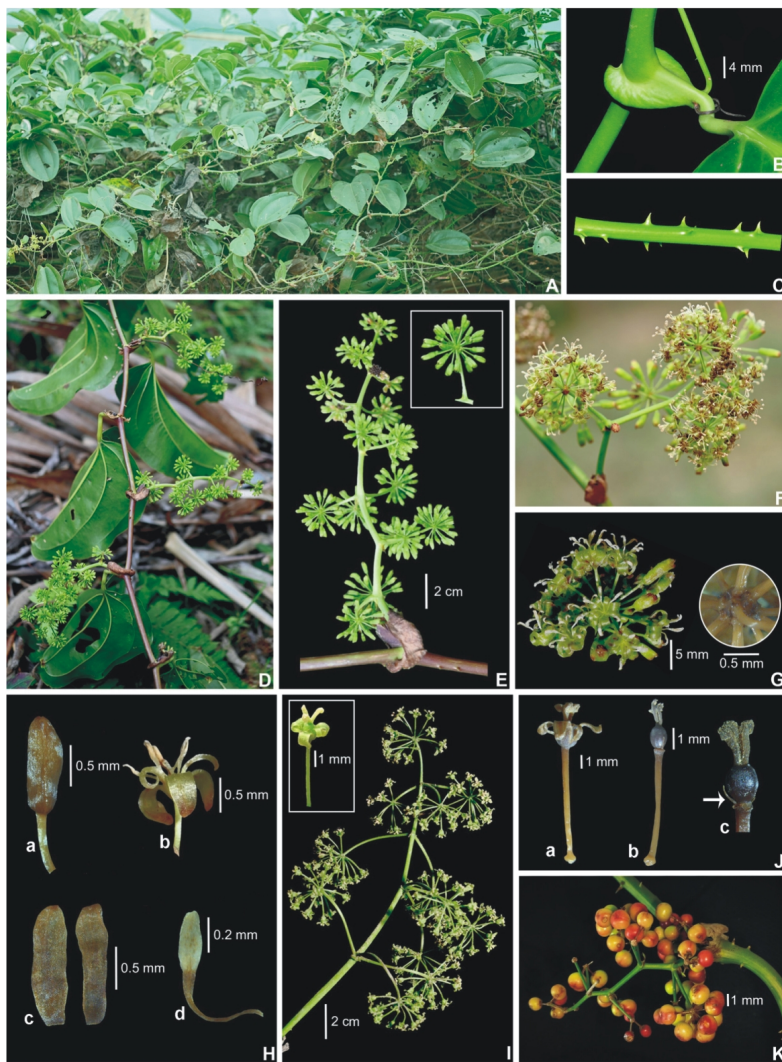
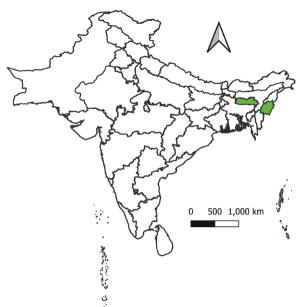


Figure 19: *Smilax perfoliata* Lour. — A. habit; B. ovate petiolar wings; C. armed stem; D. staminate flowering branch; E. staminate inflorescence with buds (inset: single umbel); F. staminate inflorescence with flowers; G. staminate umbel (inset: receptacle); H. staminate flower (a. bud, b. flower, c. outer and inner tepals, d. stamen); I. pistillate inflorescence (inset: flower); J. pistillate flower (a. flower, b. carpel, c. carpel with arrow indicating staminodes); K. infructescence.



Distribution: INDIA (Andaman & Nicobar, Manipur, Meghalaya). [MALAYSIA, THAILAND].

Etymology: The specific epithet refers to the densely prickled stems and branches (*poly*=many, *akantha*=thorn or spine; in Greek).

Specimens examined: INDIA. Andaman & Nicobar, North Nicobar: Kapanga, Katchal Island, *P. Chakraborty* 4608 (L); Manipur: Senapati, Karong, *Walter N. Koelz* 26499 (MICH); Meghalaya: East Khasi Hills,

Cherrapunjee, *Walter N. Koelz* 30016 (MICH), MALAYSIA. Pahang, Taman Negara National Park, *S.C. Chin* 1319(L).

13. *Smilax proliifera* Roxb., Fl. Ind. 3: 795. 1832. (Fig. 21)

Climber; stems terete or obtusely angular, smooth, glabrous, armed with curved conical prickles, 1–4 mm long, distantly branched, up to 15 mm thick; branches weakly zigzag, terete or obtusely angular, smooth, sparsely covered with curved conical prickles, striated, 1.5–5 mm thick; internodes 3–10 cm long. Leaves variable in size, ovate-elliptic to elliptic, 7–20 × 3–12 cm, contracted at base, acute to cuspidate at apex, coriaceous, glabrous, slightly shiny on upper surface, pale on lower surface; costae 7, including a weak marginal pair, the median 3 diverging 8–13 mm above the base and prominently raised on lower surface, distinct on the upper surface, lateral veinlets straight, forming relatively weak reticulations; petioles 1.5–6 cm long, rather curved, winged for 8–40 mm from the base; wings broadly ovate, auriculate, ca. 12 mm wide, acute at apex, cordate base clasping the stem or branch; stipular tendrils 6–20 cm long. Inflorescence umbellate; umbels 7–15 (2–4 umbels at 4–6 nodes) on a strongly zigzag axis of 9–18 cm long, basally prophyllate; prophylls ovate, ca. 10 mm long, acute at apex. Umbels of either sex 25–60-flowered; receptacles globose to subglobose, ca. 5 mm in diam.; peduncles 2–4 cm long, bracts linear, 3–4 mm long; pedicels ca. 1 cm long. Staminate tepals 6; outer tepals oblong, obtuse at apex, 5–6 × 1–1.5 mm; inner tepals narrow; strongly recurved at anthesis, clavate in bud; stamens 6, exserted, 7–8 mm long; anthers oblong, recurved, 1.5–2 mm long, creamish-white; filaments filiform, ca. 6 mm long. Pistillate tepals 6; ovate-oblong to ovate-lanceolate, acute at apex, 4–5 × 1–1.2 mm; inner tepals narrow, recurved at maturity, green; ovary

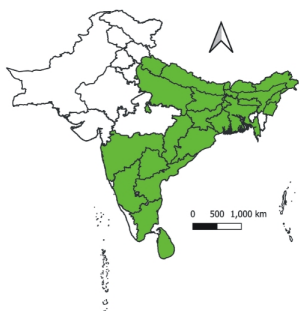


Figure 20: *Smilax polyacantha* Wall. ex Kunth – A. pistillate flowering branch; B. branch with infructescence [Drawn by Truptimayee Sahu and Geetika Sukhramani from K000292118 (K), and L1462499 (L)].

ellipsoid, ca. 2.5 mm × 1 mm; stigmas 3, ca. 1.2 mm long; staminodes 3. Berries globose, 7–10 mm in diam.

Type: Lectotype (designated by Kladwong et al. 2018a): *s. loc.*, *Wallich 5124B*, K001104859(K!).

Diagnostic characters: Leaf blades ovate-elliptic; petiolar wings ovate and well-developed, ca. 12 mm wide, cordate at base; inflorescence with 7–15 umbels.



Phenology: Fls.: February–July; Frts.: August–October.

Vernacular names: INDIA. Karnataka: *Nirubetta* (Kannada); Telangana: *Kundagurvatica* (Telugu); West Bengal: *Kumarika* (Bangla).

Distribution: BANGLADESH (Chittagong), BHUTAN, INDIA (Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Jharkhand, Karnataka, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Sikkim, Tamil

Nadu, Telangana, Uttar Pradesh, Uttarakhand, West Bengal), NEPAL (Bagmati), SRI LANKA. [CHINA, LAOS, MYANMAR, THAILAND, VIETNAM].

Etymology: The specific epithet refers to the proliferous inflorescence (*proles*=progeny, *fera*=to bear; in Latin).

Specimens examined: INDIA. Chhattisgarh: Kabirdham, Daldali, *H.F. Mooney 2018* (L), BANGLADESH. Chittagong, *Bruce 5124G* (K), NEPAL. Chitwan: Royal Chitwan National Park, *R.G. Troth 791* (US), SRI LANKA. Nuwara Eliya, *M.D. Dassanayake 328* (L), CHINA. Yunnan, Between Muang Hing and Szemao and the Szemao hills proper, *J.F. Rock 2733* (US).

Economic/medicinal usage: Root decoction is used to treat syphilis, cachexia, and chronic skin diseases (Pereram 2014).

Notes: *Smilax proliifera* has been treated differently by different authors. Koyama (1963, 1975), Karthikeyan et al. (1989), Chen & Koyama (2000), and Dassanayake (2000) regarded it conspecific with *S. perfoliata*. Conversely, Koyama (1983), Noltie (1994), and Kladwong et al. (2018a) treated it as a distinct species. Koyama (1983) treated *S. proliifera* Roxburgh emend Kunth as a distinct species, citing “Fl. Ind., ed. 2, 3: 312 (1832)” as reference. However, we could not find *Smilax* on the given page, indicating a potential error by the author. A close scrutiny of specimens from various herbaria revealed that *S. proliifera* closely resembles *S. perfoliata* but can be differentiated by its oblong-elliptic leaves i.e., pale on lower surface. Furthermore, based on the findings obtained from the molecular phylogenetic study carried out by Qi et al. (2013), we made the decision to consider *S. proliifera* and *S. perfoliata* as distinct species in this study. However, we were unable to find and examine the voucher specimens used in these phylogenetic investigations, which highlights the need for additional research in this field.

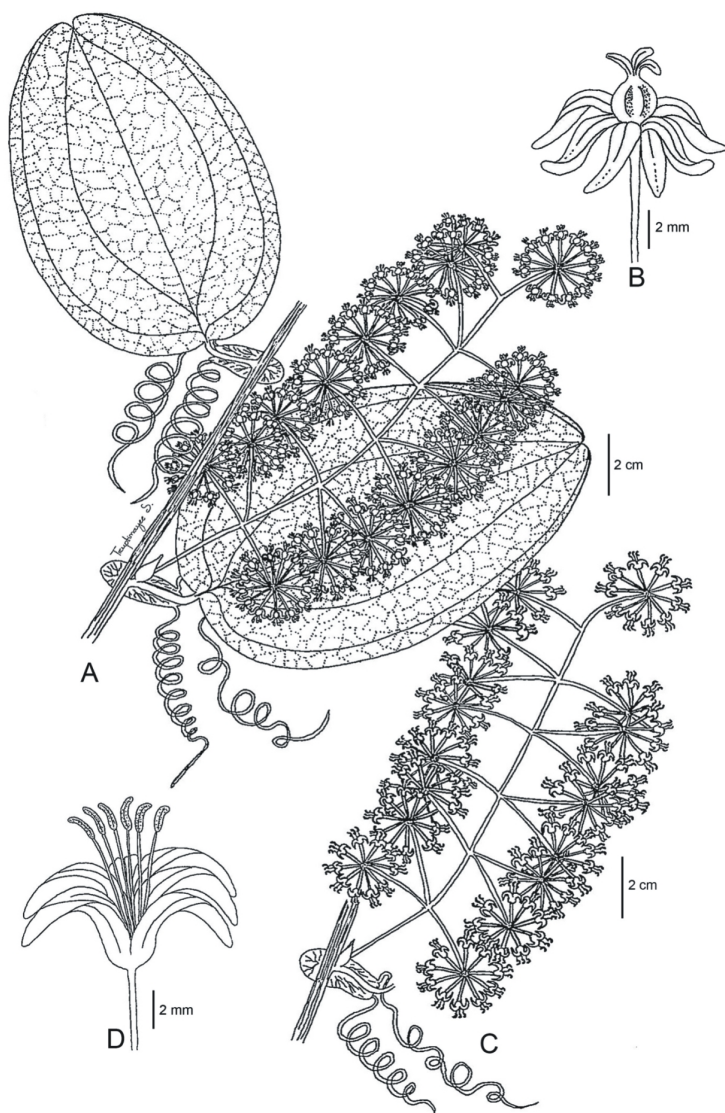


Figure 21: *Smilax prolifera* Roxb. – A. pistillate flowering branch; B. pistillate flower; C. staminate flowering branch; D. staminate flower [Drawn by Truptimayee Sahu from K001104859 (K), US03940969, and US03940970 (US)].

14. *Smilax quadrata* A. DC. in A. DC. & C. DC., Monogr. Phan. 1:183. 1878. (**Fig. 22**)

Climber; stems quadrangular, smooth, glabrous, armed with straight or recurved conical prickles, 2–3 mm long, distantly branched, ca. 4 mm thick; flowering branches strongly zigzag, acutely quadrangular, smooth, unarmed or sparsely prickled, sometimes striated, ca. 1.8 mm thick; internodes 2–5 cm long. Leaves variable in size and shape, oblong to ovate-oblong to elliptic, 5–15 × 2–7 cm, rounded to subtruncate at base, mucronate to cuspidate at apex, coriaceous to thick-membranaceous, glabrous, pale on lower surface; costae 5 including the marginal pair not reaching the leaf apex, the median 3 diverging 2–4 mm above the base, raised on lower surface, lateral veinlets irregularly divided, making weak reticulations; petioles 0.8–1.7 cm long, strongly curved above the middle, winged for 4–10 mm from the base; wings linear, narrow, less than 1 mm wide; stipular tendrils on vegetative branches up to 12 cm long, vestigial on flowering branches. Inflorescence umbellate; umbels 1–3 on a short axis of 1.5–2.5 cm long, basally prophyllate; prophylls ovate 2 mm long, acute at apex. Umbels of either sex 30–40-flowered; receptacles globose, ca. 1.5 mm in diam.; peduncles 1–1.2 cm long; pedicels 5–10 mm long. Staminate tepals 6; outer tepals ovate-lanceolate, rounded at apex, 4–5 × 0.5–1 mm; inner tepals linear and narrow; reflexed at anthesis; stamens 6, exserted, 5–6 mm long; anthers linear to oblong, ca. 1 mm long; filaments 4–5 mm long. Ovary ovoid, 2.5–3 × ca. 1 mm; stigmas 3, linear, curved in the middle; staminodes 6. Berries subglobose, 6–7 mm in diam., orange at maturity.



Type: Lectotype (designated by Koyama 1963 as “holotype”, corrected in Sukhramani & Choudhary 2023a): INDIA. Meghalaya: Khasia, *J.D. Hooker & T. Thomson 13*, K000820896 (K!).

Diagnostic characters: Stems 4-angled; flowering branches strongly zigzag; leaf blades oblong to oblong-elliptic with 3 costae; umbels 1–3.

Phenology: Fls.: September–February; Frts.: February–May.

Distribution: INDIA (Arunachal Pradesh, Manipur, Meghalaya). [CHINA, MYANMAR].

Etymology: The specific epithet attributes to the stems and branches that have a square or four-sided shape, as indicated by the term “*quadrata*” in Latin.

Specimens examined: INDIA. Meghalaya: East Khasi hills, *W. Griffith* 5427 (K); *ibid.*, *J.D. Hooker & T. Thomson* 13 (K); *ibid.*, *s. coll.* 208 (CAL); *ibid.*, Mawryngkneng, *Thakur Rup Chand* 5184 (MICH).

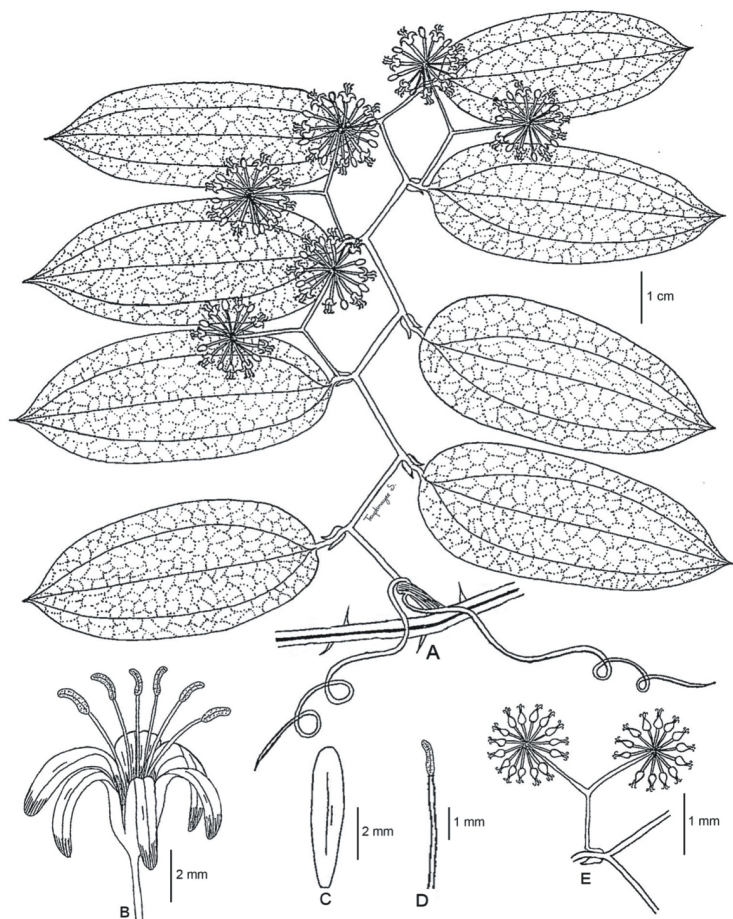
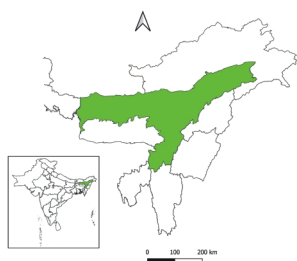


Figure 22: *Smilax quadrata* A. DC. – A. staminate flowering branch; B. staminate flower; C. staminate tepal; D. stamen; E. pistillate inflorescence [Drawn by Truptimayee Sahu from K000820896, K000820895 (K), and L1462482 (L)].

15. *Smilax sailenii* Sarma, S. Baruah & Borthakur, *Taiwania* 63(1): 32. 2018. (**Fig. 23**)

Climber; stems terete, smooth, glabrous, armed with straight conical prickles, 1–2 mm long, distantly branched, faintly striated, 7–9 mm thick; branches straight or slightly zigzag, terete, smooth, armed with straight conical prickles, non-striated, 2–3 mm thick; internodes 6–12 cm long. Leaves uniform in size and shape, ovate-oblong, $7-16 \times 4-9$ cm, rounded to sometimes abruptly contracted to an acute base, mucronate to subacuminate at apex, coriaceous, glabrous, pale green on both sides; costae 3, all diverging at the base, strongly raised on lower surface, lateral veinlets irregularly divided, making reticulations; petioles 1–2 cm long, curved at the middle, winged for 7–9 mm from the base; wings narrow, less than 0.5 mm wide, auriculate at apex; stipular tendrils 15–18 cm long. Inflorescence umbellate. Staminate umbels 20–35-flowered; pistillate umbels 18–22-flowered; receptacles expanded; peduncles 2–3.5 cm long; pedicels 1–1.5 cm long. Staminate tepals 6; outer tepals linear-lanceolate, rounded at apex, $4-6 \times 0.1-0.5$ mm; inner tepals linear and narrow; recurved at anthesis, light green; stamens 6, exserted, 7–9 mm long; anthers linear-oblong, slightly curved, 1–2 mm long, greenish-white, filaments 6–7 mm long. Pistillate tepals 6; outer tepals $5-6 \times 1-2$ mm; inner tepals narrow; ovary 3-chambered; stigma 3-lobed. Berries globose, 2.5–3 cm in diam., green when young and turn red at maturity; seeds 3, round, flat, 4–5 mm across.

Type: Holotype: INDIA. Assam: Tinsukia, Digboi Forest Division, *S. Baruah & J. Sarma 555* (GUBH).



Diagnostic characters: Leaf blades ovate-oblong, mucronate apex, and rounded base; berries 2.5–3 cm in diam.

Phenology: Fls.: September– October; Frts.: June–December.

Vernacular names: INDIA. Assam: *Assamiya-angur*, *Jangliguti* (Assamese).

Distribution: INDIA (Assam).

Etymology: The specific epithet honours Dr. Sailendra Prasad Borah, a former Professor in the Department of Botany at Gauhati University, Assam, India.

Notes: *Smilax sailenii* is known only from its type locality, i.e., Digboi Reserve Forest, Assam and has been evaluated as Critically Endangered by Baruah et al.

(2018). While the authors considered it morphologically similar to *S. orthoptera*, in our opinion, it differs significantly from *S. orthoptera*, in terms of leaf size and apex, costae number and pattern, and petiolar wings. Furthermore, there is an error in the comparison table about the length of the peduncle in male plants. The table states “*Peduncles 1 cm in length. Peduncles 2–3.5 cm*” whereas the description specifies a range of 2–3.5 cm. In addition, the illustration presented portrays sessile umbels in contrast to 2–3.5 cm, as mentioned in the description. Our attempt to locate the species in its type locality during our exploration proved unsuccessful. Therefore, the description presented here is solely based on the protologue, emphasizing the imperative need for subsequent studies to confirm the status of this species.

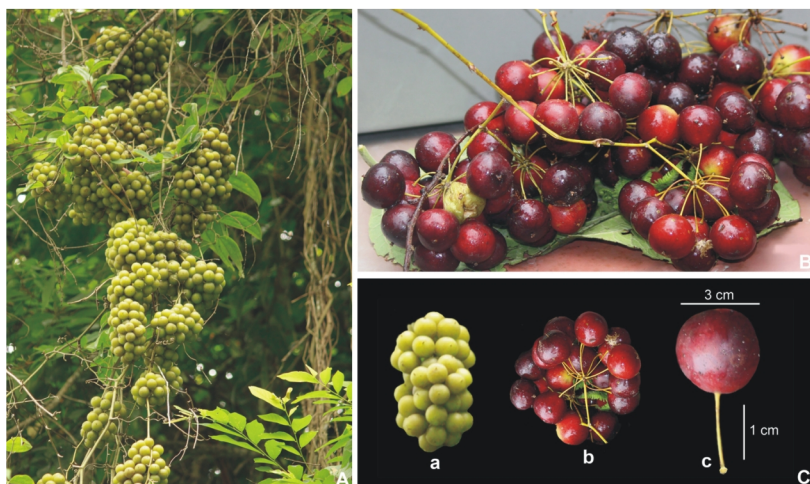


Figure 23: *Smilax sailenii* Sarma, S. Baruah & Borthakur – A. habit and branches with infructescence; B. infructescence; C. infructescence (a. young berries; b. mature berries; c. single berry). (Photos A, B & C: Dr. Sanjib Baruah).

16. *Smilax turbans* F.T. Wang & Tang, Bull. Fan Mem. Inst. Biol. Bot. 7: 298. 1937. (Fig. 24)

Suberect shrub up to 2 m high; stems angular, smooth, glabrous, armed with short conical prickles, 1–2 mm long, distantly branched, 5–7 mm thick. Branches straight, angular, sparsely prickled, sometimes striated, 3–5 mm thick; internodes 3–8 cm long. Leaves variable in size, broadly linear-lanceolate to elliptic, sometimes ovate-lanceolate, 14–24 × 5–10 cm broad below the middle, rounded to acute at the base, gradually contracted to

acuminate apex or sometimes with a short cusp at apex, glabrous, slightly pale beneath; costae 7 including a fairly distinct marginal pair, all diverging at the base, strongly raised on lower surface, slightly sunken on the upper surface but distinct, lateral veinlets irregularly divided, forming distinct loose reticulations; petioles 1–2.5 cm long, often bent upward above the middle, winged for 3–8 mm from the base; wings ovate, narrow, ca. 3 mm wide, with 2 short cirrhi; tendrils none; dark brown when dried. Inflorescence umbellate; umbels 2 or 3 on a short axis of 1–2 cm long, basally prophyllate; prophylls ovate, 4–6 mm long, acute at apex. Male umbels 8–14-flowered; receptacles globose, ca. 3 mm in diam.; peduncles 0.9–1.2 cm long; pedicels 6–10 mm long. Staminate tepals 6; outer tepals ovate-lanceolate, 5–7 × 1–1.2 mm; inner tepals slightly narrow, purplish; stamens 6, inserted, 3–3.5 mm long; anthers oblong, 0.8–1 mm long, yellowish-cream; filaments 2.2–2.5 mm long. Pistillate flowers and berries unknown.

Type: Holotype: INDIA. Arunachal Pradesh: Outer Abor Hills, *I.H. Burkill* 38197, K000820876 (K!).



Diagnostic characters: A suberect shrub with angular stems and branches; leaves lanceolate to elliptic with 7 costae; umbels 2 or 3.

Phenology: Fls.: February–April.

Distribution: INDIA (Arunachal Pradesh).

Etymology: The specific epithet probably refers to the confusion (=turbans, in Latin) with the closely allied species, i.e., *S. macrophylla*.

Specimens examined: INDIA. Arunachal Pradesh: Kurung Kumey, Dari, *R.K. Choudhary* & *Geetika Sukhramani* 2742, 2743, 2744 (AHMA); Outer Abor Hills, *I.H. Burkill* 38197 (K).

Notes: *Smilax turbans* was known only from the type locations Abor Hills and Delei Valley (present day Arunachal Pradesh) until we rediscovered it from Kurung Kumey district of Arunachal Pradesh, after a gap of 95 years (refer Sukhramani & Choudhary 2023b).

17. *Smilax wightii* A. DC. in A. DC. & C. DC., Monogr. Phan. 1: 174. 1878. (**Fig. 25**)

Climber; stems terete to subterete, smooth, glabrous, armed with straight conical prickles, 1–3 mm long, distantly branched, ca. 4–6 mm thick;

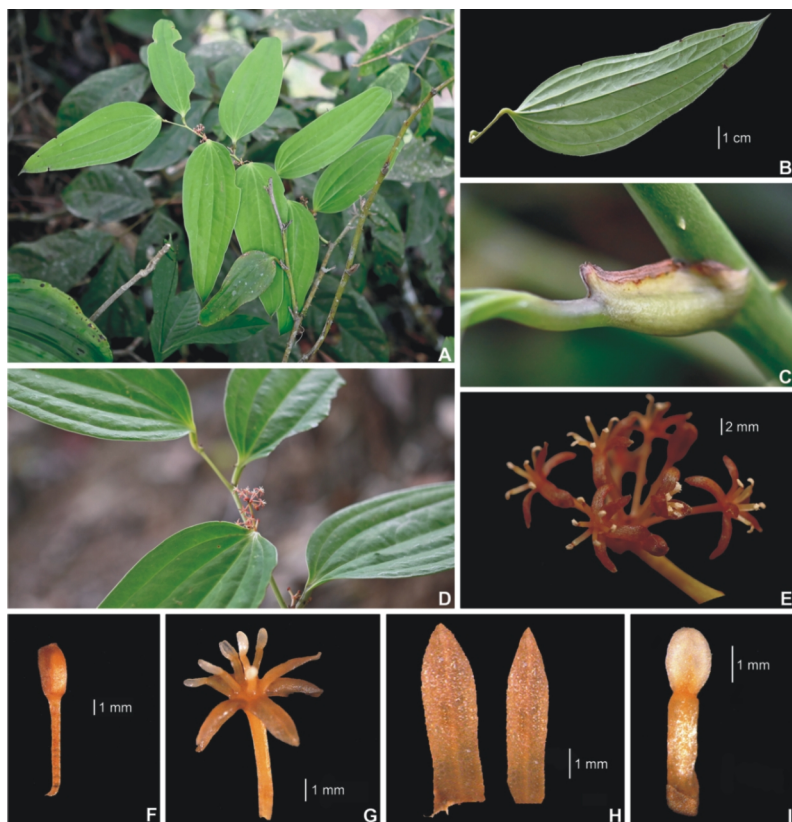


Figure 24: *Smilax turbans* F.T. Wang & Tang – A. habit; B. leaf (abaxial surface); C. ovate petiolar wings; D. staminate inflorescence; E. staminate umbel; F. staminate bud; G. staminate flower; H. staminate tepals-outer and inner; I. stamen.

branches zigzag, terete to subterete, smooth, sparsely prickly with straight conical prickles, striated, 2–4 mm thick; internodes 3–7 cm long. Leaves uniform in shape but variable in size; orbicular to orbicular-ovate to broadly ovate to elliptic, 6–18 × 4–16 cm, cordate to shallowly cordate at base, acuminate to cuspidate at apex, coriaceous, glabrous, dark green on upper surface, slightly pale on lower surface; costae 5, including a weak marginal pair, the median 3 diverging 5–6 mm above the base and prominently distinct on both the surfaces, highly raised on lower surface, lateral veinlets obliquely diverging, forming prominent reticulations; petioles 3.5–5 cm long, strongly striated, strongly curved above the middle, winged for

0.5–1.5 cm from the base; wings linear, narrow, 1–2 mm wide, auriculate at apex; stipular tendrils 4–18 cm long. Inflorescence umbellate; umbels 2 or 3 on a short axis of 2–4 cm long, basally prophyllate; prophylls ovate to ovate-lanceolate, 8–10 mm long, acute at apex. Staminate umbels 12–18-flowered; pistillate umbels 8–30-flowered; receptacles globose to subglobose, 4–6 mm in diam.; peduncles 2–3.5 cm long, bracts ovate, 4–7 mm long; pedicels filiform to capillary 1–2 cm long. Staminate tepals 6; outer tepals linear-oblong, rounded at apex, $5-6 \times 1-1.2$ mm; inner tepals linear and narrow; strongly recurved at anthesis; stamens 6, exserted, 10.5–11 mm long; anthers elliptic, 0.5–0.7 mm long, creamish-white; filaments filiform, ca. 10 mm long. Pistillate tepals 6; broadly elliptic, rounded at apex, $3.5-4 \times 1.5-2$ mm; inner tepals linear and narrow; ovary ellipsoid, ca. $3 \times 1-1.2$ mm; staminodes 3. Berries globose, 7–10 mm in diam.

Type: Syntype: *s. loc.*, Wight 2832, P00686884 (P!).

Diagnostic characters: Branches zigzag; petioles elongate, 3.5–5 cm long; leaf blades orbicular to orbicular-ovate, cordate at base; umbels 2 or 3.



Phenology: Fls.: October–January; Frts.: February–May.

Distribution: INDIA (Karnataka, Kerala, Tamil Nadu), NEPAL.

Etymology: The species was named in honour of Robert Wight (1796–1872), a British botanist who made significant contributions to the study of plants in Southern India.

Specimens examined: INDIA. Kerala: Palakkad, Palghat, Silent Valley, *A.J.G.H.*

Kostermans 26219 (US), Tamil Nadu: Coonoor, *J.S. Gamble* 13339 (CAL); Nilgiri hills, *Wight* 2832 (K); *s. loc.*, *Wight* 2832 (P); Gymkhana hills, *K.M. Sebastine* 4070 (L); NEPAL. Dhankuta: Koshi zone, *M. Minaki et al.* 9010015 (E).

Economic/medicinal usage: In the Ayurvedic system of medicine, the roots are employed for the treatment of disorders associated with the nervous and urinary systems (Paulsamy et al. 2009; Anand & Sukumaran 2022).

Notes: *Smilax wightii* was described based on the collections made from Tamil Nadu and Meghalaya in India, viz., the Nilghiri Mountains (*Wight* 2832, *Hooker & Thomson*, *Perrott* 153); Coonor Nilghir. (*Wight*), *s. n.*; and Mt. Khasia, *s. n.* But *Hooker* (1892) suspected its occurrence in Meghalaya. Our study aligns with *Hooker*'s scepticism, as we were unable to locate *S. wightii* in

the field or in herbarium records of the Himalayan regions of India. Although some Floras (Babu 1977; Srivastava 1996) have documented their presence in the Indian Himalayas, the descriptions provided do not correspond perfectly with those of *S. wightii* compared to the protologue. After an extensive search of the type specimen, we were able to find all of them except the one from Mt. Khasia. Having not seen all the original materials, we opted to solely incorporate the syntype information here while a definitive determination regarding the typification of this name is due.

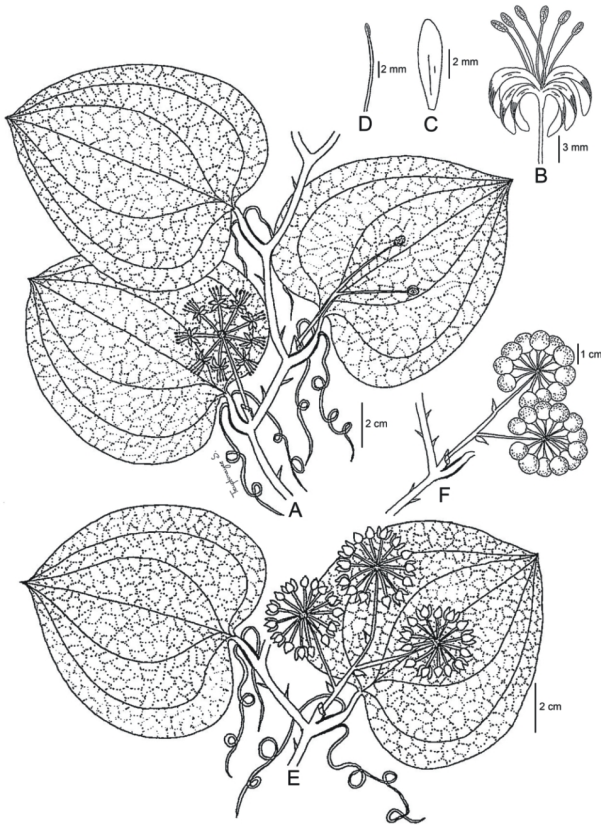
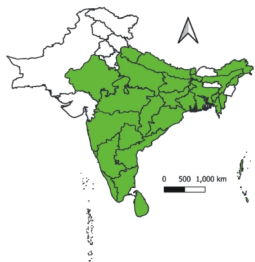


Figure 25: *Smilax wightii* A. DC. – A. staminate flowering branch; B. staminate flower; C. staminate tepal; D. stamen; E. pistillate flowering branch; F. infructescence [Drawn by Truptimayee Sahu from CAL0000222160 (CAL), K000820894, K000820893(K), and P00686884 (P)].

18. *Smilax zeylanica* L., Sp. Pl.: 1029. 1753. *S. quadrumbellata* T. Koyama, J. Jap. Bot. 42. 189. 1967 (Fig. 26)

Climber; stems angular, smooth, glabrous, armed with straight conical prickles, 1–2 mm long, distantly branched, 4–5 mm thick; branches zigzag, angular to subterete, smooth, armed with straight conical prickles, sometimes striated, 1.5–2.5 mm thick; internodes 2–5 cm long. Leaves variable in size and shape, broadly elliptic to ovate-elliptic to ovate-oblong, 6–12 × 3–8 cm, rounded to truncate to acute at base, briefly contracted to subacute to rounded with a short cusp at apex, herbaceous to thin-coriaceous, glabrous; costae 5, including a weak marginal pair, the median 3 diverging 4–8 mm above the base, raised on lower surface, slender, but distinct on upper surface, lateral veinlets irregularly divided, forming relatively loose reticulations; petioles 0.9–2 cm long, curved below the middle, winged for ca. 4 mm from the base; wings narrow, less than 1 mm wide, not auriculate at apex; stipular tendrils 6–14 cm long. Inflorescence umbellate; umbels 1–3, mostly solitary on a short axis of 1.2–1.5 cm long, basally prophyllate; prophylls ovate, 1–4 mm long, acute at apex. Umbels of either sex 10–40-flowered; receptacles globose, 4–5 mm in diam.; peduncles 1–2.5 cm long; pedicels 0.5–1.5 cm long. Staminate tepals 6; outer tepals oblong to oblong-lanceolate, rounded at apex, 5–6 × 1–1.2 mm; inner tepals linear and narrow; strongly recurved at anthesis, greenish-white, clavate in bud; stamens 6, 5–6 mm long; anthers lanceolate, 1–1.2 mm long, white; filaments filiform, 4–5 mm long. Ovary 3-chambered; staminodes 3–6. Berries globose, 6–8 mm in diam., green, 2-seeded.

Type: Lectotype (designated by Dassanayake 2000): SRILANKA. *s.loc.*, *Paul Hermann* 364, BM000621777 (BM!).



Diagnostic characters: Stems and branches angular; petioles 1–2 cm long; umbels mostly solitary or up to 3 on a short axis.

Phenology: Fls.: June–October; Frts.: October–April.

Vernacular names: INDIA. Andhra Pradesh: *Adavikondatheega*, *Phirangimokka*, *Kummeritheega*, *Kondadantena*, *Kondagarbhattige*, *Konda*, *Sithapa*, *Gurivatheega*, *Kondathaamara*, *Kummarabaddu*, *Kushtaputamara*, *Kondagurvatica*,

Phirangimokka (Telugu); Chhattisgarh: *Dokar-vela*, *Ram-datoon*, *Shere*

(Chhattisgarhi); Karnataka: *Kaaduhambutaavare*, *Ramdaun*, *Sarsaparilla* (Kannada); Kerala: *Parukannivalli*, *Ceruvacayavalli*, *Cherunchakayagavalli*, *Kalthamara*, *Karivilanti* (Malayalam); Maharashtra: *Gholbel*, *Ghottee*, *Gutwel*, *Guti*, *Ghotwel*, *Chopchini* (Marathi), *Ram-datvan* (Hindi); Odisha: *Kumbhatua*, *Muturi*, *Muter* (Odia); Tamil Nadu: *Ayadi*, *Tirunamappalai*, *Periyakanni*, *Karuvilanchikudam*, *Kaattukkodi*, *Malaiththamarai* (Tamil); Uttar Pradesh: *Chobchini*, *Jangliaushbah*, *Ramdatun* (Hindi); West Bengal: *Kumarik* (Bangla).

Distribution: BANGLADESH (Barisal, Chittagong, Khulna, Rangpur), INDIA (Andaman & Nicobar, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Goa, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Mizoram, Nagaland, Odisha, Rajasthan, Sikkim, Tamil Nadu, Telangana, Tripura, Uttar Pradesh, Uttarakhand, West Bengal), NEPAL, SRI LANKA (Central, North Western, Sabaragamuwa, Southern, Uva, Western). [MALAYSIA, MYANMAR].

Etymology: The specific epithet indicates the geographical origin and refers to Ceylon, the former name of Sri Lanka (*zeylanicus*=from Ceylon, in Latin).

Specimens examined: INDIA. Andaman & Nicobar: South Andaman, *Dr. King's Collector s. n.* (CAL); Bihar: Kishanganj, Donk Bridge, *H. Kanai & G. Murata 5650* (TI); Goa: Betim-Bartez, *Seshagiri Rao Rolla 84388* (BSI); Chimbel Reservoir to Brahmapuri temple, *Seshagiri Rao Rolla 92902* (CAL); Durgin forest, *K.C. Kanodia 89664* (CAL); Karnataka: Kodagu, Talacauvery, *B.C. Banerjee 11523* (CAL); Kerala: Idukki, Manikandan Chal-Puiyamkutty, *P. Bhargavan 87440* (CAL); Palakkad, Silent Valley, Campsite, *Prasannan SV10226* (CAL); Palghat, Siruvani River Bank-Chittoor-Agali, *E. Vajravelu 60660* (CAL); Thiruvananthapuram, Bonacaud, *M. Mohana 58530* (CAL); Maharashtra: Pune, Adarwadi, *R.K. Choudhary et al. 1492, 1493* (AHMA); *ibid.*, Mulshi, Male village, *R.K. Choudhary et al. 1490* (AHMA); *ibid.*, Tamhini, *P.P. Sharma 22* (AHMA); Raigad, Madheghat, *R.K. Choudhary 1494* (AHMA); *ibid.*, Tasgaon, Raigad fort, *Geetika Sukhramani et al. 1495, 1496, 1497* (AHMA); Ratnagiri, Dapoli, *M.M. Sardesai 1499* (AHMA); *ibid.*, Rajapur, *R.K. Choudhary 2793* (AHMA); Tamil Nadu: Kanyakumari, Upper Kodayar, Way to Valve house, *A.N. Henry 68875* (CAL); Uttar Pradesh: Budaun, Abdullaganj, *G. Panigarhi & O.P. Mishra 6360* (CAL); West Bengal: Kolkata, Komurah Kali, *H. Hara et al. 5649* (TI).

Economic/medicinal usage: The plant is used as a potential alternate source of the Ayurvedic drug *Chopchini* (Kekuda et al. 2018). In the Ayurvedic system of medicine, it is employed to treat arthritis, skin diseases, syphilis, and diarrhoea (Sabarisenthil & Kalaichelvan 2017). Ethnobotanically, the roots are used to

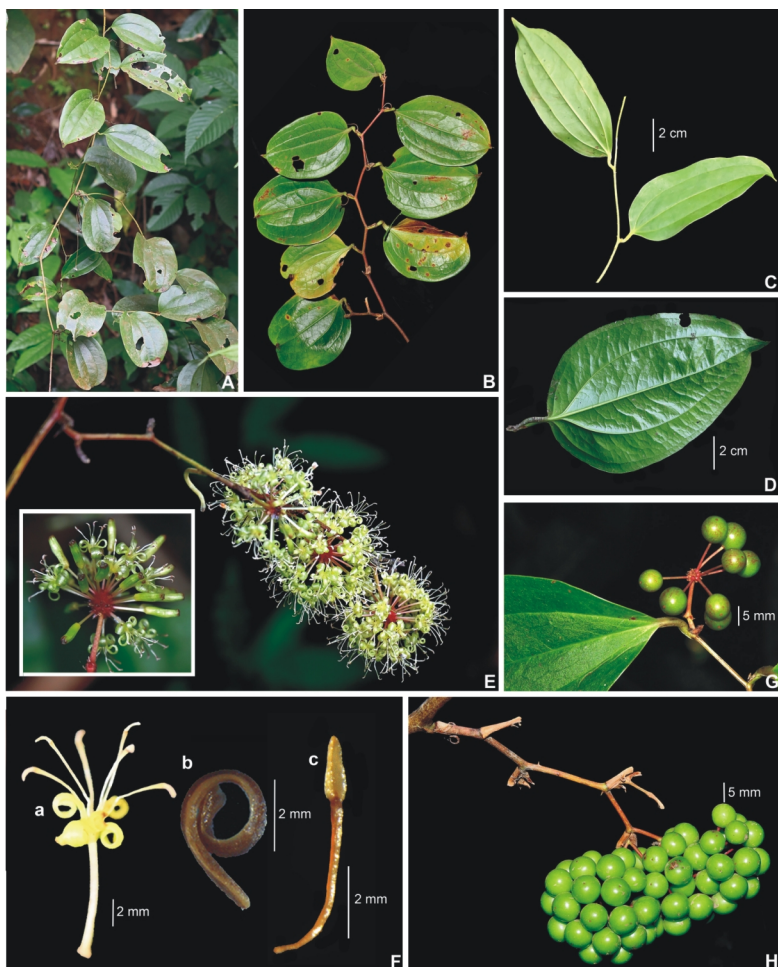


Figure 26: *Smilax zeylanica* L. – A. habit; B. vegetative branch; C, D. variations in leaf morphology E. staminate inflorescence (inset: staminate umbel); F. staminate flower (a. flower, b. tepal, c. stamen); G, H: infructescence.

cure anemia in Bangladesh (Siddique et al. 2004). Stems are used as toothbrushes for toothache and pyorrhoea in Odisha (Sahu & Sahu 2017). Rhizomes are used for venereal diseases, rheumatism, and urinary complaints in Tamil Nadu (Gritto et al. 2012; Divya et al. 2013). Plant is used as a toothbrush by the local communities of Nepal (Luitel et al. 2014).

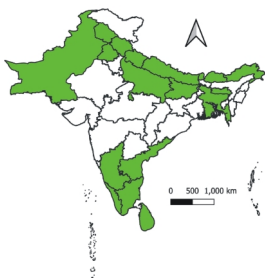
Notes: This species is widely distributed throughout India, especially in the Western Ghats of India, and is highly variable in shape and size of leaf blades. For synonymy and discussion refer Sukhramani & Choudhary (2023a).

Section: *Smilax* (L.) T. Koyama

19. *Smilax aspera* L., Sp. Pl.: 1028. 1753. (Fig. 27)

Climber; stems terete to subterete, smooth, glabrous, armed with straight to recurved prickles, 1–2 mm long, distantly branched, strongly striated, 3–4 mm thick; branches slightly zigzag, terete to subterete, smooth, armed with straight to recurved prickles, striated, 1.5–1.8 mm thick; internodes 3–7 cm long. Leaves uniform in shape, deltoid to ovate-deltoid to hastate-lanceolate, 6–12 × 2.5–7 cm, truncate to shallowly cordate at base with rounded basal lobes, gradually contracted to acute to cuspidate apex, thin-coriaceous, with margins sometimes minutely prickly, glabrous, slightly shiny on upper surface, white-powdery but non-glaucous on lower surface; costae 5–7, including a weak marginal pair not reaching the leaf apex, all diverging at base, distinct on both surfaces, slightly raised on lower surface, midrib sometimes prickly on lower surface, lateral veinlets obliquely diverging, forming prominent reticulations, but not dense; petioles 1.5–3.5 cm long, straight or slightly curved, sparsely armed with prickles, winged for 3–10 mm from the base; wings narrow, less than 0.5 mm wide, not auriculate at apex; stipular tendrils 6–12 cm long. Inflorescence umbellate; a spike of 8–12(20) sessile umbels on a slightly zigzag axis of 6–10 cm, basally prophyllate; prophylls broadly ovate, 2–3.5 mm long, acute at apex. Umbels of either sex 8–15-flowered; receptacles globose, 3–6 mm in diam.; bracteoles 1.2–3 mm long, ovate to lanceolate, acute at apex; pedicels 3–6 mm long. Staminate tepals 6; outer tepals oblanceolate to lanceolate, rounded at apex, 3.5–4.5 × 0.8–1.2 mm; inner tepals narrow, spreading; curved at anthesis, yellowish-green or creamish-white, clavate in bud; stamens 6, inserted, 2.7–3 mm long; anthers oblong, 0.7–0.9 mm long, white; filaments filiform, ca. 2 mm long. Pistillate tepals 6; outer tepals ovate to ovate-oblong, acute to obtuse at apex, 3–3.5 × 1–1.2 mm; inner tepals linear and narrow; ovary ellipsoid, ca. 1.5 mm across; stigmas 3, ca. 1 mm long; staminodes 6. Berries globose, 5–7 mm in diam., red when young and dark purple at maturity; seeds 1–3, ca. 3.5 mm across, dark red.

Type: Lectotype (designated by Jarvis 2007): NETHERLANDS. *s. loc.*, *George Clifford s. n.*, BM000647490 (BM!).



Diagnostic characters: Leaf blades deltoid to ovate-deltoid, with prickly margins, petioles, and underside costae; umbels sessile, spicate on zigzag axis.

Phenology: Fls.: August–November; Frts.: November–May.

Vernacular names: INDIA. *Chobchini*, *Kukurjari* (Hindi), NEPAL. *Kukurdaaino* (Nepali).

Distribution: BANGLADESH, BHUTAN (Kurmaed, Punakha, Thimphu), INDIA (Andhra

Pradesh, Arunachal Pradesh, Bihar, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Meghalaya, Punjab, Sikkim, Tamil Nadu, Uttarakhand), NEPAL (Bagmati, Gandaki, Koshi, Lumbini, Sudurpashchim), PAKISTAN (Punjab, Sindh), SRI LANKA (Central, Uva). [ALBANIA, ALGERIA, CHINA, CYPRUS, ERITREA, ETHIOPIA, FRANCE, GREECE, IRAN, ITALY, KENYA, LEBANON, LIBYA, MOROCCO, MYANMAR, SPAIN, SYRIA, TANZANIA, TUNISIA, TURKEY, UGANDA, YUGOSLAVIA, ZAIRE, ZAMBIA].

Etymology: The specific epithet denotes leaves characterized by rough or prickly margins and petioles, with “*aspera*” originating from the Latin term for rough.

Specimens examined: BHUTAN. Punakha, *J.C. White* 63 (CAL), INDIA. Arunachal Pradesh: West Kameng, Rupa, *R.K. Choudhary & Geetika Sukhramani* 2717 (AHMA); Himachal Pradesh: Kangra, Dharamshala, McLeod Ganj, *R.K. Choudhary DB-002* (AHMA); Kullu, *Walter Koelz* 4738 (MICH); Kerala: Idukki, Rajamalai, *A.G. Pandurangan* 62536 (CAL); Meghalaya: East Khasi Hills, Mawphlang, *Thakur Rup Chand* 2311 (MICH); Jaintia Hills, Jowai, Myntdu valley, *R.K. Choudhary & Geetika Sukhramani* 2663 (AHMA); Tamil Nadu: Dindigul, Pannaikadu, *C. Sudharsan* 402 (MKU); Nilgiris, Kattabettu-Kotagiri, *K.M. Sebastine* 906 (CAL); Uttarakhand: Tehri Garhwal, Joli, *Thakur Rup Chand* 1203 (MICH), NEPAL. Dolakha: Jiri, Chyandanda, *K.R. Rajbhandari & B. Roy* 145 (MU).

Economic/medicinal usage: In Nepal, roots are used as a tonic and stimulant. They are also used as an ingredient of soft drinks (Singh 2016). The roots, leaves, and shoots are used as vegetables (Shrestha 2013) and flowers for making pickles (Uporety et al. 2012).

Section: *Heterosmilax* (Kunth) Judd

20. *Smilax bockii* Warb. ex Diels, Bot. Jahrb. Syst. 29(2): 259. 1900. *Heterosmilax indica* A. DC. in A. DC & C. DC., Monogr. Phan. 1: 43. 1878. *H. japonica* Kunth, Enum. Pl. 5: 270. 1850. (**Figs. 28 & 29**)

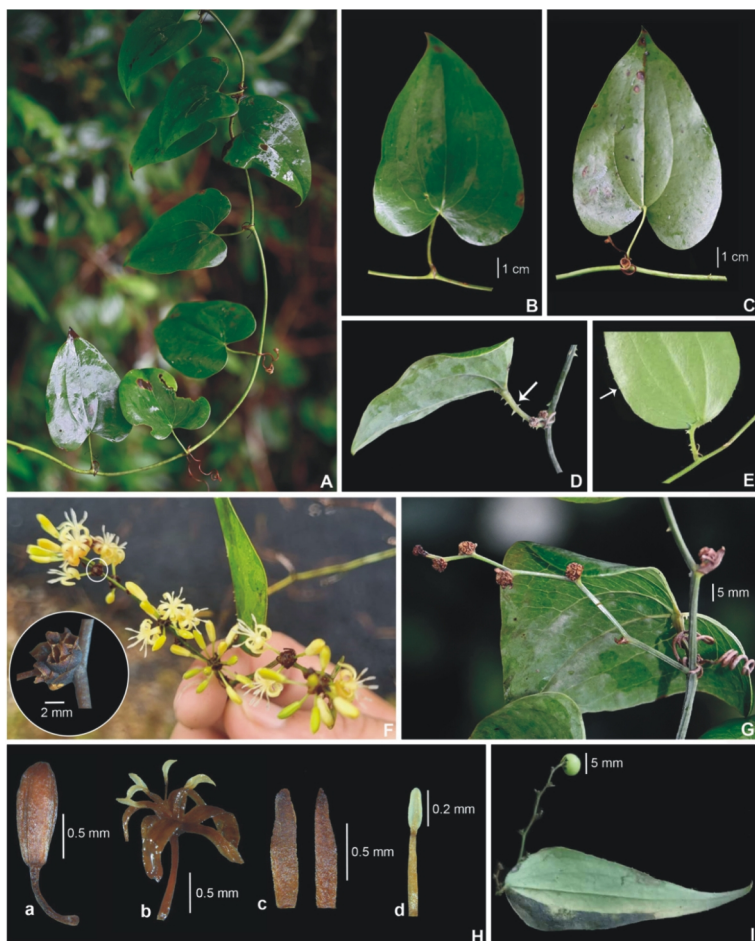


Figure 27: *Smilax aspera* L. – A. vegetative branch; B, C. Leaves (adaxial, abaxial surface) D. petiole with prickles; E. leaf margins with prickles; F. staminate inflorescence (inset: receptacle); G. staminate inflorescence (spike of sessile umbels on a zigzag axis); H. Staminate flower (a. bud, b. flower, c. outer and inner tepals, d. stamen); I. branch with infructescence. (Photos D & G: Dr. K.M. Prabhukumar; F: Dr. Dipankar Borah).

Climber up to 3 m high stems angular or sometimes terete, smooth, glabrous, unarmed, distantly branched, 3–6 mm thick; branches slightly zigzag, angular or terete, smooth, unarmed, slightly striated, 1–2 mm thick;

internodes 2–10 cm long. Leaves variable in size and shape, lanceolate to ovate-lanceolate to ovate-oblong, $5\text{--}18 \times 1.5\text{--}10$ cm, shallowly cordate to rounded at base, gradually attenuate to acuminate to cuspidate apex, membranaceous to thin-herbaceous, glabrous, dark green on upper surface, pale on lower surface; costae 5–7, including a weak marginal pair, all diverging at the base, slender but distinct on upper surface, the median 3 strongly raised on lower surface, lateral veinlets oblique, forming slender but dense reticulations; petioles 2.5–5 cm long, rather curved at the middle, winged for 3–8 mm from the base; wings narrow, 0.5–1.2 mm wide, not auriculate at apex; stipular tendrils 7–20 cm long. Inflorescence umbellate; umbels solitary, basally non-prophyllate. Umbels of either sex 10–30(–40) flowered; receptacles globose, 2–4 mm in diam.; bracteoles ovate to lanceolate, acute at apex; peduncles 3–7 cm long; pedicels filiform in staminate umbels and capillary in pistillate umbels, 1–2.5 cm long. Staminate tepals connate, forming obovoid-ellipsoid tube, $4\text{--}6 \times 1.5\text{--}3$ mm, gradually contracted at base, contracted to 3-toothed at apex, yellowish-green; stamens 3, sometimes 4, monadelphous; anthers oblong, ca. 0.5 mm long, creamish-white; filaments connate at base, ca. 2.5 mm long. Pistillate perianth subglobose to ellipsoid, $2.5\text{--}3.5 \times 2\text{--}3$ mm long, rounded at base, rounded-mucronate with 3-toothed at apex; ovary ovoid-globose; staminoides 3. Berries globose, 6–10 mm in diam., green turning purple-black at maturity; seeds 1–4.

Type: Lectotype (designated by Kladwong & Chantaranothai 2022): CHINA. Sze ch'uan: Nan ch'uan, *Bock & von Rosthorn 2375*, B100366406 (B!).



Diagnostic characters: Slender climber with unarmed angular stems; petioles 2.5–5 cm long; peduncles 3–7 cm long; staminate perianth lobes connate, stamens monadelphous.

Phenology: Fls.: June–August; Frts.: August–February.

Vernacular names: INDIA. Assam: *Roi-kantang* (Karbi).

Distribution: BHUTAN (Trongsa), INDIA (Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, West Bengal), NEPAL (Koshi). [CHINA, MALAYSIA, MYANMAR, TAIWAN, VIETNAM].

Etymology: The species was named in honour of Charles Bock, who first collected the specimens.

Specimens examined: INDIA. Assam: Kamrup, Khetri, NEDFi, *R.K. Choudhary & Geetika Sukhramani* 2644, 2645, 2646 (AHMA); Meghalaya: East Khasi Hills, Cherrapunji, *Walter N. Koelz* 30759 (L); Nagaland: Mokokchung, Changki, *R.K. Choudhary & Geetika Sukhramani* 2216 (AHMA); West Bengal: Darjeeling, Ghayabari, *A.P. Das & Upakar Rai* 1213 (NBU), CHINA. Shang-sze, Iu Shan, Shap man taai shan, *W.T. Tsang* 22278 (P).

Economic/medicinal usage: Young leaves and tender shoots are eaten as vegetables by the *Karbis* of Assam (Baruah 2016).

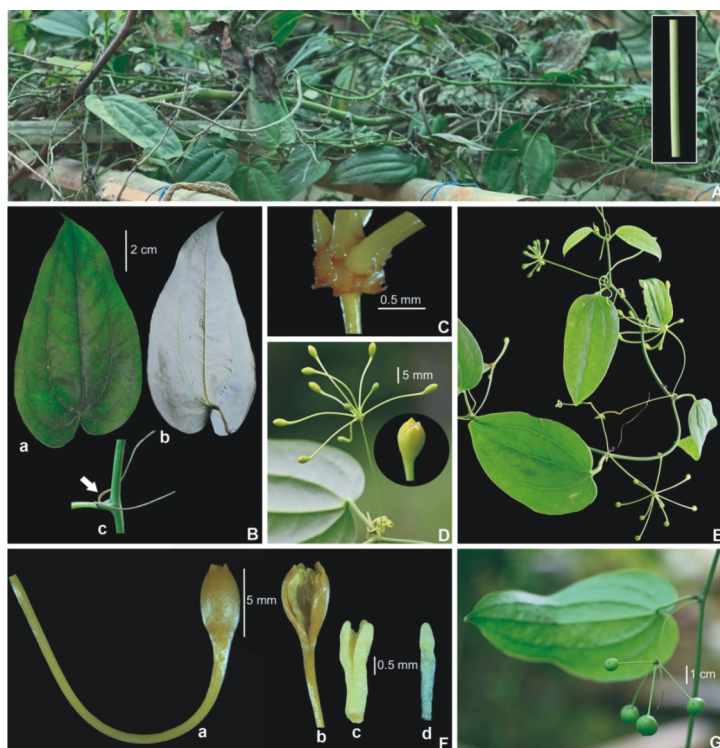


Figure 28: *Smilax bockii* Warb. ex Diels – A. habit (inset: unarmed stem); B. leaves (a, b. adaxial, abaxial surface, c. petiole with stipular tendrils); C. receptacle; D. staminate inflorescence (inset: staminate perianth); E. staminate flowering branch; F. staminate flower (a. flower, b. open flower, c. stamens with connate filaments, d. stamen); G. branch with infructescence.



Figure 29: *Smilax bockii* Warb. ex Diels – A. pistillate flowering branch; B. pistillate flower; C. staminate flowering branch; D. staminate flower; E. branch with infructescence [Drawn by Truptimayee Sahu from L1455337 (L), P02061474 (P), and US03937899 (US)].

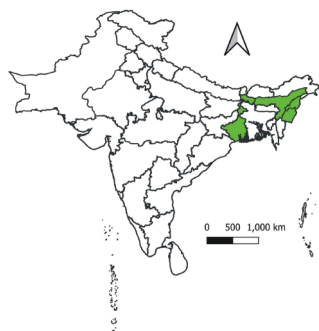
21. *Smilax polyandra* (Gagnep.) P. Li & C.X. Fu, Phytotaxa 117(2): 59. 2013. *Heterosmilax polyandra* Gagnep., Bull. Soc. Bot. France 81: 70. 1934. (**Fig. 30**)

Climber up to 3–5 m high; stems terete, smooth, glabrous, unarmed, rather

densely branched, 2.5–4 mm thick; branches straight, terete, smooth, unarmed, slightly striated, 1–2 mm thick; internodes 3–10 cm long. Leaves variable in size but uniform in shape; lanceolate to lanceolate-ovate to lanceolate-elliptic, $5\text{--}14 \times 1.5\text{--}7$ cm, shallowly cordate to rounded at base, gradually attenuate to acute to briefly caudate at apex, thin-herbaceous, glabrous, green on upper surface, pale on lower surface; costae 5, including a weak marginal pair, all diverging at the base, slender but distinct on upper surface, the median 3 strongly raised on lower surface, lateral veinlets obliquely diverging, making faint but dense reticulations; petioles 0.5–2 cm long, curved, winged for 2–6 mm from the base; wings narrow, ca. 0.5 mm wide, not auriculate at apex; stipular tendrils 7–15 cm long. Inflorescence umbellate; umbels solitary, basally non-prophyllate. Umbels of either sex 15–30-flowered; receptacles globose, 1.5–2 mm in diam.; peduncles 3–8 cm long; pedicels slender, 1–2 cm long. Staminate tepals connate, forming an ovoid to oblong tube, $4\text{--}6 \times 2\text{--}2.5$ mm, gradually contracted at base, contracted to 6-toothed apex; stamens 9–12, monadelphous, ca. 1.8 mm long; anthers elliptic, ca. 0.8 mm long; filaments connate at base, ca. 1 mm long. Pistillate perianth broadly ellipsoid, $2.8\text{--}3.2 \times 2\text{--}2.5$ mm long, obtuse at base, obtuse with 6-toothed at apex; ovary ovoid-globose, ca. 2.5×2 mm; staminoides 3. Berries subglobose to globose, ca. 9 mm in diam.

Type: Holotype: LAOS. Pak Lai, *Thorel 3380*, P00686751(P!).

Diagnostic characters: Slender climbers with unarmed terete stems; peduncles 3–8 cm long; staminate perianth lobes connate, and stamens monadelphous.



Phenology: Fls.: April–July; Frts.: August–October.

Distribution: INDIA (Assam, Manipur, Nagaland, West Bengal). [CHINA, LAOS, THAILAND].

Etymology: The specific epithet indicates the presence of many stamens (*poly*=many, *andra*=male; in Greek).

Specimens examined: INDIA. Assam: Golaghat, Garampani, *R.K. Choudhary & Geetika Sukhramani 1985* (AHMA); West

Bengal: Darjeeling, Mim Nagri Range, *R.K. Choudhary & M.M. Sardesai 1910* (AHMA); *ibid.*, Peshok, *R.K. Choudhary & M.M. Sardesai 1902* (AHMA).

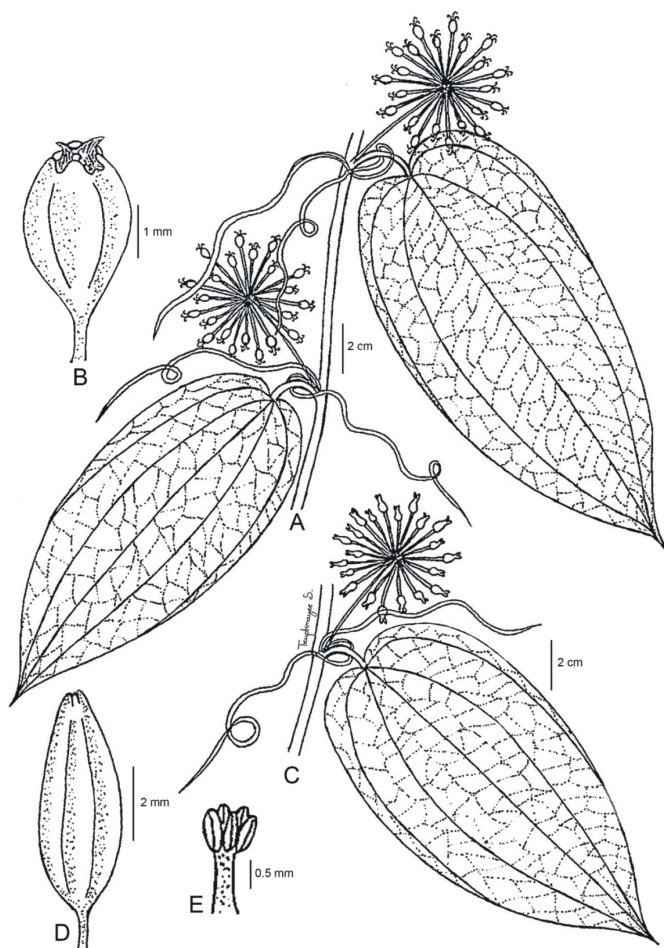


Figure 30: *Smilax polyandra* (Gagnep.) P. Li & C.X. Fu – A. pistillate flowering branch; B. pistillate flower; C. staminate flowering branch; D. staminate flower; E. monadelphous stamens [Drawn by Truptimayee Sahu from L1455343, L1455344 (L), P02069082, and P00686751 (P)].

Section: *Nemexia* (Raf.) A. DC.

22. *Smilax pseudochina* L., Sp. Pl.: 1031. 1753. (Fig. 31)

Climber; stems terete, smooth, glabrous, unarmed, striated, occasionally branched, erect when young, 2.5–4.5 mm thick; internodes 1.2–5 cm long.

Leaves variable in size but uniform in shape; deltoid-ovate to cordate-ovate, $4\text{--}12 \times 2\text{--}6$ cm, cordate to truncate at base, abruptly contracted to acute to cuspidate apex, herbaceous to coriaceous, glabrous, shiny green on upper surface, glaucous on lower surface; costae 5, including a weak marginal pair not reaching the leaf apex, all diverging at the base, strongly raised on lower surface, slender but distinct on the upper surface, lateral veinlets obliquely diverging, forming minute and prominent reticulations; petioles 1–4.5 cm long, straight, winged for 5–8 mm from the base; wings narrow, less than 0.5 mm wide, not auriculate at apex; stipular tendrils up to 20 cm long. Inflorescence umbellate; umbels solitary, basally non-prophyllate. Umbels of either sex 10–35-flowered; receptacles globose, 3–4 mm in diam.; peduncles 5–12 cm long; pedicels capillary to filiform, 0.6–2 cm long. Staminate tepals 6; outer tepals oblong to lanceolate, rounded at apex, $1.5\text{--}2.5 \times 0.5\text{--}1.2$ mm; inner tepals narrow; recurved at anthesis; stamens 6, inserted, 1.5–2.4 mm long; anthers oblong, 0.5–1.0 mm long, creamish-white; filaments 1.0–1.5 mm long. Pistillate tepals 6. Berries globose to subglobose, 4–7 mm in diam., bluish-black at maturity.

Type: Lectotype (designated by Fernald 1944): *s. loc.*, *Kalm Pehr s. n.*, LINN 1182.14 (LINN!).

Diagnostic characters: Stems occasionally branched, unarmed; leaf blades deltoid-ovate to cordate-ovate, glaucous beneath; petioles and peduncles elongated.

Phenology: Fls.: May–July; Frts.: August–November.

Distribution: BANGLADESH. [COLUMBIA, GEORGIA, USA].

Etymology: The specific epithet attributes to the plant's resemblance to *S. china*, with “*pseudo*” denoting false in Greek.

Specimens examined: USA. North Carolina, Bladen, *H.L.B. Comquist 5857* (DUKE); *ibid.*, Tobermory, *John A. Churchill 88133* (BRIT).

Notes: The distribution of *Smilax pseudochina* in Bangladesh primarily relies on information gathered from online databases (POWO 2024; Hassler 1994–2024) and Ahmed et al. (2008), as there are no supporting herbarium specimens available in Bangladesh. Due to the unavailability of specimens from Bangladesh for

examination, we cautiously include *S. pseudochina* in the Indian subcontinent, despite an apparent geographical disconnection. We recommend further investigations to confirm its distribution in Bangladesh.



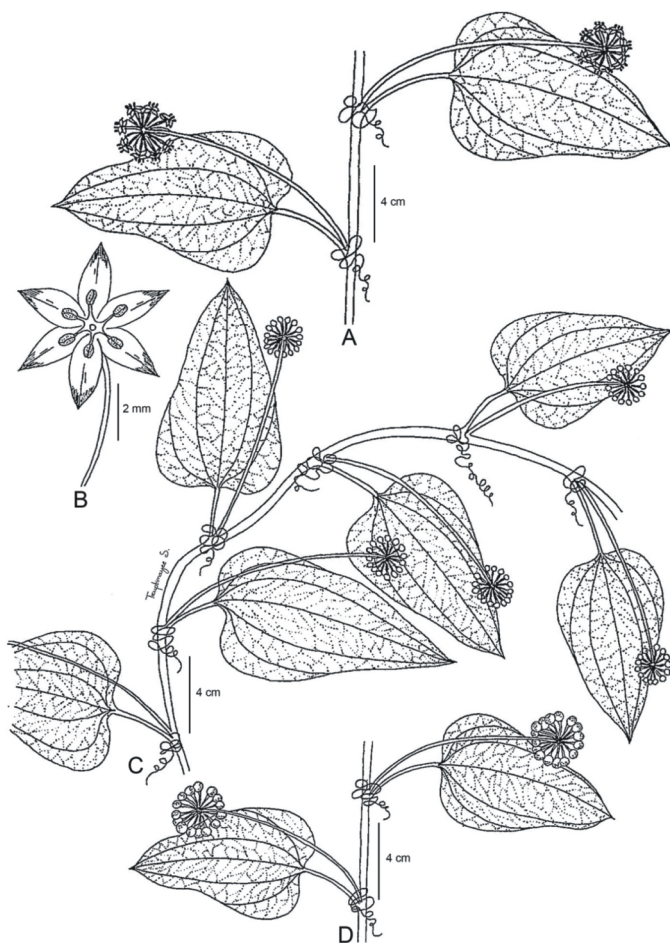


Figure 31: *Smilax pseudochina* L. – A. staminate flowering branch; B. staminate flower; C. pistillate flowering branch; D. branch with infructescence [Drawn by Truptimayee Sahu from BR11591253 (BRIT), DUKE10055281 (DUKE), and JH11213 (MO)].

Section: *China* T. Koyama

23. *Smilax arisanensis* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1):356. 1911. (**Fig. 32**)

Climber; stems terete, smooth, glabrous, sparsely prickled, sometimes

unarmed, distantly branched, 10–12 mm thick; branches more or less zigzag, terete, unarmed or sparsely armed with prickles ca. 2 mm long, slightly striated, 1–1.2 mm thick; internodes 1.5–3 cm long. Leaves rather uniform in shape; lanceolate to oblong-ovate, 3–14 × 1–5 cm, rounded at base, gradually narrowed in to acute to cuspidate apex, coriaceous, pubescent, pale green beneath; costae 3, all diverging from the base, raised on lower surface, lateral veinlets irregularly divided, reticulations not prominent; petioles 0.5–1 cm long, slightly compressed, abruptly curved above the base, winged for 3–8 mm from the base; wings narrow, 2–3 mm wide; tendrils usually present on vegetative branches and much-reduced on flowering branches. Inflorescence umbellate; umbels solitary, sometimes on an axis of 0.2–1.2 cm long, basally prophyllate; prophylls ovate, 4–5 mm long, acute at apex. Umbels of either sex 5–30-flowered; receptacles globose, ca. 1.5 mm in diam.; peduncles 1.5–3.5 cm long; pedicels 5–10 mm long. Staminate tepals 6; outer tepals elliptic ca. 4 × 1.1 mm; inner tepals narrow; campanulate at anthesis, yellow-green; stamens 6, inserted, ca. 2.5 mm long; anthers oblong-ellipsoid, ca. 0.2 mm long, milky white; filaments 2–2.2 mm long. Pistillate tepals 6; outer tepals ovate-elliptic, acute at apex, 1.8–2.2 × 0.8–1.1 mm; inner tepals narrow; pale-green; ovary ovoid; stigmas 3, linear, recurved; staminodes 0. Berries globose, 5–8 mm in diam., bluish-black at maturity; seeds 1 or 2, ovoid-ellipsoid, ca. 4 mm long.

Type: Lectotype (designated by Koyama 1978): TAIWAN. Chiayi: Mt. Alishan, *G. Nakahara s. n.*, TI00082985 (TI!).

Diagnostic characters: Leaf blades lanceolate, 3-costae; umbels solitary arising from prophyllate axil on a short axis of up to 1.2 cm long, peduncles without bracteoles.

Phenology: Fls.: April–July; Frts.: August–January.

Distribution: BANGLADESH, INDIA (Arunachal Pradesh, Assam, Meghalaya, Sikkim). [CHINA, TAIWAN, VIETNAM].

Etymology: The specific epithet refers to the type locality ‘Alishan (or Ali Mountain)’ in Taiwan.

Specimens examined: BANGLADESH. Sylhet, *Wallich 5128A* (E), CHINA. Kiangsi, Wuning, Yanyang Mountain, *Ye Cun-su 522* (MO), TAIWAN.

Miaoli Hsien, Taian Hsiang, Shei-Pa National Park, *Shu-Hui Wu 1218* (MO); Yudeshan, Randaishan, *B. Hayata et al. 7046* (TI).



Notes: This species bears a striking resemblance with *Smilax lanceifolia* in its vegetative character specifically the lanceolate leaves, however, differs in the number of costae i.e., 3 (vs 5 in *S. lanceifolia*), and the length of peduncle i.e., 1.5–3.5 cm (vs 1–1.5 cm in *S. lanceifolia*). Koyama (1963) initially distinguished this species from *S. lanceifolia* based on the emergence of umbels from non-prophyllate axils. However, our closer examination revealed that *S. arisanensis*, in fact, bears umbels arising from the prophyllate axil.

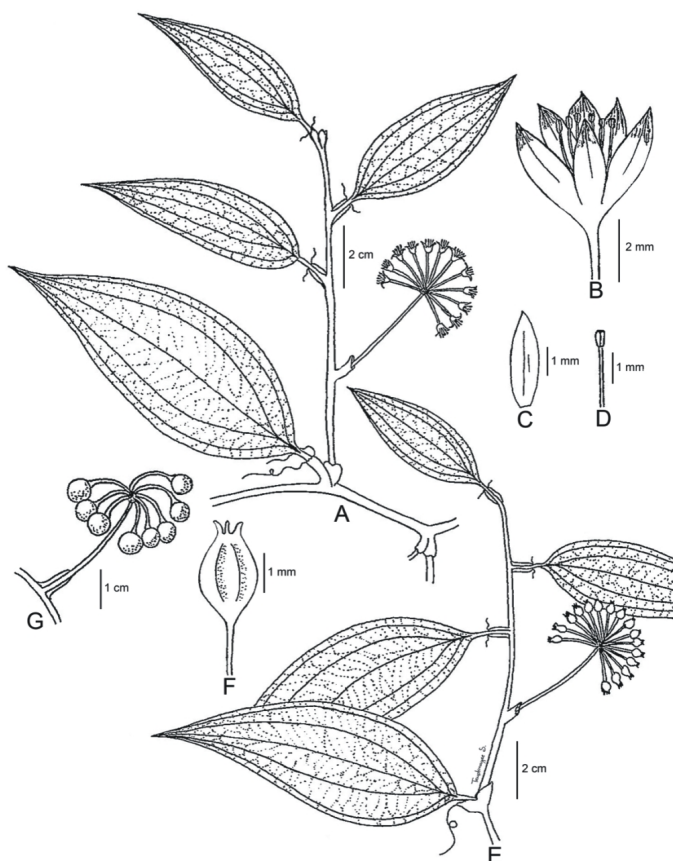


Figure 32: *Smilax arisanensis* Hayata – A. staminate flowering branch; B. staminate flower; C. staminate tepal; D. stamen; E. pistillate flowering branch; F. pistillate flower; G. infructescence [Drawn by Truptimayee Sahu from E00318410 (E), MO-348356, and MO-3483560 (MO)].

24. *Smilax china* L., Sp. Pl.: 1029. 1753. (Fig. 33)

Climber; stems terete, smooth, glabrous, armed with recurved prickles, 2–5 mm long, densely branched, 3–9 mm thick; branches zigzag to straight, obscurely angular, smooth, sparsely armed with recurved prickles, striated, 1–3 mm thick; internodes 1.5–7 cm long. Leaves variable in size and shape, ovate-orbicular to ovate-elliptic to broadly elliptic, 2–12 × 2–7 cm, rounded to shallowly cordate to suddenly contracted at base, rounded to mucronate to emarginate at apex, coriaceous, glabrous, glaucous on lower surface; costae 5–7, including a weak marginal pair, all diverging at the base, slightly raised on lower surface, slender but distinct on upper surface, lateral veinlets obliquely diverging, forming distinct reticulations; petioles 0.8–1.5 cm long, slightly curved at the middle, winged for 5–10 mm from the base; wings oblong, sometimes lanceolate-oblong, 1–2 mm wide, obtuse at apex; stipular tendrils 0.1–15 cm long. Inflorescence umbellate; umbels solitary, basally non-prophyllate, umbels from one to several lower axils of first-year branch. Umbels of either sex 10–25-flowered; receptacles elongated, 2–3 mm long; peduncles 1.5–4 cm long; pedicels capillary to filiform, 0.1–1.5 cm long. Staminate tepals 6; outer tepals lanceolate-elliptic, rounded to sub-obtuse at apex, recurved at apex, 4–5 × 1.5–2.5 mm; inner tepals oblanceolate to oblong, narrow; stamens 6, inserted, 3.5–4 mm long; anthers ellipsoid, ca. 0.6 mm long; filaments filiform, ca. 3 mm long. Pistillate tepals 6; outer tepals ovate-lanceolate to elliptic, rounded to subobtuse at apex, 3–4 × 1–2.2 mm; inner tepals narrow; ovary ovoid, ca. 2 mm long; stigmas 3, ca. 0.8 mm long, linear; staminodes 3. Berries globose, 10–12 mm in diam., red at maturity; seeds 1 or 3, obovate-orbicular, 3–4 mm long, reddish purple.

Type: Lectotype (designated by Altinordu 2015): *s. loc.*, *s. coll.*, *s. n.*, LINN 1182.6 (LINN!).

Diagnostic characters: Branches zigzag, leaf blades cordate to cuneate at base, strongly glaucous beneath; petiolar wings oblong to elliptic, 1–2 mm wide.

Phenology: Fls.: March–May; Frts.: April–July.

Vernacular names: INDIA. Assam: *Sukchini*, *Chobchini* (Karbi).

Distribution: INDIA (Assam, Meghalaya). [CHINA, JAPAN, KOREA, MYANMAR, PHILIPPINES, TAIWAN, THAILAND, VIETNAM].



Etymology: The specific epithet indicates the geographical origin and refers to China.

Specimens examined: CHINA. Anhwei, Chu hwa shan, *R.C. Ching* 2805 (SYS); *ibid.*, Chouchow, *W.C. Cheng* 5211 (P); Kwang Tung, *C.O. Levine s. n.* (PE); Kiangsi, Sui Feng Sze, *A.N. Steward* 2649 (HUH), JAPAN. Between Shojiko and Kofu, *P.H. Doorsett & W.J. Morse* 546 (P), THAILAND. Loei, Phu Kradung, *K. Bunchuai* 130 (P).

Economic/medicinal usage: *Smilax china* has widely been used as a traditional medicine in China to treat syphilis, rheumatoid arthritis, and other ailments (Shahrajabian et al. 2019). Known as the botanical source of the Ayurvedic drug *Chopchini* (API 2006); the roots and rhizomes are used to treat congenital diseases, polyuria, epilepsy, leprosy, etc. (Madhavan et al. 2010).

Notes: The protologue of *Smilax china* states that its leaf blades are ovate-cordate, and it provides four synonyms [Linnaeus (1749: 461), Kaempfer (1712: 781), Bauhin (1623: 896), and Plukenet (1705: 101)]. Kaempfer and Plukenet provided illustrations. Plukenet's illustration depicted strongly zigzag branches, sub-terete and striated stems, obovate leaf blades with three costae, emarginate apex, cuneate base, narrow petiolar wings, and long tendrils. In contrast, Kaempfer's illustration displays strongly zigzag branches, a striated stem, ovate-orbicular leaf blades with five costae, emarginate or cuspidate apex, contracted or truncate base, all these variations within a single branch, along with narrow petiolar wings and long tendrils. An evaluation of these illustrations and the lectotype at LINN (1182.6) revealed that *S. china* exhibits a wide range of variations in terms of the shape, apex, and base of its leaf blades, petiolar wings, and the number of costae.

Koyama (1960a, 1963, 1975) previously noted that *S. china* is very similar to *S. davidiana* but differs in having strongly zigzag branches (vs nearly straight branches of *S. davidiana*); petiolar wings 1–1.5 mm in width (vs broader petiolar wings, 2–3 mm in width in *S. davidiana*). While there is a slight difference in the colour of lower surface, with *S. china* having a glaucous underside and *S. davidiana* having a slightly pale lower surface. However, this distinction may not always hold true, as some sheets of *S. davidiana* annotated by Wang and Tang also displayed a glaucous underside. Furthermore, Koyama in 1963, noted that *S. china* appeared to be entirely absent in the Himalayas. However, Baruah et al. (2011) reported the presence of *S. china* in India for the first time and included an illustration showing horizontally straight branches.

The current documentation of *S. china* in India relies exclusively on the report of Baruah et al. (2011). Despite our multiple exploratory searches, we were unable to locate this species in Assam and Meghalaya. Our concerted efforts to

examine herbarium sheets from Assam (Hailakandi district, Sapanpur, *Sanjib Baruah* 535, GUBH) and Meghalaya (Ri Bhoi, Kodh-Hati, *Sanjib Baruah* 535, GUBH), using the same field numbers as referenced in Baruah et al. (2011, 2017), proved futile, as these specimens were not found in GUBH. Furthermore, morphological and molecular data from Sun et al. (2015, 2016) suggest that *S. china* constitutes a mixploid species complex, including five diploid taxa: *S. biflora* Siebold ex Miq., *S. china* L., *S. davidiana* A. DC., *S. microdontus* Z.S. Sun & C.X. Fu, *S. nantoensis* T. Koyama, and *S. trinervula* Miq. Emphasizing the critical need for future research on this species, it is also evident that integrating multiple lines of evidence is essential for a comprehensive understanding.



Figure 33: Lectotype of *Smilax china* L. (LINN1182.6 © Linnaean Herbarium).

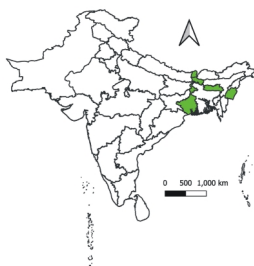
25. *Smilax davidiana* A. DC. in A. DC. & C. DC., Monogr. Phan. 1: 104. 1878. (Figs. 34 & 35)

Climber; stems terete, smooth, glabrous, armed with recurved prickles, 2–4 mm long, densely branched, 3–6 mm thick; branches straight or weakly

zigzag, terete or obscurely angular, smooth, sparsely armed with recurved prickles, strongly striated, 1–2.5 mm thick; internodes 1.5–5 cm long. Leaves very variable in size and shape, elliptic to obovate-elliptic to obovate, $2.5\text{--}12 \times 2\text{--}7$ cm, abruptly contracted to cuneate at base, abruptly contracted to acute to mucronate apex, thick-herbaceous, glabrous, slightly pale on lower surface but not glaucous; costae 5, including a weak marginal pair, all diverging at the base, raised on lower surface, lateral veinlets irregularly divided, forming loose reticulations; petioles 0.3–1.2 cm long, slightly curved, winged for 3–10 mm from the base; wings oblong to elliptic, sometimes obovate, narrow, 2–3 mm wide, not auriculate at apex; stipular tendrils short and rather curved, 0.2–3 cm long. Inflorescence umbellate, umbels solitary, basally non-prophyllate, umbels borne at the lowest axil of older branch. Umbels of either sex 10–25-flowered; receptacles ellipsoid to subglobose, 2–3 mm long; bracteoles ovate to lanceolate, acute at apex; peduncles 1.5–3.5 cm long; pedicels capillary to filiform, 0.8–1.5 cm long. Staminate tepals 6; outer tepals obovate, rounded at apex, $3\text{--}4 \times 1\text{--}1.5$ mm; inner tepals oblanceolate to oblong, narrow; recurved at anthesis, yellowish-green, obovoid in bud; stamens 6, exserted, 3.8–4.5 mm long; anthers elliptic, ca. 0.8 mm long, curved, creamish-white; filaments filiform, 3–3.5 mm long. Pistillate tepals 6; outer tepals ovate-lanceolate, acute at apex, $2\text{--}3 \times 0.8\text{--}1$ mm; inner tepals narrow; ovary ellipsoid, ca. 1.5×0.8 mm; stigmas 3, ca. 1 mm long, recurved; staminodes 3. Berries globose, 5–8 mm in diam., red at maturity; seeds 1 or 3, ellipsoid, 3–5 mm long.

Type: Holotype: CHINA. Kiangsi, *David s. n.*, P00686782 (P!).

Diagnostic characters: Densely branched climber; leaf blades cuneate at base; petiolar wings oblong to elliptic, 2–3 mm wide; anthers elliptic and curved, ca. 8 mm long; umbels borne at the first axils of branches.



Phenology: Fls.: March–May; Frts.: June–October.

Distribution: INDIA (Manipur, Meghalaya, Sikkim, West Bengal). [CHINA, LAOS, THAILAND, VIETNAM].

Etymology: The species was named in honour of Rabe Armand David (1826–1900), a Chinese plant collector who made significant contributions to the fields of natural history of China and parts of Asia.

Specimens examined: INDIA. Manipur: Karong, *Walter N. Koelz* 26694 (MICH); Meghalaya: East Khasi Hills, Cherrapunji, *Walter N. Koelz* 33601, (MICH); *ibid.*, Nohkalikai Road, *R.K. Choudhary & Geetika Sukhramani* 2283, 2284, 2285 (AHMA); *ibid.*, Mawsmi Cave Road, *R.K. Choudhary & Geetika Sukhramani* 2280 (AHMA); *ibid.*, Mawryngkneng, Puriang, *R.K. Choudhary & Geetika Sukhramani* 2651, 2657 (AHMA); *ibid.*, Pynursula, Risawkur, *R.K. Choudhary & Geetika Sukhramani* 2670, 2671 (AHMA).

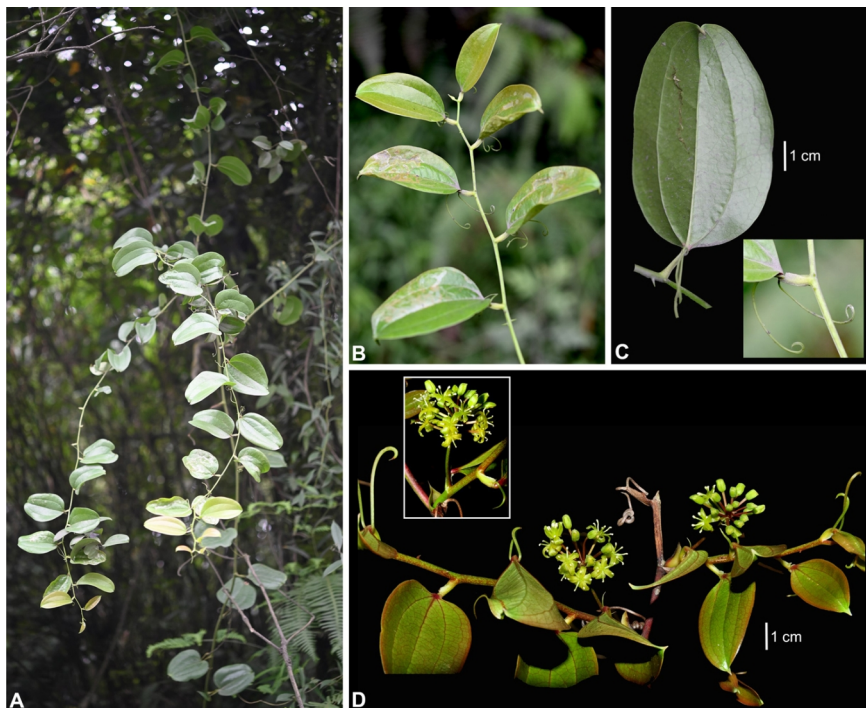


Figure 34: *Smilax davidiana* A. DC. – A. habit; B. vegetative branch; C. leaf (abaxial surface) (inset: petiole with stipular tendrils); D. staminate flowering branch (inset: staminate inflorescence).

26. *Smilax ferox* Wall. ex Kunth, Enum. Pl. 5: 251. 1850. (Figs. 36 & 37)

Climber; stems terete, smooth, glabrous, armed with straight or recurved conical prickles, 2–5 mm long, densely branched, 4–4.5 mm thick; branches slightly zigzag, subterete, smooth, armed with straight or recurved conical prickles, striated, 1–2 mm thick; internodes 1–2.5 cm long. Leaves

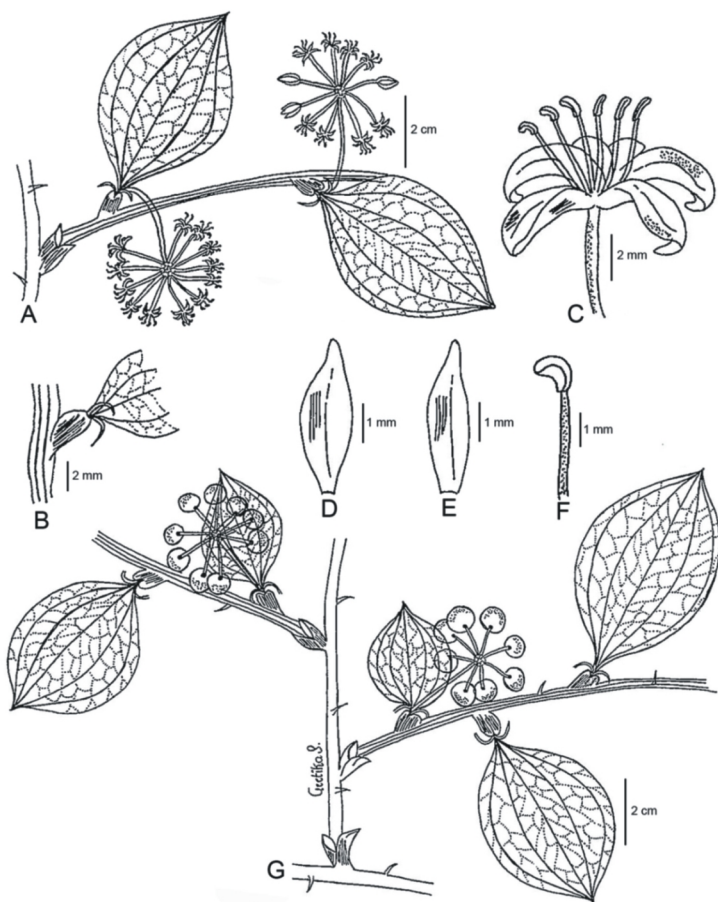


Figure 35: *Smilax davidiana* A. DC. – A. staminate flowering branch; B. petiole with wings and stipular tendrils; C. staminate flower; D, E. staminate tepals-outer and inner; F. stamen; G. branch with infructescence [Drawn by Geetika Sukhramani from MICH1492567 (MICH), NY04343224 (NYBG), P02060821 (P), and US03940663 (US)].

variable in size and shape, ovate-lanceolate to ovate-oblong to ovate-elliptic, 2–9 × 1.5–3.5 cm, cuneate to rounded at base, mucronate at apex, coriaceous, glabrous, fresh green, shiny above, glaucous on lower surface; costae 5, including a faint marginal pair, all diverging at the base, the median 3 raised on lower surface, faint on the upper surface, lateral veinlets

oblique and faint, making dense reticulations; petioles 0.3–0.8 cm long, straight, winged for 2–6 mm from the base; wings obovate to elliptic, narrow, 1–2.5 mm wide, not auriculate at apex; stipular tendrils on vegetative branches up to 12 cm long, sometimes absent on flowering branches. Inflorescence umbellate; umbels solitary, basally non-prophyllate. Umbels of either sex 15–22-flowered; receptacles elongated, 4–6 mm long; bracteoles lanceolate, acute at apex; peduncles 0.6–2.5 cm long; pedicels capillary to filiform, 7–10 mm long. Staminate tepals 6; outer tepals ovate-oblong, rounded at apex, $3.5\text{--}4.5 \times 1.5\text{--}2.5$ mm; inner tepals narrow; recurved at anthesis, ellipsoid in buds; stamens 6, inserted, 2–2.5 mm long; anthers oblong, 0.5–0.8 mm long; filaments 2–2.2 mm long. Pistillate tepals 6; outer tepals ovate, rounded at apex, $2.8\text{--}3.2 \times 2.4\text{--}2.6$ mm; inner tepals narrow; recurved; ovary ovoid ca. 2.5 mm across; stigmas 3, linear, recurved; staminodes 3–6. Berries globose, 8–10 mm in diam., reddish-brown at maturity, seeds 1 or 2.

Type: Lectotype (first step, designated by Koyama, 1983): *Wallich 5119*, Nepal (K).

Lectotype (second step, designated here): NEPAL. *s. loc.*, *Wallich 5119*, K001104849 (K!).



The original materials of *S. ferox* are housed at E, GH, GZU, K, and P. Koyama (1983) cited ‘Type: Wallich 5119, Nepal, K’. The term ‘type’ is corrected here to ‘lectotype’ following article 9.10 of the Shenzhen Code (Turland et al. 2018). However, Kladwong et al. (2018b) selected K001104849 at K-W as the lectotype. In our opinion, Kladwong’s typification appears unnecessary since Koyama’s prior designation had effectively narrowed down the type of the Wallich collection housed at K. We consider that

Koyama’s inadvertent designation constitutes the first-step of lectotypification. Notably, there are two sheets of *S. ferox* at K (K001104849 and K000820901) bearing the same label as ‘Wallich 5119, Nepal’ and both qualify as original material. Given that we hereby designate K001104849 as a second-step lectotype following articles 7.11, 9.3, 9.12, and 9.17 of the Shenzhen Code (Turland et al. 2018), as it bears several well-preserved mature male flowers.

Diagnostic characters: Densely branched climber with prickles ca. 5 mm long; leaf blades strongly glaucous beneath; petiolar wings narrow and elliptic.

Phenology: Fls.: March–July; Frts.: July–November.

Distribution: BANGLADESH, BHUTAN (Bumthang, Daga, Kurmaed, Punakha, Thimphu, Trongsa), INDIA (Arunachal Pradesh, Kerala, Manipur, Meghalaya, Sikkim, Uttarakhand, West Bengal), NEPAL (Gandaki, Koshi, Sudurpashchim). [CAMBODIA, CHINA, LAOS, MYANMAR, THAILAND, VIETNAM].

Etymology: The specific epithet refers to the fierce appearance of the species due to the presence of long prickles (*ferox*=fierce or *ferocious*, in Latin).

Specimens examined: INDIA. Arunachal Pradesh: West Kameng, Shergaon, R.K. Choudhary & Geetika Sukhramani 2716 (AHMA); Manipur: *s. loc.*, George Watt 5966 (CAL); Meghalaya: East Khasi Hills, Cherrapunji, Nohkalikai Road, R.K. Choudhary & Geetika Sukhramani 2286, 2287 (AHMA); Sikkim: *s. loc.*, G. King 5143 (CAL); West Bengal: Darjeeling, Peshok, R.K. Choudhary & M.M. Sardesai 1901 (AHMA); *ibid.*, Rishi Road, R.K. Choudhary & M.M. Sardesai 1912, 1913 (AHMA), CHINA. Hunan, Dongan, Mt Shunhuangshan, Liu Jin-Kui 417 (NY).

Economic/medicinal usage: In Meghalaya (India), the Khasi traditional healers utilize a concoction made from the root of *Smilax ferox* and the rhizome of *Pteridium aquilinum* (L.) Kuhn to eliminate gallstones. The boiled extract of *S. ferox* roots, along with the entire plant of *Viscum articulatum* Burm., is administered to newborns, breastfeeding mothers, and expecting mothers as a preventive measure against gastrointestinal issues (Hynniewta & Kumar 2008).

Notes: Hooker, in 1892, synonymized *Smilax thomsoniana* A. DC. with *S. ferox*. However, Koyama in 1963, correctly pointed out that *S. thomsoniana* is more closely related to *S. davidiana*. He further mentioned the confusion between *S. ferox* and *S. davidiana* with the widely distributed *S. china* but did not elaborate on the differences between the former two. A comprehensive comparison of these species reveals that *S. ferox* bears a strong resemblance to *S. davidiana* in its overall appearance. Nonetheless, there are some notable differences: *S. ferox* exhibits zigzag branches, broadly ovate-lanceolate leaf blades that are glaucous underside, and the presence of solitary umbels in most axils of the branches. In contrast, *S. davidiana* has straight branches, broadly elliptic or obovate leaf blades that are non-glaucous beneath, and solitary umbels only at the first axil of the branches.

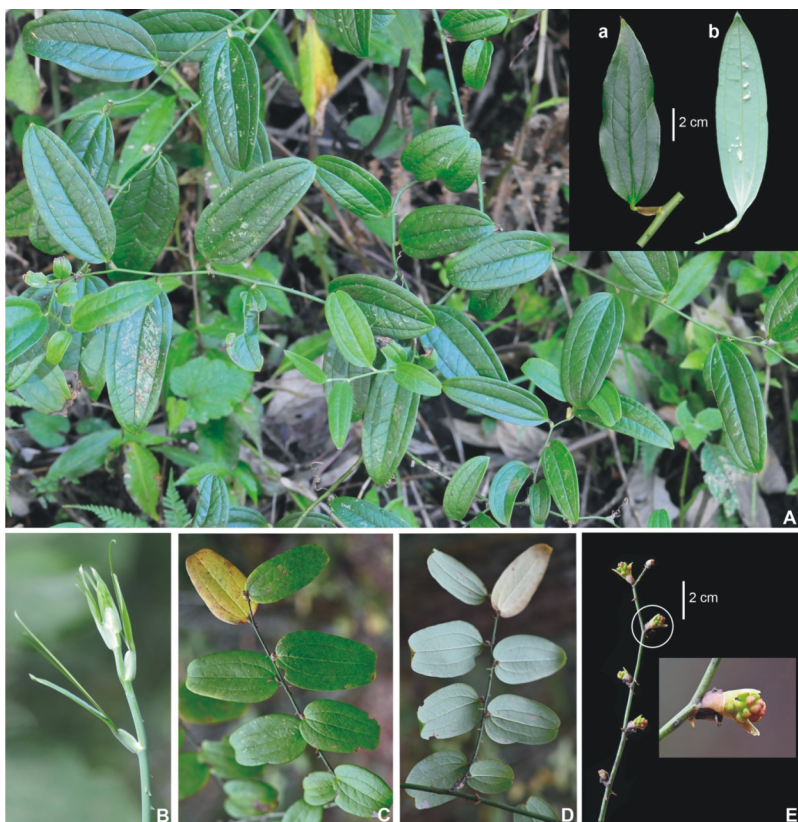


Figure 36: *Smilax ferox* Wall. ex Kunth – A. habit [inset: leaves (a, b. adaxial and abaxial surface)]; B. tender shoot; C, D. flowering branches-adaxial, abaxial surface); E. flowering branch (inset: umbel with young floral buds).

Section: *Coilanthus* A. DC.

27. *Smilax elegans* Wall. ex Kunth subsp. *elegans* Enum. Pl. 5: 163. 1850. (Fig. 38)

Climber; stems terete, smooth, glabrous, unarmed, densely branched, 4–5 mm thick; branches strongly zigzag, sometimes straight, terete to obscurely angular, smooth, unarmed, striated, 1–2 mm thick; internodes 1–7 cm long. Leaves variable in size and shape; ovate-lanceolate to lanceolate to lanceolate-elliptic to broadly ovate, $3\text{--}12 \times 1\text{--}7$ cm, rounded to cuneate to sometimes shallowly emarginate at the base, briefly acute at apex, thick-herbaceous to thin-coriaceous, glabrous, slightly shiny on upper surface,

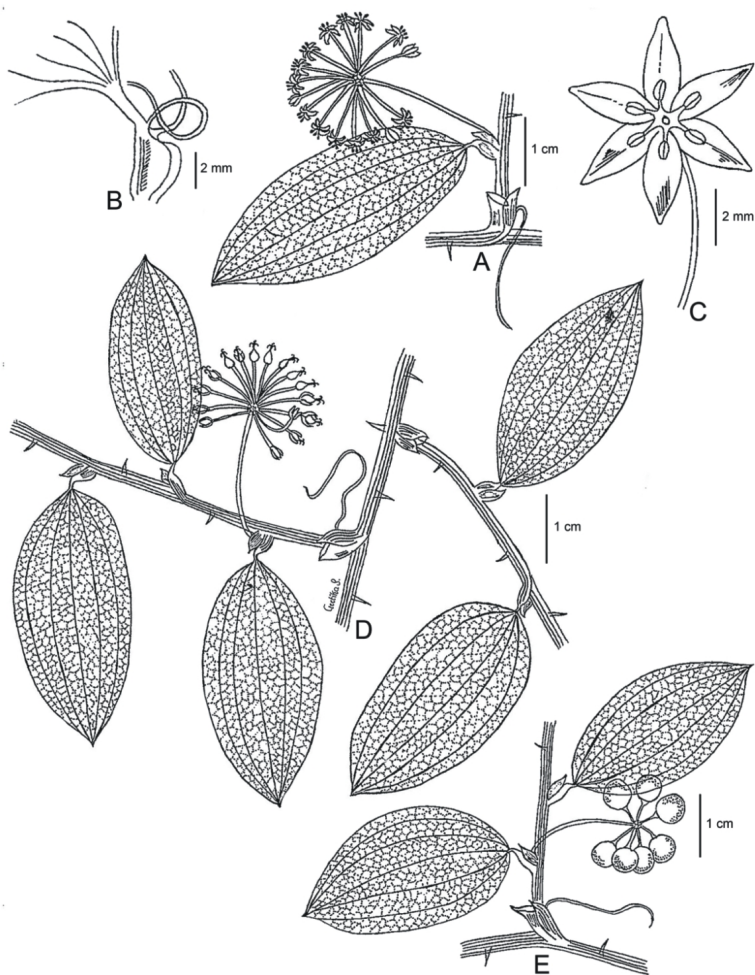


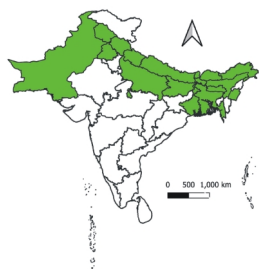
Figure 37: *Smilax ferox* Wall. ex Kunth – A. staminate flowering branch; B. lateral view of petiolar wings; C. staminate flower; D. pistillate flowering branch; E. branch with infructescence [Drawn by Geetika Sukhramani from NY03777802 (NYBG), P000686778, and P01803381(P)].

glaucous on lower surface; costae 5, including a weak marginal pair, all diverging at the base, strongly raised on both surface, lateral veinlets irregularly divided, making loose and distinct reticulations; petioles 0.5–2

cm long, straightish, winged for 3–14 mm from the base; wings oblong, narrow 3–4 mm wide, recurved on entire margins, deltoid at apex; stipular tendrils 2–12 cm long. Inflorescence umbellate; umbels solitary, basally non-prophyllate. Umbels of either sex 4–22-flowered; receptacles globose to hemispherical, 2–5 mm in diam.; bracteoles linear-lanceolate, ca. 1 mm long, sometimes up to 3.5 mm long, acute at apex, gradually falling off on maturity; peduncles 1–2(–5) cm long; pedicels capillary to filiform, 0.7–1.2 cm long. Staminate tepals 6; outer tepals oblong-lanceolate, acute at apex, $1.8\text{--}2 \times \text{ca. } 1 \text{ mm}$; inner tepals narrow, spreading, greenish-yellow; stamens 6, inserted, 1.5–1.6 mm long; anthers elliptic, 0.5–0.6 mm, white; filaments ca. 1 mm long. Pistillate tepals 6; outer tepals lanceolate, acute at apex, $1.2\text{--}1.5 \times \text{ca. } 0.5 \text{ mm}$; inner tepals narrow; ovary ellipsoid, 2–3 mm long; stigmas 3; staminodes 3. Berries globose, 4–6 mm in diameter, green turning dark blue at maturity; seeds 1 or 2, globose, 3–3.5 mm in diam.

Type: Neotype (designated by Noltie 1994): NEPAL. *s. loc.*, *Wallich 5117*, K000820906 (K!).

Diagnostic characters: Densely branched climbers; branches zigzag; leaf blades glaucous beneath; petiolar wings recurved on entire margin, deltoid at apex.



Phenology: Fls.: May–August; Frts.: August–February.

Distribution: BANGLADESH, BHUTAN (Daga, Punakha, Thimphu), INDIA (Arunachal Pradesh, Bihar, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Punjab, Sikkim, Uttarakhand, West Bengal), NEPAL (Bagmati, Gandaki, Karnali, Koshi, Sudurpashchim), PAKISTAN. [CHINA, MYANMAR].

Etymology: The specific epithet refers to the elegant or graceful appearance of the plant (*elegans*=elegant, in Latin).

Specimens examined: INDIA. Arunachal Pradesh: Kurung Kumey, Tassar, *R.K. Choudhary & Geetika Sukhrmani 2738* (AHMA); West Kameng, Shergaon, *R.K. Choudhary & Geetika Sukhrmani 2714, 2715* (AHMA); *ibid.*, Bomdila, *R.K. Choudhary & Geetika Sukhrmani 2718* (AHMA); *ibid.*, Dirang, *R.K. Choudhary & Geetika Sukhrmani 2726* (AHMA); Meghalaya: East Khasi Hills, Cherrapunji, Laitryngew, *R.K. Choudhary & Geetika Sukhrmani 2672* (AHMA); *ibid.*, Mawsynram Road, *R.K. Choudhary & Geetika Sukhrmani 2294* (AHMA); *ibid.*, Pynursula, *R.K. Choudhary & Geetika Sukhrmani 2665* (AHMA); *ibid.*, Shillong

peak, R.K. Choudhary & Geetika Sukhramani 2256, 2257, 2258, 2259, 2260 (AHMA), NEPAL. s. loc., Wallich 5117(K).

Notes: This species closely resembles *Smilax menispermoidea*, however, differs from it by the strongly zigzag branches; oblong petiolar wings, entirely recurved on margins; and thicker leaf blades turning dark grey in the dry state.

Hooker (1892) elevated *Smilax elegans* var. *major* A. DC. to a specific rank as *S. longebracteolata* Hook.f. In 1963, Koyama examined the type specimens and regarded them as an unusual variant of *S. glaucophylla* (present-day *S. elegans*). Furthermore, considering the difference in the degree of development of its bracteoles and peduncle, Noltie (1994) placed it under *S. elegans* subsp. *subrecta* Noltie. Chen (1996) and Chen & Koyama (2000) reverted to treat *S. longebracteolata* as a distinct species. However, most of the online plant databases (Banki et al., 2024; POWO 2024) continue to acknowledge Noltie's classification, listing *S. elegans* subsp. *subrecta* as an accepted name. Our observations align with the treatment of Koyama (1963) after examining the live specimens collected in Meghalaya (India), which exhibited both small leaves on younger branches and large leaves on the main branches. Additionally, our other collections of *S. elegans* displayed varying lengths of peduncles and bracteoles (as per the protologue of *S. elegans*). Based on these characters, we find no substantive distinctions between *S. elegans* subsp. *elegans* and *S. elegans* subsp. *subrecta*. Nevertheless, it is crucial to acknowledge that additional collections from India are necessary prior to drawing any conclusive findings. In this study, we have classified *S. elegans* subsp. *subrecta* as an imperfectly known taxon.

28. *Smilax elegans* subsp. *osmastonii* (F.T. Wang & Tang) Noltie, Edinburgh J. Bot. 51(2): 155. 1994. *S. osmastonii* F.T. Wang & Tang in Bull. Fan Mem. Inst. Biol. Bot. 7: 298. 1937.

Climber; stems terete, smooth, glabrous, unarmed, densely branched, 3–4 mm thick; branches zigzag, terete or obscurely angular, smooth, unarmed, striated, 1–2 mm thick; internodes 1–6 cm long. Leaves variable in size and shape, broadly ovate to ovate-lanceolate to lanceolate, 3–6 × 1.5–2.5 cm, rounded to truncate at base, acuminate at apex, thick-herbaceous to thin-coriaceous, glabrous, slightly shiny above, strongly glaucous and minutely papillose on lower surface; costae 5, including a weak marginal pair, all diverging at the base, strongly raised on both surfaces, lateral veinlets irregularly divided, making dense and distinct reticulations; petioles 0.5–1.2 cm long, straight, winged for 3–5 mm from the base; wings narrow, 1–2 mm wide, minutely acute at apex; stipular tendrils none. Inflorescence umbellate; umbels solitary, basally non-prophyllate. Umbels of either sex

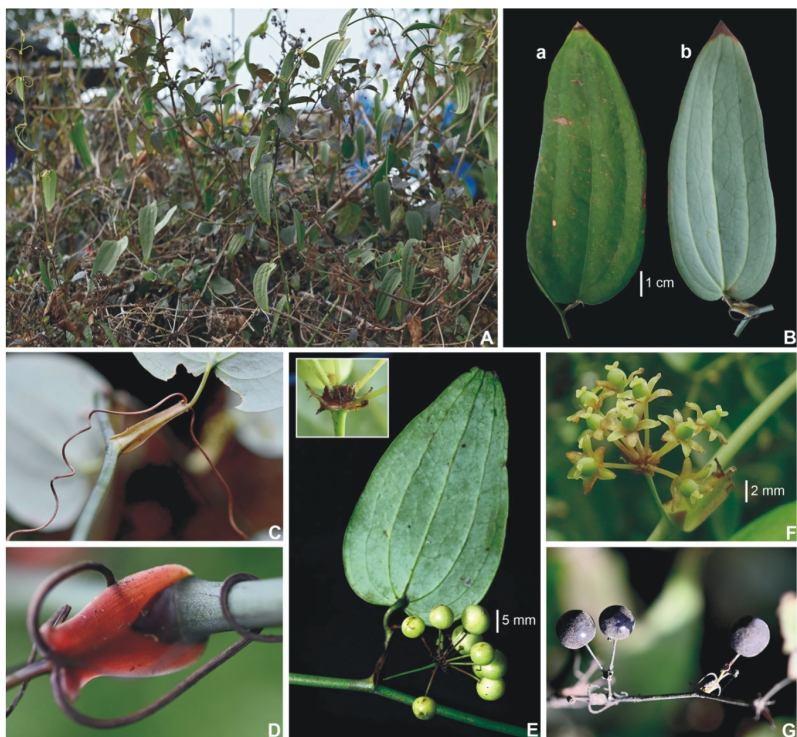
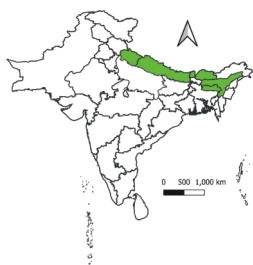


Figure 38: *Smilax elegans* Wall. ex Kunth subsp. *elegans* – A. habit; B. leaves (a, b. adaxial, abaxial surface); C, D. oblong petiolar wings; E. branch with infructescence (inset: receptacle); F. female inflorescence; G. infructescence with mature berries. (Photo F: Dr. Gopal Krishna).

3–10-flowered; receptacles slightly elongated, 1–2 mm long; bracteoles absent; peduncles 2–3 cm long; pedicels capillary to filiform, unequal in staminate umbels, 0.7–1.2 cm long. Staminate tepals 6; outer tepals oblong-ovate, acute at apex, $1.5\text{--}2.5 \times 0.9\text{--}1.2$ mm; inner tepals narrow; spreading at anthesis, incurved, ovoid-globose in bud, purple; stamens 6, inserted, ca. 1.0 mm long; anthers ovoid-globose, ca. 0.5 mm long, white; filaments ca. 0.5 mm long or almost sessile.

Type: Lectotype (designated by Noltie 1994): INDIA. Uttarakhand: Garhwal, *Osmaston 1076* (Beeson), K000820908 (K!).

Diagnostic characters: Densely branched; leaf blades glaucous beneath; petiolar wings narrow, acute at apex.



Phenology: Fls.: April–June.

Distribution: BHUTAN (Thimphu), INDIA (Assam, Meghalaya, Sikkim, Uttarakhand), NEPAL.

Etymology: The subspecies name was given in honour of Arthur Edward Osmaston (1885–1972), a forest officer and naturalist who made significant contributions to geology, plants, and the natural history of the Indian Himalayas.

Specimens examined: INDIA. Assam: Cachar, Laikul, *Walter N. Koelz* 27880 (MICH); Meghalaya: East Khasi hills, Mawphlang, *Thakur Rup Chand* 7561 (MICH); Sikkim: *s. loc.*, *J.D. Hooker s. n.* (L); BHUTAN. Thimphu, Dochu La, *Hara et al. s. n.* (NY).

Notes: Following Noltie's (1994) findings, we noted a discrepancy in the type specimen Osmaston 1076 housed at K (K000820908). This specimen exhibits a tendril, indicating the climbing tendency of the plant. In contrast, the lectotype (K000820908) lacks tendrils. Moreover, *S. elegans* subsp. *osmastonii* differs from *S. elegans* subsp. *elegans* in having narrow petiolar wings 1–2 mm wide, minutely acute at apex; leaves papillose on lower surface; receptacles without bracteoles.

29. *Smilax glabra* Roxb., Fl. Ind. 3: 792. 1832. (Figs. 39 & 40)

Climber; rhizomes irregularly lobed, tuber-like, 10–28 × 4–8 cm; stems terete, smooth, glabrous, unarmed, distantly branched, 2.5–5 mm thick; branches slightly zigzag, terete, smooth, unarmed, non-striated, 1–2 mm thick; internodes 1–5 cm long. Leaves variable in size but uniform in shape, lanceolate to ovate-lanceolate to ovate-oblong to elliptic-lanceolate, 5–18 × 2.5–7 cm, rounded to cuneate at base, gradually attenuate to acute to acuminate to briefly caudate at apex, membranaceous to thin-coriaceous, with thickened margins, glabrous, shiny above, glaucous beneath; costae 5, including a weak marginal pair, all diverging at the base, strongly raised on lower surface, lateral veinlets rectangularly divided, forming faint but dense reticulations; petioles 0.5–3 cm long, straight, winged for 3–10 mm from the base; wings narrow, less than 0.5 mm wide, not auriculate at apex; stipular tendrils 7–12 cm long. Inflorescence umbellate; umbels solitary, basally non-prophyllate. Umbels of either sex 10–30(60)-flowered; receptacles globose in staminate umbels and hemispherical in pistillate umbels, 3–4 mm in diam., both showing narrow bracteoles; bracteoles ovate to lanceolate, acute at apex; peduncles 1–7 mm long or less; pedicels capillary to filiform, 1.5–2.5 cm long. Staminate tepals 6; outer tepals

saccate, longitudinally furrowed along the median line, obovate to orbicular, rounded at apex, 2–2.5 × 3–3.5 mm; inner tepals ovate to boat-shaped, acute at apex, furrowed along the median line and curved, narrow; stamens 6, inserted, 0.7–1 mm long; anthers ovoid-globose, 0.7–0.9 mm long, white, subsessile. Pistillate tepals 6; outer tepals globose, obovate-orbicular to orbicular, rounded at apex, 1–2.5 × 3–2.5 mm; inner tepals obovate; recurved; ovary ellipsoid 2–3 mm long and wide; stigmas annulate, 3-lobed; staminodes 3. Berries globose, 5–9 mm in diam., dark blue at maturity; seeds 1–3.

Type: Lectotype (second step designated by Sukhramani & Choudhary 2023a): BANGLADESH. Sylhet: *s. loc.*, *Wallich 5114B*, K001104841 (K!).

Diagnostic characters: Climbers with unarmed stems and branches; leaves glaucous beneath; peduncles 1–7 mm long.

Phenology: Fls.: June–September; Frts.: August–March.



Vernacular names: INDIA. Assam: *Tukchini* (Assamese); Mizoram: *Thuangngil* (Mizo).

Distribution: BANGLADESH, INDIA (Assam, Meghalaya, Mizoram, Nagaland). [CAMBODIA, CHINA, LAOS, MYANMAR, TAIWAN, THAILAND, VIETNAM].

Etymology: The specific epithet refers to the smoothness of the stems and branches, with “*glabra*” representing smooth or hairless in Latin.

Specimens examined: INDIA. Assam: Kamrup, Khetri, NEDFi, *R.K. Choudhary & Geetika Sukhramani 2248, 2638, 2639* (AHMA);

Meghalaya: East Khasi hills, Pynursla, *Walter N. Koelz 23620* (MICH)

Economic/medicinal usage: In Assam (India), leaves are used to treat venereal diseases by the local people. Rhizomes are reported to be used for the production of aphrodisiac drugs by the pharmaceutical industries (Baruah et al. 2022). In Sri Lanka, traditional and Ayurvedic physicians recommend a herbal remedy for cancer patients, consisting of a decoction prepared from seeds of *Nigella sativa* L., roots of *Hemidesmus indicus* (L.) R. Br., and rhizomes of *Smilax glabra* (Iddamaldeniya et al. 2006).

30. *Smilax menispermoides* A. DC. in A. DC. & C. DC., Monogr. Phan. 1:108. 1878. (**Figs. 41 & 42**)

Climber; stems terete, smooth, glabrous, unarmed, distantly branched, 2.5–4 mm thick; branches slightly zigzag, terete to subterete, smooth, unarmed, non-striated or sometimes faintly striated, 0.8–2 mm thick;

internodes 2–7 cm long. Leaves variable in size and shape, ovate to elliptic-ovate to lanceolate-ovate, 2–7 × 1–3 cm, rounded to subcordate to occasionally truncate at base, gradually attenuate to acute to mucronate at apex, thick-herbaceous to thin-coriaceous, glabrous, pale green on upper surface, glaucous on lower surface; costae 5–7, including a weak marginal pair, all diverging at the base, slender and obscure but distinct on both surfaces, lateral veinlets irregularly divided, making faint and minute reticulations; petioles 0.6–1.5 cm long, slightly curved above the middle, winged for 3–8 mm from the base; wings linear-lanceolate, narrow, less than 1 mm wide, deltoid and auriculate at apex; stipular tendrils slender, 1–3 cm long. Inflorescence umbellate; umbels solitary, basally non-prophyllate. Staminate umbels 8–15-flowered; pistillate umbels 3–8-flowered; receptacles thin, scarcely expanded; bracteoles small and deciduous; peduncles filiform to capillary, 2–4 cm long; pedicels filiform to

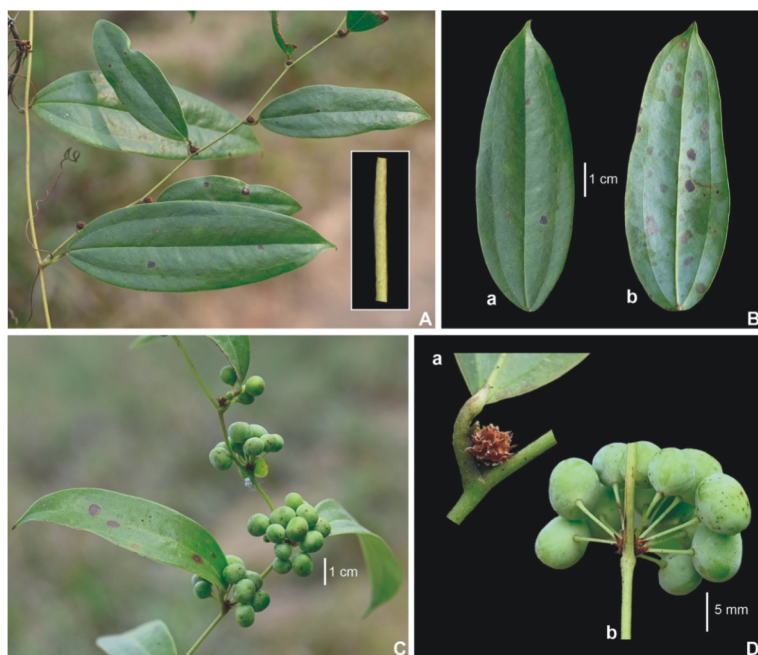


Figure 39: *Smilax glabra* Roxb. — A. vegetative branch (inset: unarmed stem); B. leaves (a, b. adaxial, abaxial surface); C. branch with infructescence; D. umbel (a. receptacle, b. sessile umbel).

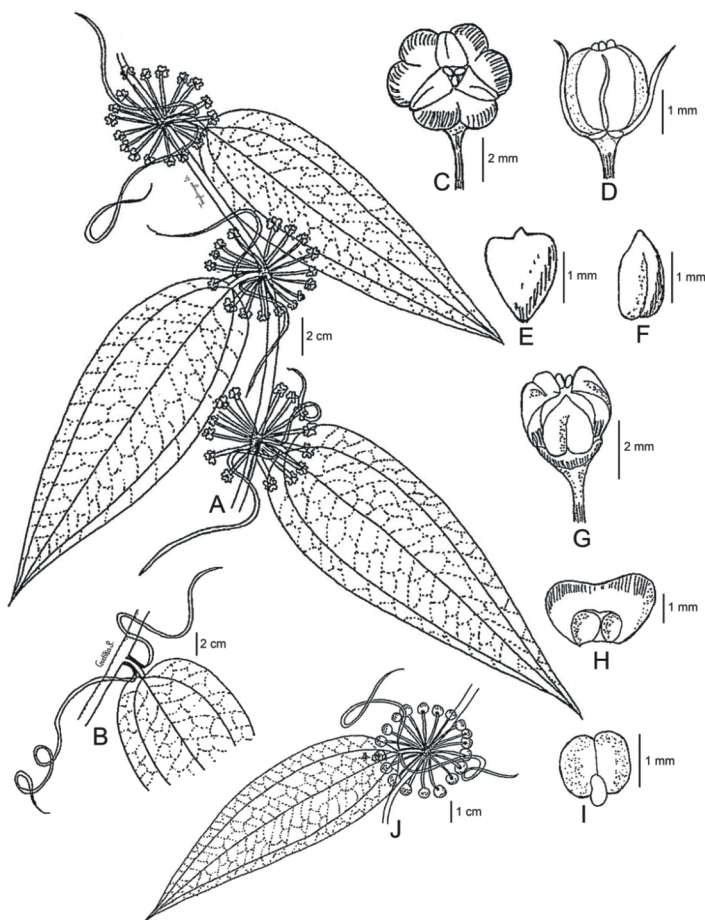


Figure 40: *Smilax glabra* Roxb. – A. pistillate flowering branch; B. petiole with stipular tendrils; C. pistillate flower; D. carpel with staminodes; E, F. pistillate tepals-outer and inner; G. staminate flower; H. staminate tepal (outer); I. stamen; J. branch with infructescence [Drawn by Truptimayee Sahu and Geetika Sukhramani from BM001217151 (BM), L3893722, and L1463299 (L)].

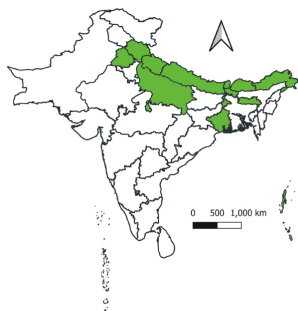
capillary, 0.5–1 cm long. Staminate tepals 6; outer tepals oblong-lanceolate to lanceolate and rounded at apex, $3-4 \times 1.5-2$ mm; inner tepals linear and narrow; spreading, ovoid-globose in buds, reddish-brown to purplish-red; stamens 6, inserted, 0.7–1 mm long; anthers globose, 0.3–0.4 mm long;

filaments connate at base, 0.4–0.6 mm long. Pistillate tepals 6; outer tepals ovate and acute at apex, $3-4 \times 1.5-2$ mm; inner tepals narrow; spreading; ovary globose, 1–2 mm in diam.; stigmas 3, ca. 0.5 mm long, recurved. Berries globose, 6–10 mm in diam., dark purple at maturity; seeds 1–3, globose, ca. 4 mm long, reddish brown.

Type: Lectotype (second step designated by Sukhramani & Choudhary 2023a): INDIA. Sikkim: *s. loc.*, *J.D. Hooker* 7, K000820877 (K!).

Diagnostic characters: Climbers with unarmed stems; leaf blades ovate; petiolar wings narrow, minutely deltoid at apex; umbels pendant on filiform peduncles.

Phenology: Fls.: March–May; Frts.: June–September.



Distribution: BHUTAN (Bumthang, Daga, Kurmaed, Paro, Punakha, Thimphu, Trongsa), INDIA (Andaman & Nicobar, Arunachal Pradesh, Himachal Pradesh, Meghalaya, Punjab, Sikkim, Uttarakhand, West Bengal), NEPAL (Bagmati, Gandaki, Koshi, Sudurpashchim). [CHINA, LAOS, MYANMAR, VIETNAM].

Etymology: The specific epithet refers to the crescent-shaped seeds (*mene*=moon, *sperma*=seed; in Greek).

Specimens examined: INDIA. Sikkim: North Sikkim, Dombang valley, *R.K. Choudhary & Geetika Sukhramani* 1964 (AHMA); West Bengal: Darjeeling, Singalila National Park, Tonglu, *Manas R. Debta* 40532 (CAL), NEPAL. Sagarmatha, Solu Khumbu, Dudh Koshi Valley, *M. F. Watson et al.* 319 (E).

Section: *Vaginatae* T. Koyama

31. *Smilax biumbellata* T. Koyama, Brittonia 26(2): 133. 1974. (Fig. 43)

Climber; stems terete, smooth, glabrous, unarmed, distantly branched, slender, ca. 2 mm thick; branches straight, terete, smooth, unarmed, non-striated, 1–1.5 mm thick; internodes 3–10 cm long. Leaves rather uniform in shape, lanceolate to ovate-lanceolate, $4-16 \times 1-6$ cm, subcordate to shallowly emarginate at base, acute at apex, herbaceous to finely coriaceous, pale green on both sides; costae 7, including the marginal pair not reaching the leaf apex, all diverging from the base, slightly raised on lower surface, obscure on the upper surface, lateral veinlets obliquely diverging, forming fine and minute reticulations; petioles 1–2.5 cm long, slightly curved at the middle, winged for 3–5 mm from the base; wings

linear, narrow, 0.2–0.6 mm wide; stipular tendrils up to 20 cm long. Inflorescence umbellate; umbels solitary, basally non-prophyllate. Umbels of either sex 6–25-flowered; receptacles globose to subglobose, 1–1.5 mm in diam., both showing narrow bracteoles; bracteoles lanceolate, ca. 1 mm long; peduncles filiform, 2–5 cm long; pedicels 0.5–1.5 cm long. Staminate tepals 6; outer tepals lanceolate to oblanceolate, shortly acuminate to

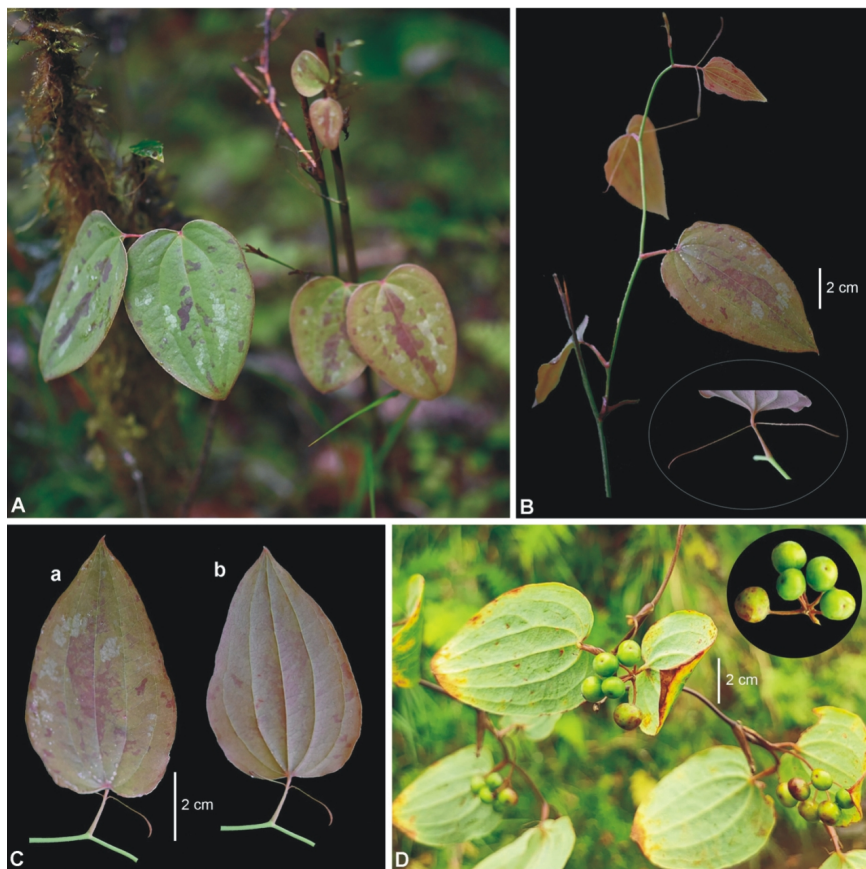


Figure 41: *Smilax menispermoidea* A. DC. – A. habit; B. vegetative branch (inset: petiole with stipular tendrils); C. leaves (a, b. adaxial, abaxial surface); D. branch with infructescence (inset: umbel). (Photo D: Dr. Avishek Bhattacharjee).

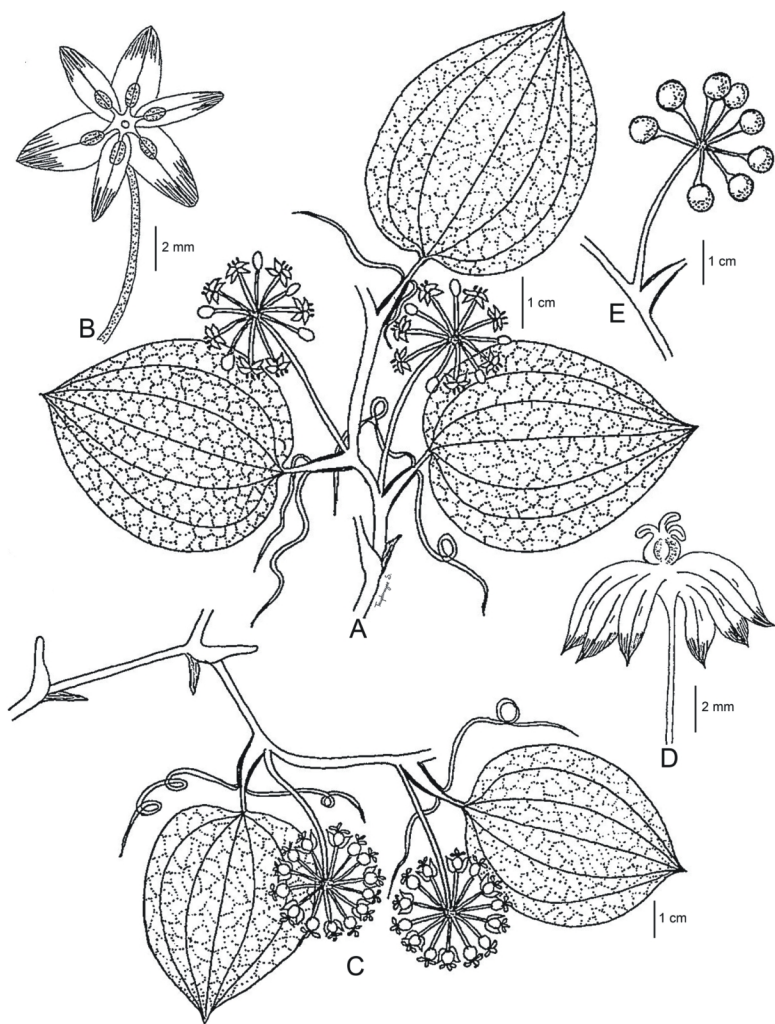


Figure 42: *Smilax menispermoides* A. DC. – A. staminate flowering branch; B. staminate flower; C. pistillate flowering branch; D. pistillate flower; E. infructescence [Drawn by Truptimayee Sahu from BSHC00035587 (BSHC), E00327049 (E), MICH1492599 (MICH), and P02061123 (P)].

apiculate at apex, $2.5-3 \times 1-1.5$ mm; inner tepals linear and narrow; tepals spreading, olivegreen or purplish-red; stamens 6, inserted, 0.9–1.2 mm

long; anthers globose, ca. 0.5 mm long, white; filaments 0.5–0.7 mm long or subsessile. Pistillate tepals 6; outer tepals ovate-oblong to ovate-lanceolate and acute at apex, 2.3–2.6 mm × ca. 1 mm; inner tepals narrow; tepals spreading, pale purple; ovary globose, ca. 1.5 mm in diam.; stigmas 3, ca. 1 mm long, recurved; staminodes 3, sometimes absent. Berries globose, 5–8 mm in diam., purplish-red; seeds 1 or 2, ovate-orbicular.

Type: Holotype: MYANMAR. Kachin: Htawgaw valley of Naungchaung, *F. Kingdon-Ward 1582*, E00318409 (E!).

Diagnostic characters: Unarmed climber with slender stems and branches; peduncles slender, 2–5 cm long; anthers subsessile.

Phenology: **Fls.:** October–January; **Frts.:** February–May.

Distribution: INDIA (Arunachal Pradesh). [CHINA, MYANMAR, THAILAND, VIETNAM].

Etymology: The specific epithet signifies the existence of two umbels (*biumbellatus*= having two umbels, in Latin)

Specimens examined: INDIA. Arunachal Pradesh: Delei Valley, *F. Kingdon Ward 8327* (K), CHINA. Tongshan, Jiugong Mountain, *C.S. Ye 3553* (MO), MYANMAR. Kachin, *F. Kingdon Ward 1582* (E).

Notes: *Smilax biumbellata*, in its general appearance, particularly in the lanceolate herbaceous leaves and slender climbing habit, resembles *S. polyandra*. The floral parts, however, show a clear distinction between the two. The staminate perianth of *S. biumbellata* comprises six free ovate-lanceolate tepals, as opposed to the connate perianth segments in *S. polyandra*.

32. *Smilax microphylla* C.H. Wright, Bull. Misc. Inform. Kew 1895 (100–101): 117–118. 1895. *S. elegans* subsp. *microphylla* (C.H. Wright) Noltie, Edinburgh J. Bot. 51(2): 158. 1994. (**Fig. 44**)

Climber; stems terete or obtusely angular, smooth, glabrous, armed with short straight or curved conical prickles, 1–2 mm long, distantly branched, 2.5–5 mm thick; branches slightly zigzag, terete or obtusely angular, smooth or rarely minutely verruculose, armed with short straight or curved conical prickles, striated, 0.7–2 mm thick; internodes 1–4 cm long. Leaves variable in size but uniform in shape; ovate-lanceolate to linear-lanceolate to ovate, 3–9 × 1.5–5 cm, rounded to acute to sometimes shallowly cordate at base, mucronate to acute at apex, thin-coriaceous, glabrous, glaucous on





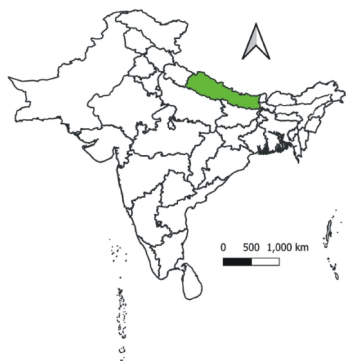
Figure 43: *Smilax biumbellata* T. Koyama – A. staminate flowering branch; B. staminate flower; C, D. staminate tepals-outer and inner; E. stamen; F. pistillate flowering branch; G. pistillate flower; H, I. pistillate tepals-outer and inner; J. branch with infructescence [Drawn by Geetika Sukhramani from E00318409 (E), K000820882 (K), and MO-3483589 (MO)].

lower surface; costae 5–7, including a weak marginal pair not reaching the leaf apex, all diverging at the base, conspicuously raised on both surfaces, lateral veinlets irregularly divided, forming distinct reticulations; petioles 0.5–1.2 cm long, straight, winged for 3–6 mm from the base; wings narrow, 0.5–2 mm wide, auriculate at apex; stipular tendrils upto 15 cm long. Inflorescence umbellate; umbels solitary, basally non-prophyllate.

Staminate umbels 10–40-flowered; pistillate umbels 3–15-flowered; receptacles globose, 4–5 mm in diam., both showing narrow bracteoles; bracteoles ovate to lanceolate, acute to acuminate at apex; peduncles short, 2–9 mm long or less; pedicels filiform, 3–8 mm long. Staminate tepals 6; outer tepals ovate-oblong, acute to rounded at apex, 1.8–2.5 mm \times 1–1.2 mm; inner tepals lanceolate-oblong, acute at apex, narrow, green; stamens 6, inserted, 0.7–1 mm long; anthers oblong, ca. 0.5 mm long, creamish-white; filaments 0.3–0.4 mm long or subsessile. Pistillate tepals 6; outer tepals ovate-oblong, acute to rounded at apex, 1.6–2.2 \times 0.8–1 mm; inner tepals lanceolate-oblong, acute at apex, narrow; staminodes 3. Berries globose, 5–7 mm in diam., bluish-black at maturity.

Type: Lectotype (designated by Noltie 1994): CHINA. Hupeh, Ichang, *Henry 3980* (K).

Diagnostic characters: Branches armed with prickles; leaf-blades ovate-lanceolate to linear-lanceolate, mucronate at apex, glaucous beneath; peduncles 2–7 mm long.



Phenology: Fls.: June–August; Frts.: September–November.

Distribution: NEPAL. [CHINA].

Etymology: The specific epithet indicates the small size of the leaves, with “*mikros*” meaning small and “*phyllon*” meaning leaf in Greek.

Specimens examined: CHINA. Hupeh, Ichang, *A. Henry 3089* (P); 3089A (P), (GH); 3980 (P); 1521 (P), (GH), (US); 3996 (P), (GH), (NYBG), (US).

Notes: *Smilax microphylla* is known to exhibit remarkable variability in leaf

characters. At first, Koyama (1960) considered it a distinct species, but later, in 1963, he reduced it to a variety under *S. glaucophylla* (present day *S. elegans*). However, in 1975, he reinstated *S. microphylla* as a distinct species. Further, Noltie (1994) made a new combination *Smilax elegans* subsp. *microphylla* and noted that the specimens mentioned in the protologue of *S. microphylla* encompassed both small-leaved, prickly specimens and large-leaved, non-prickly ones (Henry 3996). However, upon our examination of the type specimens (including Henry 3996) housed at GH, NY, and P, we found that all the type specimens indeed possess prickles. Therefore, following Chen and

Koyama (2000), we consider *S. microphylla* to be a distinct species, primarily distinguished from *S. elegans* by the presence of prickles.



Figure 44: *Smilax microphylla* C.H. Wright – A. staminate flowering branch; B. staminate flower; C. branch with infructescence [Drawn by Truptimayee Sahu from E00327104 (E), P01803660 (P), and US01101445 (US)].

33. *Smilax minutiflora* A. DC. in A. DC. & C. DC., Monogr. Phan. 1: 109. 1878. (Fig. 45)

An erect shrub; stems terete or obscurely angular, smooth, glabrous, unarmed, densely branched, 4–5 mm thick; branches straight or slightly zigzag, terete or obscurely angular, smooth, unarmed, striated, slender, 1–3 mm thick; internodes 1.5–4 cm long. Leaves variable in size but uniform in shape; lanceolate to ovate-lanceolate, $4\text{--}15 \times 1.5\text{--}5$ cm, contracted to rounded at base, gradually attenuate to cuspidate to acuminate apex, membranaceous to thin-coriaceous, glabrous, slightly shiny on upper surface, glaucous on lower surface; costae 5, including a weak marginal pair, all diverging at the base, faint on the upper surface, strongly raised on lower surface, lateral veinlets oblique, forming faint but dense reticulations; petioles 0.7–1.5 cm long, straight or slightly curved, winged for 3–5 mm from the base; wings narrow, ca. 1 mm wide, apex gradually tapered in to petiole; stipular tendrils absent. Inflorescence umbellate; umbels solitary and pendant, basally non-prophyllate. Staminate umbels 6–15-flowered; pistillate umbels 2–7-flowered; receptacles not expanded; bracteoles absent or rarely lanceolate; peduncles capillary, 2–6 cm long; pedicels unequal in staminate umbels, 3–10 mm long and equal in pistillate umbels, 3–9 mm long. Staminate tepals 6; outer tepals oblong-ovate, acute at apex, $0.8\text{--}2.0 \times 0.5\text{--}1.2$ mm; inner tepals narrow; spreading at anthesis, incurved, purple; stamens 6, inserted, ca. 0.8 mm long; anthers ovoid-globose, ca. 0.4 mm long; filaments ca. 0.4 mm long or subsessile. Pistillate tepals 6; outer tepals oblong-ovate, $1.6\text{--}2.5 \times 0.8\text{--}1.2$ mm; inner tepals narrow; spreading, incurved, purplish-green; ovary globose, ca. 1.5 mm across; stigmas 3, flat, 0.5–1 mm long. Berries globose, 5–7 mm in diam.; seeds 1 or 2.

Type: Lectotype (designated by Noltie 1994): INDIA. Arunachal Pradesh: Mishmi, *Griffith 5433*, K000820911 (K!).



Diagnostic characters: Densely branched shrub; leaf blades lanceolate to ovate-lanceolate, glaucous beneath; umbels pendant with a capillary peduncle.

Phenology: Fls.: May–October; Frts.: October–February.

Distribution: BANGLADESH, BHUTAN (Daga, Thimphu, Trongsa), INDIA (Arunachal Pradesh, Bihar, Manipur, Meghalaya, Nagaland, Sikkim, West Bengal), NEPAL (Koshi).

Etymology: The specific epithet pertains to the small size of the flowers, with “*minutus*” meaning small and “*flora*” meaning flower in Latin.

Specimens examined: INDIA. Arunachal Pradesh: Minguing-Takepotong, R.S. Rao 17805 (BR); Sikkim: North Sikkim, Lachen, Gurudongmar Road, R.K. Choudhary & Geetika Sukhramani 1957 (AHMA); *ibid.*, Lachen, Bansoi Bridge, R.K. Choudhary & Geetika Sukhramani 1959 (AHMA); West Bengal: Darjeeling, Tiger Hill, R.K. Choudhary & M.M. Sardesai 1921 (AHMA), *s. loc.*, W. Griffith 5433 (P).

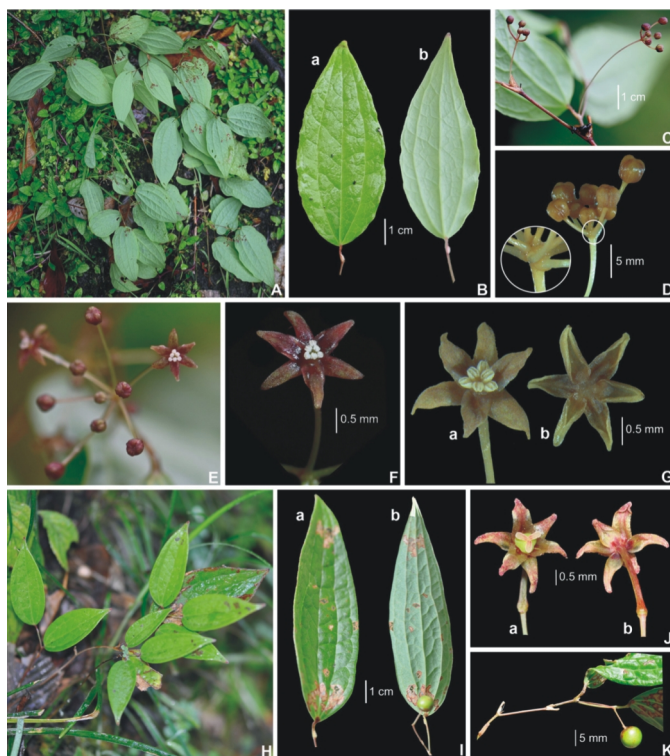


Figure 45: *Smilax minutiflora* A. DC. – Male plant: A. habit; B. leaves (a, b. adaxial, abaxial surface); C. staminate flowering branch; D. staminate inflorescence with buds (inset: receptacle); E. staminate inflorescence with flowers; F. staminate flower; G. staminate flower (a, b. adaxial, abaxial surface). Female plant: H. habit; I. leaves (a, b. adaxial, abaxial surface); J. pistillate flower (a, b. adaxial, abaxial surface); K. branch with infructescence.

34. *Smilax munita* S.C. Chen, Acta Phytotax. Sin. 34(4): 436. 1996. *S.*

rigida Wall. ex Kunth, Enum. Pl. 5: 164. 1850. *S. myrtillos* var. *rigida* Noltie, Edinburgh J. Bot. 51(2): 160. 1994. (**Fig. 46**)

Erect shrub, 90–150 cm high; stems 2- or 3-angled, glabrous, smooth, armed with straight long prickles, 5–8 mm long, densely branched, 3–4 mm thick; branches straight, 2- or 3-angled, armed with straight long prickles, non-striated, 2–3 mm thick; internodes 1–3 cm long. Leaves uniform in shape and size, broadly ovate to orbicular-ovate, $1.5\text{--}3.5 \times 1\text{--}2.5$ cm, rounded to subcordate at base, acute to apiculate to shortly mucronate at apex, thick-herbaceous, dark green and glossy on upper surface, pale green on lower surface; costae 3, diverging at the base, slender but distinct on both surfaces, lateral veinlets obliquely diverging, forming weak reticulations; petioles ca. 1 mm long, almost sessile, decurrent at the base, winged for 0.5–1 mm from the base; wings linear to lanceolate, narrow, ca. 0.5 mm wide, auriculate at apex; stipular tendrils none. Inflorescence umbellate; umbels solitary, basally non-prophyllate. Staminate umbels 5–10-flowered; pistillate umbels 2–8-flowered; receptacles expanded, 2–6 mm long; bracteoles 0.8–1 mm long, linear; peduncles 0.5–1.8 cm long; pedicels 4–8 mm long. Staminate tepals 6; outer tepals ovate-oblong, obtuse at apex, $0.8\text{--}2 \times 0.5\text{--}0.8$ mm, inner tepals ovate-oblong, narrow, globular in bud, yellowish-green; stamens 6, inserted, ca. 0.6 mm long; anthers globose, ca. 0.2 mm long, white; filaments ca. 0.3 mm long or subsessile. Pistillate tepals 6; 1.2–1.5 mm long; ovary subglobose; staminodes 3. Berries globose, 5–7 mm in diam.; seeds 1 or 2.

Type: Lectotype (designated by Koyama 1963 as “type”, corrected here): NEPAL. *s. loc.*, Wallich 5120, K000820913(K!).

Smilax munita was established as a *nom. nov.* by S.C. Chen in 1996, with *S. rigida* Wall. ex Kunth as its synonym. He specified the type as Nepal, Wallich 5120 (isotype, E) following the protologue of *S. rigida* which mentions Wallich Cat. No. 5120, Nepalia. In our search for type sheets, we identified seven specimens labeled Nepal, Wallich 5120 (one each at BM, E, and K, and four at P). Koyama (1963), while preparing the account of Indian *Smilax* species, stated, “Nepal: Wallich 5120 (Type of *S. rigida* in K).” The term ‘type’ is corrected here to ‘lectotype’, following article 9.10 of the Shenzhen Code (Turland et al. 2018).

Diagnostic characters: Erect shrubs with stems and branches 2- or 3-angled, armed with straight prickles, 5–8 mm long; leaf blades sessile, ovate to orbicular-ovate.



Phenology: Fls.: March–June; Frts.: June–September.

Distribution: BHUTAN, INDIA (Arunachal Pradesh, Bihar, Sikkim, West Bengal), NEPAL (Bagmati, Koshi). [CHINA, MYANMAR].

Etymology: The specific epithet pertains to the armed nature of the plant that likely offers protection or defense against environmental challenges, predators, or other factors (*munita*=armed, in Latin).

Specimens examined: INDIA. Arunachal Pradesh: West Kameng, Shergaon, *R.K. Choudhary & Geetika Sukhramani 2713* (AHMA); Sikkim: North Sikkim, Lachen, Bansoi Bridge, *R.K. Choudhary & Geetika Sukhramani 1958* (AHMA); *ibid.*, Lachung, *R.K. Choudhary & Geetika Sukhramani 1960* (AHMA); West Bengal: Darjeeling, Tiger Hill, *R.K. Choudhary & M.M. Sardesai 1922* (AHMA), BHUTAN. Khosa, Tamji, *H. Kanai et al. 13202* (NY), NEPAL. Baroya Khimty-Thakma Khokla, *H. Hara et al. 6301131* (NY).

35. *Smilax myrtillos* A. DC. in A. DC. & C. DC., Monogr. Phan. 1:106. 1878. (Fig. 47)

Erect shrub; stems quadrangular, glabrous, smooth, unarmed, rarely armed with short prickles, ca. 0.2 mm long, densely branched, 2–3 mm thick; branches straight, quadrangular, unarmed, non-striated, 1–1.8 mm thick; internodes 1–2 cm long. Leaves uniform in shape and size, rhombic-ovate to ovate, 1.5–4 × 1–3 cm, cuneate at base, briefly acute to acuminate at apex, thick-herbaceous, green and glossy on upper surface, pale green on lower surface; costae 3 or sometimes 5 including a weak marginal pair, diverging at the base, slender but distinct on both surfaces, lateral veinlets oblique, forming weak reticulations; petioles 1–3 mm long, almost sessile, decurrent at the base, winged for 0.5–1 mm from the base; wings linear to lanceolate, narrow, ca. 0.5 mm wide, auriculate at apex; stipular tendrils none. Inflorescence umbellate; umbels solitary, non-prophyllate, borne on the upper part of branches. Staminate umbels 3–10-flowered; pistillate umbels 2–8-flowered; receptacles expanded, 2–6 mm long; peduncles 0.5–1.2 cm long; pedicels 2–8 mm long. Staminate tepals 6; outer tepals ovate-lanceolate, subacute at apex, 1.5–2 × 0.6–0.8 mm; inner tepals ovate-lanceolate, narrow; spreading and curved, yellowish-green; stamens 6, inserted, ca. 0.7 mm long; anthers globose, ca. 0.2 mm long, white; filaments ca. 0.5 mm long or subsessile. Pistillate tepals 6; ca. 1 × 0.3 mm; ovary globose; staminodes 3. Berries 5–8 mm in diam.; seeds 1 or 2.

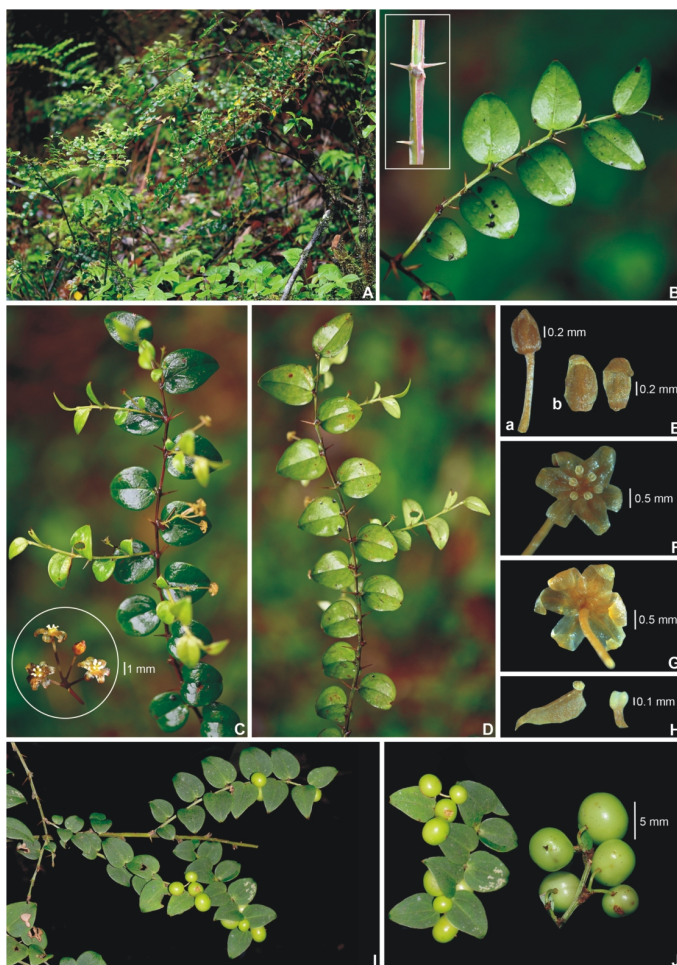


Figure 46: *Smilax munita* S.C. Chen – A. habit; B. vegetative branch (inset: angular and armed stem); C. staminate flowering branch (adaxial surface) (inset: staminate inflorescence); D. staminate flowering branch (abaxial surface); E. staminate flower (a. bud, b. outer and inner tepals); F, G. staminate flowers (adaxial, abaxial surface); H. epitepalous and subsessile stamens; I. branch with infructescence; J. infructescence. (Photos I & J: Dr. R. Ganesan).

Type: Lectotype (designated by Kladwong et al. 2018a): INDIA. Meghalaya: Khasia, *Hooker & Thomson 5*, K000939180 (K!).

Diagnostic characters: Erect shrub with stems and branches quadrangular and unarmed; leaf blades sessile, rhombic-ovate.

Phenology: Fls.: May–July; Frts.: July–October.



Distribution: BANGLADESH, BHUTAN (Daga, Kurmaed, Punakha, Thimphu, Trongsa), INDIA (Arunachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim, West Bengal), NEPAL (Bagmati). [CHINA, LAOS, MYANMAR, THAILAND].

Etymology: The specific epithet refers to its small leaves or fruits (*myrtus*=myrtle plant, in Latin).

Specimens examined: INDIA. Arunachal Pradesh: Dibang Valley, *M. Bhaumik* 3683 (CAL); Meghalaya: East Khasi hills, Mawphlang, *Thakur*

Rup Chand 7607 (MICH); *ibid.*, Shillong peak, *R.K. Choudhary & Geetika Sukhramani* 2266, 2267, 2268 (AHMA); Jaintia Hills, Jowai, Myntdu valley, *R.K. Choudhary & Geetika Sukhramani* 2655 (AHMA).

Notes: *Smilax myrtillus*, in its general appearance, particularly in the shrubby habit and sessile leaves, resembles *S. munita*. However, it shows a clear distinction in its quadrangular stems and branches (vs 2- or 3-angled stems and branches), unarmed stems (vs long prickly stems), and rhombic-ovate leaf blades (vs ovate or orbicular leaf blades).

36. *Smilax vaginata* Decne. in Jacque. Voy. Inde 4 (Bot.): 169, t. 169. 1844. (Fig. 48)

Erect shrub, 0.3–0.9(1.8) m high; stems terete, glabrous, smooth, bamboo-like, up to 0.6 m height, unarmed, densely branched ca. 3 mm thick; branches straight, terete, unarmed, striated, ca. 1 mm thick; internodes 1.2–3 cm long. Leaves variable in size; ovate to broadly ovate to orbicular, sometimes elliptic, 2–6 × 1.5–5 cm, cuneate, truncate to subcordate at base, subacute to obtuse at apex, membranaceous, glabrous, dark and glossy on upper surface, glaucous on lower surface; costae 5, including the marginal pair not reaching the leaf apex; diverging at the base, lateral veinlets weak on upper surface, but prominent on lower surface making fine reticulations; petioles 0.8–1.5 cm long, slender, dilated at the base, grooved adaxially, winged for 3–10 mm from base; wings linear, thin, narrow, ca. 0.5 mm wide, confluent with the petiole at apex; stipular tendrils none. Inflorescence umbellate; umbels solitary, non-prophyllate. Staminate

umbels 4–11-flowered; pistillate umbels 1–3-flowered; receptacles flat; flowers pendent on a peduncle of 0.5–2(3) cm long; pedicels 4–6 mm long. Staminate tepals 6; outer tepals ovate-oblong, $1.5\text{--}2 \times 0.5\text{--}0.8$ mm; inner tepals narrow; yellowish-green or purple, globular in bud; stamens 6,



Figure 47: *Smilax myrtillos* A. DC. – A. habit; B. vegetative branch (inset: angular stem); C. leaves (a, b. adaxial, abaxial surface); D. branch with infructescence.

inserted, 0.4–0.8 mm long; anthers ovoid-globose, 0.4–0.6 mm long; filaments filiform, subsessile. Pistillate flowers unknown. Berries ovoid-globose, $5\text{--}8 \times 4\text{--}6$ mm, green while bluish-black on maturity; seeds usually one.

Type: Lectotype: INDIA. *s. loc.*, *V. Jacquemont* 293, P00686878 (P!).

Diagnostic characters: Densely branched shrub with smooth stems; leaves without stipular tendrils; umbels with minute and purple flowers.



Phenology: Fls.: May–September; Frts.: October–December.

Distribution: INDIA (Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Nagaland, Punjab, Sikkim, Uttarakhand), NEPAL, PAKISTAN (Khyber Pakhtunkhwa, Punjab). [AFGHANISTAN, CHINA].

Etymology: The specific epithet is associated with the sheathed petiole bases, with “*vaginatus*” meaning sheathed or enclosed in a sheath in Latin.

Specimens examined: INDIA. *s. loc.*, *V. Jacquemont* 293 (P); Himachal Pradesh: Kullu, Chandrakani, *Walter N. Koelz* 156 (MICH); Uttarakhand: Harsil, *W. Dudgeon & L.A. Kenoyer* 232 (MO), CHINA. Hebei Province, *Liu Ying* 12985 (MO).



Figure 48: *Smilax vaginata* Decne. – A. habit; B. abaxial leaf (inset: petiole); C. Leaf (adaxial surface); D. staminate umbel; E. staminate flower; F. branch with infructescence. (Photos: Mr. Ashutosh Sharma).

Excluded Taxa

The following taxa listed here have not been included in the present work, chiefly because of insufficient evidence of validity.

1. *Smilax borneensis* A. DC. in A. DC. & C. DC., Monogr. Phan. 1: 202. 1878.

Deka et al. (2024) reported *Smilax borneensis* A. DC. from Arunachal Pradesh as an addition to the Flora of India. However, a careful examination of the vegetative morphology (Fig. 1a of the original publication), revealed twining stems, a broad petiole base, and leaves with a tail-like projection at the tip, which bear a closer resemblance to the genus *Dioscorea*. Moreover, a comparison with the type specimen highlighted disparities, particularly in the inflorescence. While *S. borneensis* typically presents six umbels, the published image only displayed two, resembling those of *Smilax orthoptera* A. DC. Additionally, considering the native distribution of the species in Borneo, it has been determined to be excluded from our study.

2. *Smilax elegans* subsp. *subrecta* Noltie, Edinburgh J. Bot. 51(2): 155. 1994. Refer to notes under *Smilax elegans* subsp. *elegans* (Page 90)

3. *Smilax kingii* Hook.f., Fl. Brit. India 6(18): 307. 1892.

Until 1963, this species was exclusively documented in Malaya. However, based on a single specimen from Sikkim, housed at K (K002376778), Koyama (1963) first reported it from India. Subsequent to 1963, there have been no records of the species in any part of India. Upon close examination of the same specimen, we found a discrepancy with the protologue description. The branches in the specimen lacked the granulated texture, a distinctive feature of *S. kingii*. In light of this, we believe that the record of this species in India is likely erroneous.

4. *Smilax roxburghiana* Wall. ex A. DC., Mém. Soc. Phys. Genève 7: 314. 1836.

Several online databases (Banki et al., 2024; POWO 2024) report the distribution of *Smilax roxburghiana* Wall. ex A. DC. in Bangladesh and Northeast India. In Koyama's treatment of *Smilax* in India (1963), he indicated that the specimen of *Smilax roxburghiana* Wall. ex A. DC., housed at G (G00413462) is conspecific with *S. bracteata* var. *verruculosa* (Merr.) Koyama. However, our investigation of the G specimen revealed a single sheet (identified as a syntype) of *S. roxburghiana* Wall ex A.DC., with a determination as *Cocculus laurifolius* DC. by N. Fumeaux (December 2021). In agreement with the determinator's decision, we have excluded *S. roxburghiana* Wall. ex A. DC. from the current study.

5. *Smilax wallichii* Kunth, Enum. Pl. 5: 246. 1850.

Hooker (1892) listed *Smilax wallichii* Kunth as a doubtful and imperfectly known species with suggestions that it might belong to either *S. zeylanica* L. or *S. roxburghiana* Wall. ex Hook.f. (present day *S. ocreata* A. DC.). Similarly, Koyama (1963) listed it as an imperfectly known species, appending a note that it could potentially be *S. ocreata* A. DC. Noltie (1994) subsequently designated a neotype of *S. wallichii*, while emphasizing the uncertainty. In light of these considerations and an examination of the neotype, we believe that the morphology of this specimen (ovate leaves with acuminate apex, coriaceous nature; bracteate peduncles with elongated receptacles) suggests that it may be *S. ocreata*; therefore, it is excluded here.

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<i>Smilax zeylanica</i> subsp. <i>hemsleyana</i> (Craib) T. Koyama	26



Smilax zeylanica L.

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Ms. Geetika Sukhramani is a Ph.D. student and a DST-INSPIRE Fellow in the Biodiversity and Palaeobiology Group of Agharkar Research Institute, and Savitribai Phule Pune University, Pune. She is currently engaged in research that focuses on the taxonomic revision of the wild relatives of *Sarsaparilla* (*Smilax* L.) in the Indian subcontinent, involving the development of super-barcodes and the use of phylogenomic tools to understand their diversification. Her previous research concentrated on seed storage protein quantification and SSR analysis in aromatic rice genotypes. With five research publications in international journals, her specific interests lie in phylogenetics, phylogenomics, and evolutionary biology.

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About the Book

Smilacaceae of the Indian Subcontinent

Explore the intricate world of Smilacaceae in the Indian subcontinent through an in-depth examination of 36 taxa within this botanical family. This meticulously crafted guide offers a wealth of information to cater to a diverse audience.

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- Taxonomic keys, utilizing both vegetative and reproductive characters, enabling easy identification at both section and species levels.
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