



RESEARCH COMMUNICATION

Notes on the taxonomic identity of *Asystasia nemorum* (Russel ex Wall.) Nees from India

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Abstract

The taxonomic status of *Asystasia nemorum* (Russel ex Wall.) Nees has been critically evaluated in the present study. The taxon is ambiguously considered in various floras and herbaria, demanding a thorough revisionary approach. The nomenclature of the taxon since 1826 has been over-checked. *A. nemorum* has been wrongly interpreted as *A. intrusa*, *A. hispida*, *A. salicifolia* and *A. australasica* as observed in various herbaria. Meanwhile *A. blumei*, *Isochoriste javanica* and *Ruellia clavata* has been mentioned as the heterotypic synonym of this taxon as per IPNI. A thorough analysis of the various voucher specimens has been done along with descriptions in the literature which shows that *A. nemorum* stands distinct. The erroneous interpretation done for the taxon from time to time has been justified.

Keywords: herbaria; nomenclature; taxonomic ambiguity

Introduction

The genus *Asystasia* Blume comprises about 50 species distributed in the Tropical and South Africa to Northern Queensland (1-6). The term *Asystasia* means inconsistency in terms of actinomorphic corolla. Since the discovery of genus in 1826, there exists ambiguity in the taxonomic status of some species which significantly contributed the nomenclatural issues. Further variations in the flower color shown by species like *A. gangetica* (L.) T. Anderson also caused dilemma for taxonomists. A recent revision for the genus in the Indian scenario has been provided in an earlier report. Accordingly, in India the genus is represented by 14 species, 1 subspecies and 2 varieties (7-9).

During field explorations, the authors collected specimens of *Asystasia* with bluish-purple and reddish-pink flowers. Subsequently, the specimens were identified as *A. nemorum* Nees, an exotic species, which has not yet been authentically accounted in the flora of India.

Materials and Methods

Floristic explorations have been carried out in different districts of Kerala during April 2022- January 2024. Specimens have been collected from various geographical regions of Kerala. Critical taxonomic analysis was done using protologues and other relevant literature (1, 10-12). Morphological characters were evaluated and analysed with herbarium specimens at Botanical Survey of India (BSI), Central National Herbarium (CAL), Herbarium of University of Graz (GZU), National Herbarium of Netherland (NLH), Tropical Botanical Garden and Research Institute (TBGRI)

herbarium and University College Thiruvananthapuram (UCBD), floras (13-16).

Taxonomic treatment

Asystasia nemorum Nees in Wall., Pl. Asiat. Rar. 3:90.1832; Backer & Bakh.f., Fl. Java 2: 576.1965. Type: Java, Buitenzorg, *Blume* s.n. (L, Lectotype).

= *Asystasia blumei* Nees in DC., Prodr. 11: 167 .1847. Type: Java, *Junghuhn* s.n. (L, Holotype).

= *Isochoriste javanica* Miq., Fl. Ned. Ind. 2:822.1858. Type: Java, Gunung Mandjulung, *Junghuhn* s.n. (L, Holotype).

= *Ruellia clavata* Reinw. ex Valetton Dep. Agric. Indes Neerl. 10:60 .1970, *nom inval.* *A. intrusa* Blume, Bijdr. Fl. Ned. Ind. 796. 1826. (1, 10, 17-19).

Perennial herbs, up to 1 m high. Stem green, quadrangular branched. Leaves simple, opposite decussate, ovate to obovate, 4 - 10 × 2.5-5 cm, acuminate at apex, base attenuate. Inflorescences 4 - 9 flowered, one-sided racemes, 5 - 9 cm long. Flowers red to purple, 2.5 - 3.2 cm long; corolla tube cylindric below, inflated above, up to 1.2 cm long; bracts triangular, hairy; pedicels 1-2 mm long; calyx 5-6 mm long, lanceolate; stamens 4, didynamous, up to 2.4 cm long, filament white, pubescent at base, anthers yellow, slightly pubescent; pistil white, up to 2.6 cm long, puberulous at base. Capsules 1.8 - 2.2 cm long; seeds irregularly obovate in outline, 2 - 4 × 2.5 mm, tuberculate - rugose (description of fruits from Flora of China, 2008; as the authors could not observe any plants under fruiting after continuous observations).

Fruiting was not observed in any of the sites during May

2021 to April 2023 and also in populations maintained in homestead garden (Fig. 1 & 2).

Flowering

August - December

The plants were grown by people in gardens and along roadsides close to house premises (seemed as garden escapes through vegetative propagation, as none of the collected specimens showed fruits). Two color variants have been collected from different locations which showed no variations except the flower

color. Upon enquiry, it has been noticed that once the plants were much abundant in many houses and homesteads but now in declining state as other exotic plants with more beautiful flowers dominated the gardens.

Though *A. intrusa* Blume has been erroneously mentioned as *A. nemorum* in previous reports, it differs with marked features (20). *A. intrusa* had been erroneously described as *A. gangetica* var. *krishnae* which was later on revised and established as *A. intrusa* (5, 8).

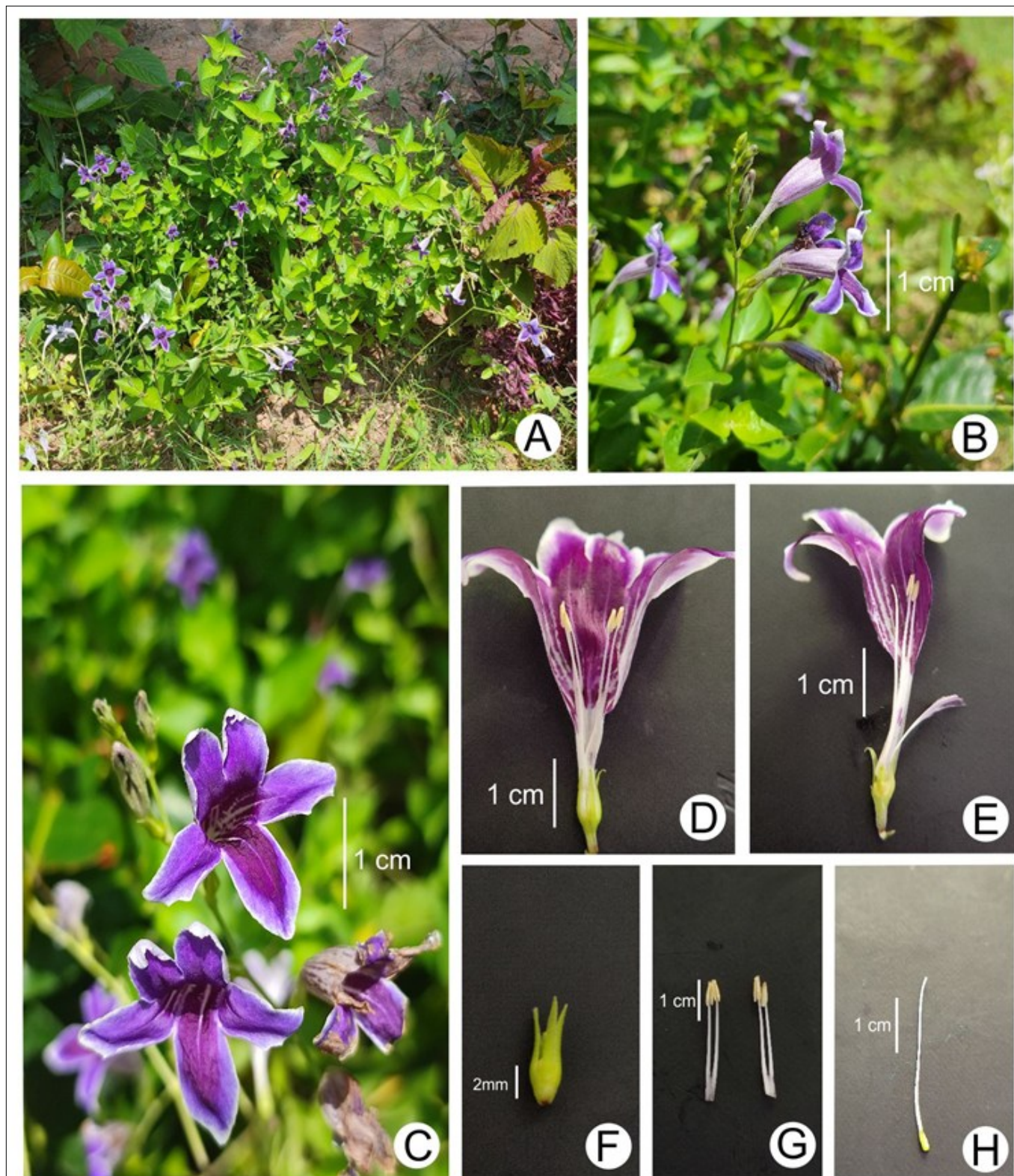


Fig. 1. Purple flower color variant of *A. nemorum* Nees. **A:** habit; **B:** inflorescence; **C:** flower (front view); **D:** corolla (opened); **E:** corolla (dissected open); **F:** calyx; **G:** stamens; **H:** pistil.

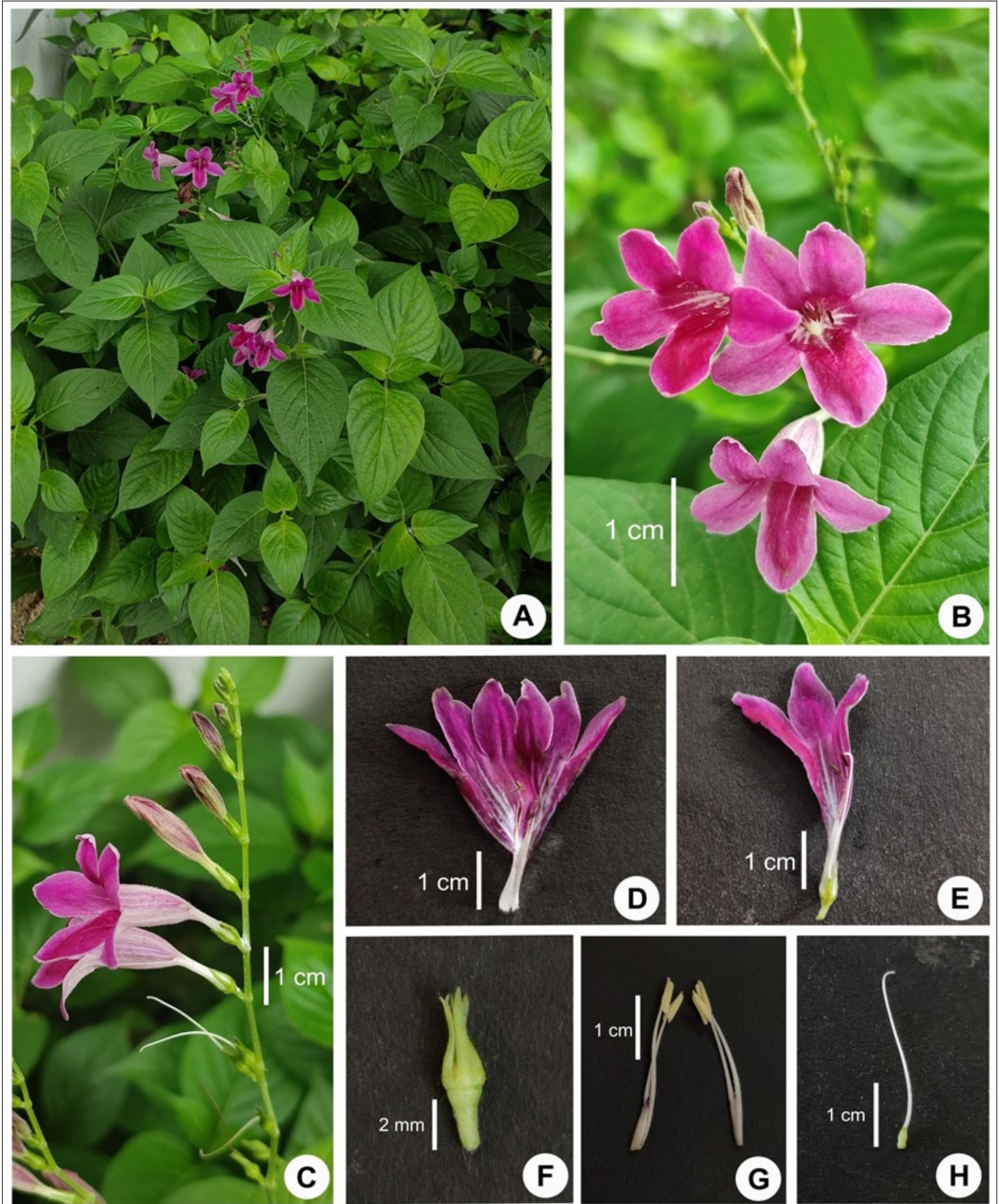


Fig. 2. Purplish red flower color variant of *A. nemorum* Nees. **A:** habit; **B:** flower (front view); **C:** inflorescence; **D:** corolla (opened); **E:** corolla (dissected open); **F:** calyx; **G:** stamens; **H:** pistil.

Specimens examined

India, Kerala, Thiruvananthapuram, Chirayinkeezhu, 8°39'33.9"N 76°47'06.2"E, 25.04.2022, V S Anil Kumar & Deepa Lekshmi V S, 22301(UCBD); India, Kerala, Thiruvananthapuram, Kollampuzha, Attingal, 8°42'24.4"N 76°46'42.2"E, 16.05.2022, V S Anil Kumar & Deepa Lekshmi V S, 22303(UCBD); India, Kerala, Thiruvananthapuram, Kariavattam, 8°33'51.4"N 76°53'36.1"E, 10.09.2022, V S Anil Kumar & Deepa Lekshmi V S, 22304(UCBD);

India, Kerala, Kollam, Kulathupuzha, 8°54'13.2"N 77°03'22"E, 20.08.2022, V S Anil Kumar & Deepa Lekshmi V S, 22305(UCBD); India, Kerala, Kollam, Madathara, 8°48'27.2"N 77°00'27"E, 03.09.2022, V S Anil Kumar & Deepa Lekshmi V S, 22306(UCBD); India, Kerala, Kollam, Melila, 9°00'11.7"N 76°48'32.1"E, 17.09.2022, V S Anil Kumar & Deepa Lekshmi V S, 22307(UCBD); India, Kerala, Pathanamthitta, Konni, 9°14'28.4"N 76°51'09.9"E, 14.11.2022, V S Anil Kumar & Deepa Lekshmi V S, 22308(UCBD);

India, Kerala, Pathanamthitta, Mekozhoor, 9°19'09.3"N 76°47'28.2"E, 30.10.2022, V S Anil Kumar & Deepa Lekshmi V S, 22309 (UCBD); India, Kerala, Pathanamthitta, Ranni, 9°22'21.0"N 76°47'34.1"E, 19.11.2022, V S Anil Kumar & Deepa Lekshmi V S, 22310 (UCBD); India, Kerala, Kozhikode, Eravattur, 11°32'19.3"N 75°43'57"E, 27.11.2022, V S Anil Kumar & Deepa Lekshmi V S, 22311 (UCBD); India, Kerala, Palakkad, Kizhur, 11°31'29.1"N 75°37'40.4"E, 21.01.2023, V S Anil Kumar & Deepa Lekshmi V S, 22312 (UCBD); India, Kerala, Kasaragod, Neeleswaram, 12°14'47.1"N 75°08'00.6"E, 17.12.2022, V S Anil Kumar & Deepa Lekshmi V S, 22312(UCBD); India, Kerala, Kasaragod, Bedadka, 12°27'38.1"N 77°10'27.5"E, 18.12.2022, V S Anil Kumar & Deepa Lekshmi V S, 22313(UCBD) (Fig. 3).

Notes on taxonomic ambiguities

The genus *Asystasia* was described by Blume based on plant collected from Java and the collected material was named as *Asystasia intrusa*. Blume took the epithet '*intrusa*' from Arabian species *Ruellia intrusa* Forssk (1). Later, Nees in 1832 described 11 new species from Asia and placed Blume's Javan material under Indian taxon *A. nemorum* and renamed *Asystasia intrusa sensu* Blume as *A. nemorum* (10). However, it is re-described as *Asystasia blumei* by Nees in 1847. The following cases have been categorised after considering the treatment of the species in the literature.

Case 1. Considering *A. intrusa*, *A. gangetica* subsp. *micrantha*, *A. gangetica* var. *krishnae* and *A. nemorum*

Previously the image provided in POWO for *A. intrusa* was the same as that for *A. gangetica* subsp. *micrantha* (which has been misidentified as a new variety *A. gangetica* var. *krishnae* Tandyekk, Pandur & N. Mohanan) and not that of *A. nemorum*. During 2024, Deepa lekshmi and Anil Kumar revised the taxonomic status of *A. gangetica* var. *krishnae* and established that it was an erroneous identification. Subsequently, the specimen was reported as *A. intrusa* as a new record for India.

Since then, the images given for *A. nemorum* have been found to be revised in POWO. Earlier it was also noticed that in POWO, the herbarium specimen for *A. nemorum* (K000885428) (with introduction centres in Caroline islands, Malaya and Maluku) has indications of its earlier identification as *A. henryi* sp. nova (not a validly published name, 1905) which has been reassessed as *A. nemorum* Nees, which was also been found to be revised (21).

Case 2. Considering *A. australasica*, *A. hispida*, *A. salicifolia*, *A. blumei* and *A. nemorum*

In Kerala Flora, *A. nemorum* has been wrongly included as *A. intrusa* (20). The type specimen of *A. blumei* (GZU 250606 & 250607) with ID 45831 and 45830 matches with the specimen mentioned as *A. nemorum* in Hortus botanicus (015379 UTRECHT). The specimen mentioned in the National Herbarium Nederland (202660) bears names of *A. blumei*, *A. intrusa*, *A. australasica* and *A. nemorum*. This specimen also matches with the specimens given in the herbarium of GZU (Fig. 4 & 5). In the herbarium of Natural History Museum, the type specimen of the Thailand species, *A. hispida* J.B. Imlay (1939) (000538669 BM) has been wrongly corrected as *A. nemorum* in 1998 (Fig. 4). Also, the specimen in the herbarium of Royal Botanic Garden, Kew (K000885513, collection No. 11471) originally represents the specimen of *A. salicifolia* Craib (1918), having linear lanceolate leaves. However, it has also been wrongly reassessed as *A. nemorum* in 1998 (Fig. 5). In the POWO, interestingly, there are no synonyms for *A. hispida* and *A. salicifolia* and both remain as accepted species (6). There exists the type specimen in the herbarium of Royal Botanic Garden, Kew for *A. salicifolia* (K000885512) which is quite different from the specimens of *A. nemorum* (Fig. 5). The flower color as well as some other traits remains common for *A. hispida*, *A. salicifolia* and *A. nemorum*, as per descriptions in the literature, which might have created dilemma in their taxonomic discrimination.

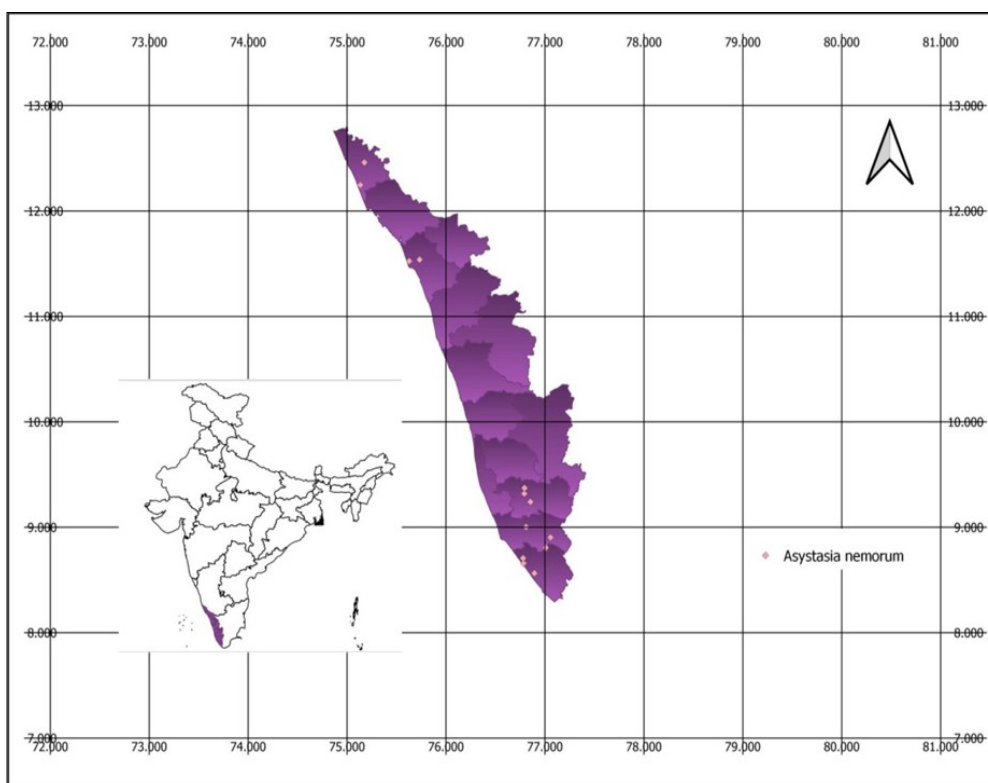


Fig. 3. Geographical distribution of *A. nemorum* Nees in Kerala, India.



Fig. 4. Herbarium sheets of *A. nemorum* Nees. **A:** Type specimen of *A. intrusa* at National Herbarium Nederland 202660; **B:** Voucher specimen at Royal Botanic Garden Kew K00885532; **C:** Voucher specimen at Royal Botanic Garden Kew K00885428; **D:** Type specimen of the Thailand species, *A. hispida* J.B. Imlay at Natural History Museum, 000536669.

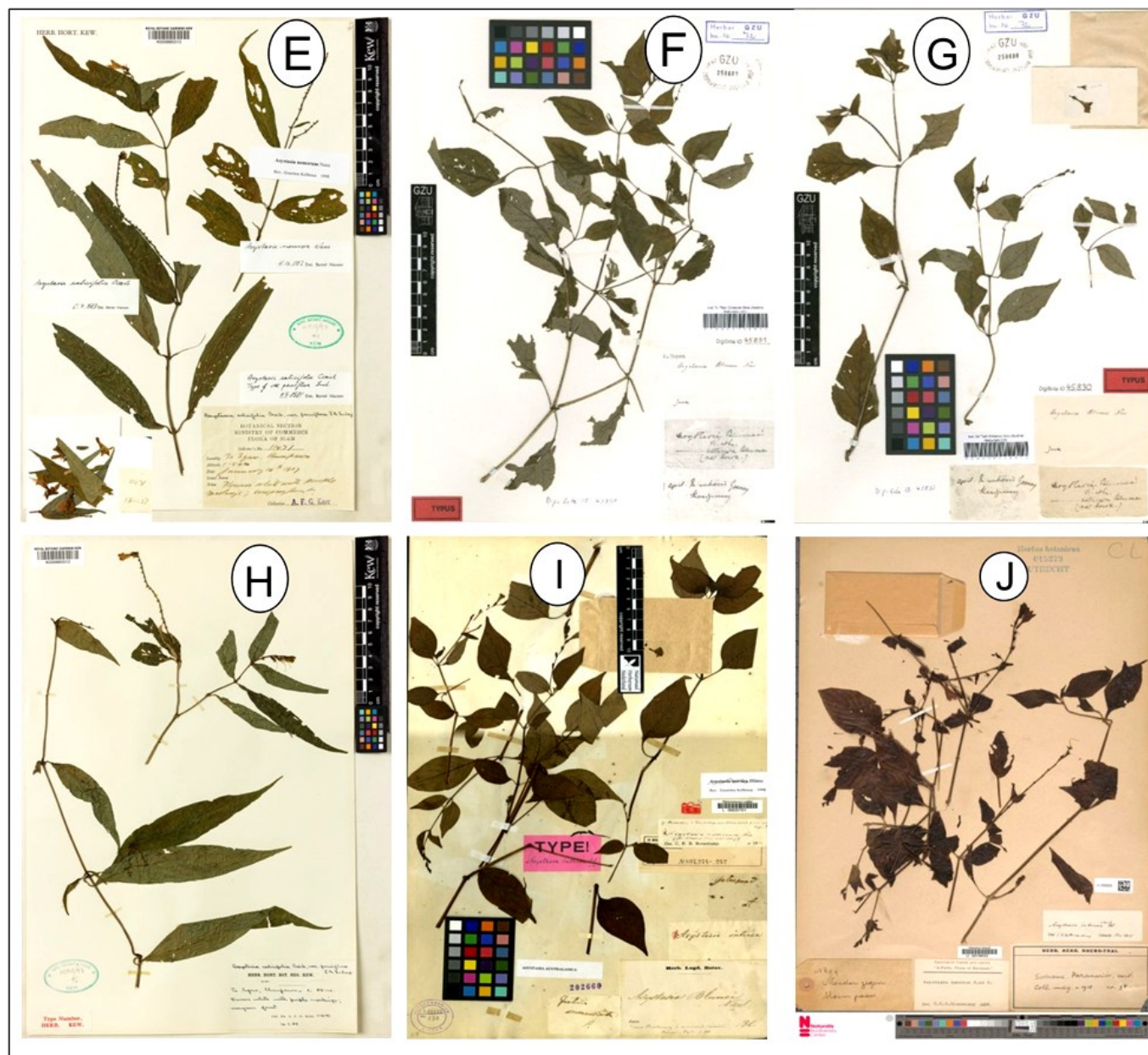


Fig. 5. Herbarium sheets of *A. nemorum* Nees. **E:** Type specimen *A. salicifolia* Craib at Royal Botanic Garden Kew K00885513; **F:** Type specimen of *A. blumei* at Graz Institute for Botanic Universe, 250607; **G:** Type specimen of *A. blumei* at Graz Institute for Botanic Universe, 250606; **H:** Type specimen *A. salicifolia* at Royal Botanic Garden Kew K00885512; **I:** Type specimen of *A. intrusa* at National Herbarium Nederland 202660; **J:** Voucher specimen mentioned as *A. nemorum* in Hortus botanicus 015379.

Case 3. Considering *A. violacea* and *A. nemorum*

The specimen (K000885532) provided in Kew site represents *A. nemorum* which was originally identified as *A. violacea* Dalz. in 1878. These specimens have leaves quite different from that of *A. salicifolia* (which are also designated as *A. nemorum* in herbaria-K000885513).

Case 4. Considering *A. chelonoides* and *A. nemorum*

Asystasia nemorum has been misidentified as *A. chelonoides* (22). A thorough revisionary study has not been attempted in *Asystasia* that has created an obviously wider lacuna in the systematic understanding of the taxon. Even in floras, the authors have raised concerns regarding the exact identity of *A. salicifolia* and *A. nemorum* (13). However, in the Flora of China, a distinction has been given between *A. salicifolia* and *A. nemorum*, based on the width of leaf and corolla size. Kew and Vollesen expressed the possibility that the plants treated in the Flora of China as *A. nemorum* are either not that species or cultivated

plants of that species, emphasizing the need of revisionary studies (12). The ambiguous interpretations by taxonomists from time to time have created a great puzzle in the exact identity of *A. nemorum* (synonym *A. blumei*). In present study, the authors have clarified the identity of the taxon, based on the existing ambiguous interpretations and concomitant inappropriately assigned specific epithets.

Conclusion

The study concludes that after its original description in 1826, *A. nemorum* has been misinterpreted in various ways as evident in several herbaria. Species viz. *A. intrusa*, *A. hispida*, *A. salicifolia* and *A. australasica* has been erroneously treated as *A. nemorum* with *A. blumei*, *Isochoriste javanica* and *Ruellia clavata* as the only synonyms as per currently available literature.

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Authors' contributions

The authors contributed equally to the present work. All the authors read and approved the manuscript.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interest to declare.

Ethical issues: None

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