

# Conspectus of the Family Convolvulaceae with New Additions in Flora of Uttar Pradesh, India

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DOI: 10.18811/ijpen.v11i03.16

## ABSTRACT

The present study provides a comprehensive taxonomic account of the family Convolvulaceae in Uttar Pradesh, India, revealing significant additions to the regional flora. Based on extensive field surveys and herbarium consultations, a total of 74 taxa, including 71 species distributed across 20 genera, were documented. Remarkably, nine species are reported for the first time from the state: *Cuscuta campestris* Yunck., *Dinetus racemosus* (Roxb.) Sweet, *Ipomoea capitellata* Choisy, *I. coccinea* L., *I. hederacea* Jacq., *I. laxiflora* H.J. Chowdhery & Debta, *I. littoralis* Blume, *I. mauritiana* Jacq., and *I. triloba* L. These new records not only enhance the floristic diversity of Uttar Pradesh but also underscore the ecological range and adaptability of the family in varied habitats.

Each species was examined for morphological traits, phenology, floral characteristics, dehiscence patterns, and conservation status. The findings highlight the ecological value of Convolvulaceae in local ecosystems and emphasize the urgent need for region-specific conservation measures, particularly for rare and endemic taxa. This study contributes to the baseline knowledge of regional plant biodiversity and serves as a foundation for future generations.

**Keywords:** Convolvulaceae, New Records.

## Highlights

- Taxonomic Study: A comprehensive investigation of Convolvulaceae taxa in Uttar Pradesh, assessing their diversity and ecological roles.
- Conservation Impact: Findings support conservation efforts, especially for rare and endemic species.
- Species Collection: 74 taxa (71 species, 20 genera) were collected and analyzed across the region.
- New Records: Nine species were recorded for the first time in Uttar Pradesh, expanding knowledge of regional plant diversity.

*International Journal of Plant and Environment* (2025);

ISSN: 2454-1117 (Print), 2455-202X (Online)

## INTRODUCTION

Uttar Pradesh (23.83° N to 31.43° N latitudes; 77.06° E to 84.96° E longitudes) covers an area of 2,40,928 km<sup>2</sup> (7.3% of India's total area). The state's terrain is divided into three main regions: The Himalayan region in the north, the Indo-Gangetic Plain in the center, and the Vindhya Range and the Bundelkhand region in the south. It has a diverse and rich flora, fauna, topography, heritage culture and other features which result in a unique and complex ecosystem. The protected area network encompasses around 5,064 km<sup>2</sup> including five national parks, twenty-four wildlife sanctuaries, one biodiversity hotspot and ten Ramsar sites.

The members of the family Convolvulaceae are called 'Morning Glories' because where they occur, their foliage merges with the landscape, making no visual impact. With the rising sun, they flower and blossom to glory that slowly dwindles down and their flowers wither by noon.

Convolvulaceae is a family of twining vines and lianas, with 59 genera and 1900 species. Only a few are erect herbs or shrubs (e.g., *Evolvulus*, *Ipomoea*, *Jacquemontia*, *Merremia*), and rarely trees (e.g., *Humbertia*, *Ipomoea*). Most species are cosmopolitan in distribution, occurring throughout tropical and warm temperate regions (Simoes and Staples, 2017). India is represented by 25 genera and 173 species under Convolvulaceae (Meena *et al.*, 2020a) 1 genus and nine species under Cuscutaceae (Meena *et al.*, 2020b). While Upper Gangetic Plains (Duthie, 1911) by 38 species belonging to 15 genera. Flora of Uttar Pradesh (Kumar, 2020) is represented by 14 genera and

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**How to cite this article:** Kaur, J., Narain, S. (2025). Conspectus of the Family Convolvulaceae with New Additions in Flora of Uttar Pradesh, India. *International Journal of Plant and Environment*. 11(3), 583-590.

**Submitted:** 18/02/2025 **Accepted:** 12/06/2025 **Published:** 30/09/2025

60 species under Convolvulaceae 1 genus and 5 species under Cuscutaceae.

The family Convolvulaceae could be easily distinguished from related families with alternate leaves lacking tendrils, presence of milky sap or latex, bicollateral vascular strands, large to medium-sized flowers, corollas tubular, funnel form, campanulate or urceolate sympetalous with 5 conspicuous mid-petaline bands, buds mostly induplicate, inflorescence is fundamentally cymose, stamens distinct, ovules erect sessile with placentation axile, fruits 1 to 4 locular often a dehiscent four-seeded capsule. However, several other types of fruits also occur (Staples and Brummitt, 2007).

Plants of the family Convolvulaceae attracted many botanists, in international, Indian and regional contexts. Many

genera need a thorough study throughout their ranges to give a satisfactory classification. After the creditable works of Clarke (1883), Duthie (1911) and Raizada (1976), no reliable work has been undertaken on this family. A revisionary study in a global perspective is most urgent for this family. First, intensive taxonomic studies on a local or regional basis must be initiated. Keeping this in mind, we chose to undertake the revisionary study of Convolvulaceae in Uttar Pradesh, India.

The present study was initiated as a part of the completion of the PhD thesis on the family Convolvulaceae in the Upper Gangetic plains of India. Knowledge of the systematic distribution of the family in Uttar Pradesh is inadequate despite the sporadic publications. Therefore, a detailed study was carried out to give an overview of the presence of Convolvulaceous taxa in Uttar Pradesh to assess their distribution and diversity. It will be useful to facilitate decision-making and implementation of conservation programmes, particularly for the endemic and rare species.

## METHODOLOGY

The present investigation is grounded in an extensive and systematic survey of the family Convolvulaceae conducted across various ecological zones of Uttar Pradesh, India. The study aimed to document the taxonomic diversity, phenological characteristics, morphological traits, and distributional patterns of Convolvulaceous taxa in the region. This work forms a part of a broader taxonomic revision carried out during doctoral research focused on the Upper Gangetic Plains, with a particular emphasis on under-documented or newly reported species.

Fieldwork was carried out over several growing seasons from 2015 to 2021 to ensure coverage of both seasonal and habitat-specific variations in species occurrence. Surveys were conducted in different districts of Uttar Pradesh, representing varied ecosystems such as riverbanks, agricultural margins, forests, wetlands, grasslands, and scrublands. Sites were selected to reflect the diversity of topographical and ecological conditions prevalent across the state—from the Terai and Doab regions to the Bundelkhand uplands and Vindhyan ranges. Photographs were taken for each plant to provide visual documentation and aid in identification (Figs 1-7).

Plant specimens were collected using standard herbarium techniques, following guidelines provided by the Botanical Survey of India. Each specimen was carefully pressed, dried, and mounted on herbarium sheets with detailed labels documenting locality, altitude, date of collection, habitat type, and phenological state (flowering or fruiting). Special care was taken to collect fertile material, as reproductive structures are critical for accurate identification. In cases where species were difficult to identify in the field, multiple specimens from different life stages were collected for later examination.

The identification and authentication of collected specimens were performed through rigorous comparison with authenticated herbarium materials housed at major Indian herbaria. The primary reference collection was located at the Duthie Herbarium (DUTHIE), Department of Botany, University of Allahabad, where a significant portion of the collected material has been deposited.

In addition to the Duthie Herbarium, comparative studies were carried out at several other premier herbaria, including: Botanical Survey of India, Prayagraj (BSA), Botanical Survey of India, Dehradun (BSD), Forest Research Institute, Dehra Dun (DD), National Botanical Research Institute, Lucknow (LWG), Central National Herbarium, Kolkata (CAL). Access to these collections provided a broader perspective and ensured that taxonomic determinations were made with the highest possible accuracy.

An extensive review of published and unpublished literature was undertaken to complement the field and herbarium data. Standard regional floras, taxonomic revisions, and checklists formed the basis for species identification and nomenclatural consistency. Notable references included: Narain, 2009; Singh *et al.*, 2011; Malik *et al.*, 2012; Ansari and Tiwari, 2013; Kumar, 2013; Khanna, 2017, 2018; Kaur and Narain 2018 (a,b) Kaur *et al.*, 2018; Tiwari and Garg, 2018; Kaur, 2019; Kumar, 2020; Saini *et al.*, 2021; Kaur and Kumar, 2025 etc.

Additionally, monographs and global revisionary works were consulted to resolve difficult taxa and confirm new records. Important international references included: Yuncker, 1932; Ooststroom, 1934; Hoogland, 1953; Robertson, 1971; Austin and Staples, 1980; Johari, 1983; Austin and Huaman, 1996; Biju, 1997; Austin, 1999, 2000a; Staples, 2007, 2017; Yadav, 2018; etc. These resources were instrumental in updating the classification according to current taxonomic standards and in identifying species that had not previously been reported from Uttar Pradesh.

## RESULTS AND DISCUSSION

A total of 74 taxa, comprising 71 species, have been collected and studied from 20 genera of the family *Convolvulaceae* in the study area. The study's thorough exploration and intensive investigations have resulted in the identification of several previously unreported species in the region. Out of the 74 taxa, 9 species were discovered to be new records for the area, contributing to the understanding of the family's diversity in this region. These newly identified species are:

- *Cuscuta campestris* Yunck.
- *Dinetus racemosus* (Roxb.) Sweet
- *Ipomoea capitellata* Choisy
- *I. coccinea* L.
- *I. hederacea* Jacq.
- *I. laxiflora* H.J. Chowdhery & Debta
- *I. littoralis* Blume
- *I. mauritiana* Jacq.
- *I. triloba* L.

These new records expand the taxonomic understanding of the *Convolvulaceae* family in the study region and highlight the need for further ecological and systematic studies to better understand their role in local ecosystems. The detailed identification of these species will provide valuable insights into the floral diversity and the potential ecological interactions that these plants might be involved in.

All 74 taxa collected were systematically enumerated in Table 1. For each species and infraspecific, the following details were recorded and organized alphabetically:

Table 1: Plants of the family Convolvulaceae with their habit, phenology, flower color, dehiscence and abundance

S. No	Species	Habit	Flowering & fruiting	Flower colour	Dehiscence type	Status
1	<i>Aniseia martinicensis</i> (Jacq.) Choisy	Twiner	Oct-Nov	White	Valvular Dehiscent	Rare
2	<i>Argyreia bella</i> (C. B. Clarke) Raizada	Shrubby climber	Sept-Dec	Pale-purple	Indehiscent	Rare
3	<i>A. barbigera</i> Choisy	Climber	Sept-Jan	Lavender to rose purple	Indehiscent	Common
4	<i>A. kleiniana</i> (Schult.) Raizada	Lianas	Oct-Jan	Red-purple	Indehiscent	Occasional
5	<i>A. nervosa</i> (Burm.f.) Bojer	Climber	Oct-Feb	Rose-purple	Indehiscent	Common
6	<i>A. sericea</i> Dalzell & A. Gibson	Twiner	Aug-Oct	Pale-purple	Indehiscent	Rare
7	<i>A. setosa</i> (Roxb.) Sweet	Climber	Nov-Feb	Rose-purple	Indehiscent	Rare
8	<i>Calystegia hederacea</i> Wall.	Twiner/ Prostrate	Mar-Dec	Pinkish Purple /White	Irregular dehiscent	Rare
9	<i>Camonea umbellata</i> (L.) A.R. Simões & Staples	Climber	Oct-Dec	Yellow /Cream	Dehiscent (from tip)	Rare
10	<i>Convolvulus arvensis</i> L.	Vines	Sept-Jan	White /Lilac pink	Irregular dehiscent	Common
11	<i>C. prostratus</i> Forssk.	Prostrate herb	All around the year	White / Rose yellow	Irregular dehiscent	Common
12	<i>Cressa cretica</i> L.	Erect herb	Feb-July	White with a pink tinge	Dehiscent	Common
13	<i>Cuscuta australis</i> R. Br.	Parasitic twiner	June-Oct	Yellow	Indehiscent	Rare
14	<i>C. campestris</i> Yunc.	Parasitic twiner	June-Feb	Pale-White	Indehiscent	Common
15	<i>C. capitata</i> Roxb.	Parasitic twiner	Apr-May	White	Irregular dehiscent	Rare
16	<i>C. chinensis</i> Lam.	Parasitic twiner	Sept-Dec	Yellow	Circumscissile dehiscent	Occasional
17	<i>C. reflexa</i> Roxb.	Parasitic twiner	Oct-Feb	White or Cream	Circumscissile dehiscent	Common
18	<i>C. santapau</i> Banerji & S. Das	Parasitic twiner	Oct-Nov	White to reddish brown	Circumscissile dehiscent	Rare
19	<i>Decalobanthus peltatus</i> (L.) A.R. Simões & Staples	Robust vine	Jan-Sep	White	Valvular dehiscent	Rare
20	<i>Dinetus racemosus</i> (Roxb.) Sweet	Climber	Sept-Oct	White	Indehiscent	Rare
21	<i>Distimake aegyptius</i> (L.) A. R. Simões & Staples	Twiner	Sept-Nov	White	Dehiscent	Common
22	<i>D. dissectus</i> (Jacq.) A. R. Simões & Staples	Twiner	Nov-Jun	White or Pinkish	Valvular dehiscent	Common
23	<i>D. quinatus</i> (R. Br.) A. R. Simões & Staples	Twiner	Sept-Oct	White	Valvular dehiscent	Rare
24	<i>D. quinquefolius</i> (L.) Simões & Staples	Twiner	Oct-Mar	White or Pale yellow	Dehiscent	Rare
25	<i>D. tuberosus</i> (L.) A. R. Simões & Staples	Twiner/ Prostrate	Oct-Jan	Yellow	Irregular dehiscent	Rare
26	<i>D. vitifolius</i> (Burm.f.) Pisuttimarn & Petrongari	Twiner	Jan-Apr	Yellow	Valvular dehiscent	Rare
27	<i>Erycibe paniculata</i> Roxb.	Woody climber	Nov-Feb	White	Indehiscent sub-baccate	Common
28	<i>Evolvulus alsinoides</i> (L.) L.	Herb	July-Mar	Pale Blue/ Purple/White	Dehiscent	Common

29	<i>E. nummularius</i> (L.) L.	Prostrate herb	July-Apr	White	Dehiscent	Common
30	<i>Hewittia malabarica</i> (L.) Suresh	Twiner/ Prostrate	Oct-Dec	Pale yellow or Whitish	Dehiscent	Occasional
31	<i>Ipomoea aitonii</i> Lindl.	Twiner/ Prostrate	Aug-Nov	Pink /Mauve	Dehiscent	Common
32	<i>I. alba</i> L.	Vine	Sept-Dec	White	Valvular dehiscent	Common
33	<i>I. aquatica</i> Forssk.	Vine	Nov-Mar	Light Purple/ White	Irregular dehiscent	Common
34	<i>I. asarifolia</i> (Desr.) Roem. & Schult.	Climber	Aug-Nov	Purple-pink	Dehiscent	Rare
35	<i>I. barlerioides</i> (Choisy) Benth. ex C. B. Clarke	Vine	Sept-Dec	Pink to Purple	Dehiscent	Rare
36	<i>I. batatas</i> (L.) Lam.	Climber	Oct-Dec	Deep Pink to purple	Dehiscent	Common
37	<i>I. biflora</i> (L.) Pers.	Vine	Sept-Nov	White / Pinkish	Dehiscent	Common
38	<i>I. cairica</i> (L.) Sweet	Climber	Oct-Jun	White /Pink/Purple	Dehiscent	Common
39	<i>I. capitellata</i> Choisy	Vine	Nov-Dec	Purplish White	Dehiscent	Occasional
40	<i>I. capitellata</i> var. <i>multilobata</i> Bhellum	Twiner	Aug-Oct	White/Pale-pink	Dehiscent	Occasional
41	<i>I. carnea</i> Jacq.	Shrub	Whole year	Deep Pink to light Purple	Dehiscent	Common
42	<i>Ipomoea coccinea</i> L.	Twiner/ Prostrate	Jul-Oct	Scarlet/ Dull Red	Dehiscent	Common
43	<i>I. coptica</i> (L.) Roth	Twiner/ Prostrate	Sept-Nov	White	Valvular dehiscent	Rare
44	<i>I. eriocarpa</i> R. Br.	Twiner	Aug-Nov	Lavender or Pink	Valvular dehiscent	Common
45	<i>I. hederacea</i> Jacq.	Climber	July-Nov	Lavender to Blue	Dehiscent	Common
46	<i>I. hederifolia</i> L.	Twiner	Aug-Dec	Solid Red	Dehiscent	Common
47	<i>I. indica</i> (Burm.) Merr.	Climber	July-Jan	Blue/ purple	Valvular dehiscent	Common
48	<i>I. laxiflora</i> H. J. Chowdhery & Debta	Twiner	Sept-Oct	Pink	Dehiscent	Rare
49	<i>I. littoralis</i> Blume	Vine	Sept-Dec	Lavender to pinkish Purple	Dehiscent	Rare
50	<i>I. mauritiana</i> Jacq.	Climber	Aug-Sept	Pink or reddish Purple	Valvular dehiscent	Occasional
51	<i>I. muricata</i> (L.) Jacq.	Vine	Sept-Dec	Lavender to purplish	Valvular dehiscent	Common
52	<i>I. nil</i> (L.) Roth.	Climber	Aug-Dec	Blue	Valvular dehiscent	Common
53	<i>I. obscura</i> (L.) Ker Gawl.	Vine	Whole Year	Cream/White	Dehiscent	Common
54	<i>I. pes-caprae</i> (L.) R.Br.	Prostrate herb	Nov-Feb	Orange or pinkish-red	Explosive Dehiscent	Rare
55	<i>I. pes-tigridis</i> L.	Vine	Aug-Nov	White/Bluish/ pinkish white	Dehiscent	Common
56	<i>I. purpurea</i> (L.) Roth.	Climber	Sept-Nov	Pink/ reddish to Blue Purple	Dehiscent	Common
57	<i>I. quamoclit</i> Linn.	Climber	Sept-Nov	Solid Red	Valvular dehiscent	Common
58	<i>I. rumicifolia</i> Choisy	Twiner/ Prostrate	Nov-Dec	White to yellow	Dehiscent	Rare
59	<i>I. sagittifolia</i> Burm.f.	Vine	Aug-Nov	Lavender to pink/ White	Valvular dehiscent	Common
60	<i>I. sindica</i> Stapf	Prostrate creeper	Aug-Oct	White	Dehiscent	Occasional
61	<i>I. triloba</i> L.	Vine	Aug-Feb	Pink/ Pale purple	Dehiscent	Common



62	<i>I. violacea</i> L.	Vine	Feb-Apr	White	Valvular dehiscent	Rare
63	<i>Jacquemontia paniculata</i> (Burm. f.) Hallier f.	Climber	Oct-Nov	White	Valvular dehiscent	Rare
64	<i>J. pentanthos</i> (Jacq.) G. Don	Vine	Oct-Jan	Blue	Irregular dehiscent	Occasional
65	<i>Merremia emarginata</i> (Burm.f.) Hallier f.	Prostrate herb	Oct-Dec	Yellow	Valvular dehiscent	Common
66	<i>M. hederacea</i> (Burm. f.) Hallier f.	Twiner/ Prostrate	Oct-Dec	Yellow	Valvular dehiscent	Common
67	<i>Operculina petaloidea</i> (Choisy) Ooststr.	Robust climber	Jan-Apr	White to Sulphur Yellow	Operculate dehiscent	Rare
68	<i>O. petaloidea</i> var. <i>pauciflora</i> (C.B. Clarke) Parmar	Robust climber	Apr-May	Yellow	Circumscissile dehiscent	Rare
69	<i>O. turpethum</i> (L.) Silva Manso	Robust climber	Feb-May	White / Cream / Greenish White	Operculate dehiscent	Common
70	<i>Poranopsis paniculata</i> (Roxb.) Roberty	Lianas	Oct-Feb	White	Indehiscent	Occasional
71	<i>Rivea hypocrateriformis</i> (Desr.) Choisy	Lianas	July-Oct	White to Creamy White	Dehiscent	Common
72	<i>R. ornata</i> (Roxb.) Choisy	Lianas	July-Oct	White	Indehiscent	Rare
73	<i>Xenostegia tridentata</i> (L.) D. F. Austin & Staples	Twiner/ Prostrate	Oct-Dec	Pale yellow/ White	Valvular dehiscent	Common
74	<i>X. tridentata</i> subsp. <i>hastata</i> (Ooststr.) Parmar	Twiner/ Prostrate	Aug-Dec	Pale yellow/ White	Valvular dehiscent	Common

### Flowering & Fruiting Periods

The specific periods during which each species produces flowers and fruits were noted. This data provides insight into the reproductive strategies of the species and their potential for dispersal in the study area.

### Flower Color

Flower color plays an important role in plant-pollinator interactions and was documented for each species. This characteristic also aids in species identification and has ecological significance, as flower color may attract specific pollinators.

### Dehiscence Type

The mechanism by which fruits open to release seeds was recorded for each species. This trait is essential in understanding seed dispersal methods, which can influence the spread of species within the region.

### Conservation Status

The status of each species within the state was noted to assess whether the species is common, rare, or threatened. This information can inform future conservation efforts, particularly for those species that may be vulnerable due to habitat loss, over-collection, or other environmental pressures.

### Ecological Implications

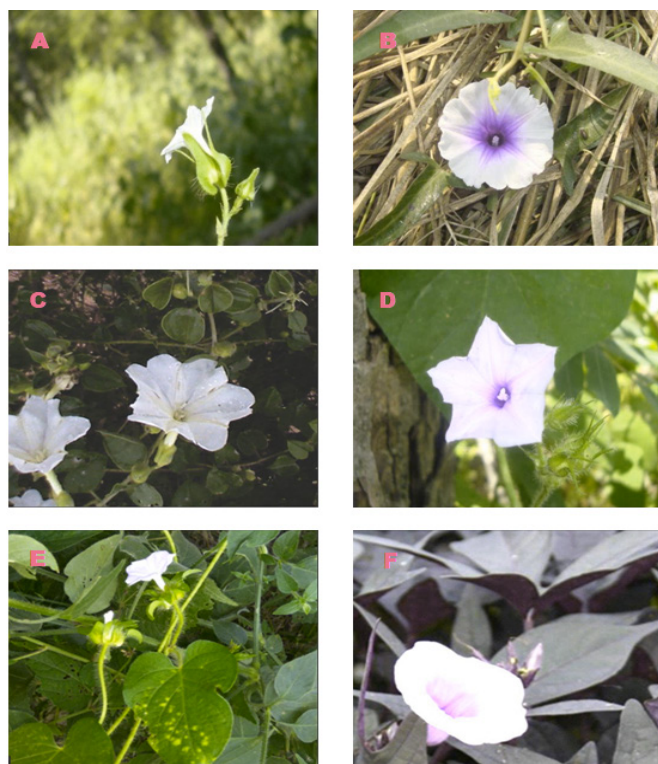
The discovery of 9 new records for the region contributes to a more comprehensive understanding of the local flora and the



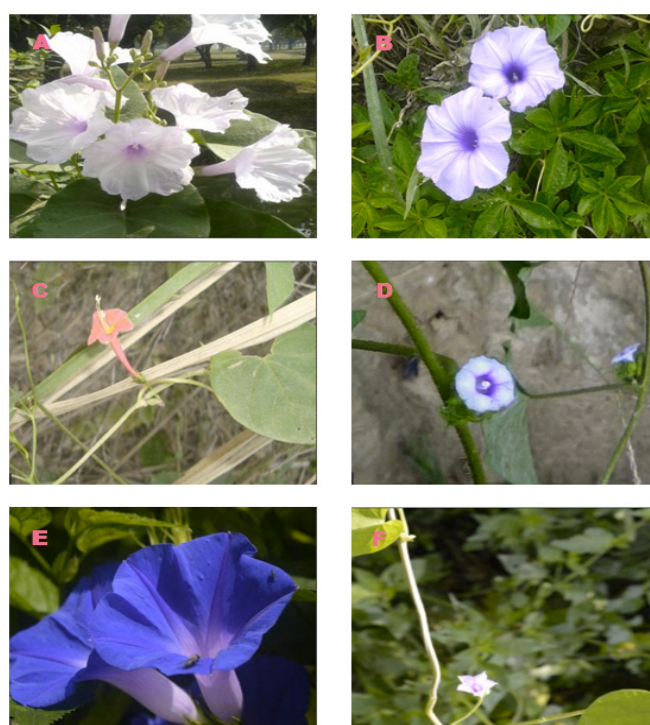
Fig. 1(A-F): (A) *Argyreia nervosa* (Burm.f.) Bojer; (B) *I. capitellata* Choisy; (C) *I. coccinea* L.; (D) *Convolvulus arvensis* L.; (E) *Convolvulus prostratus* Forssk.; (F) *Cuscuta campestris* Yunck



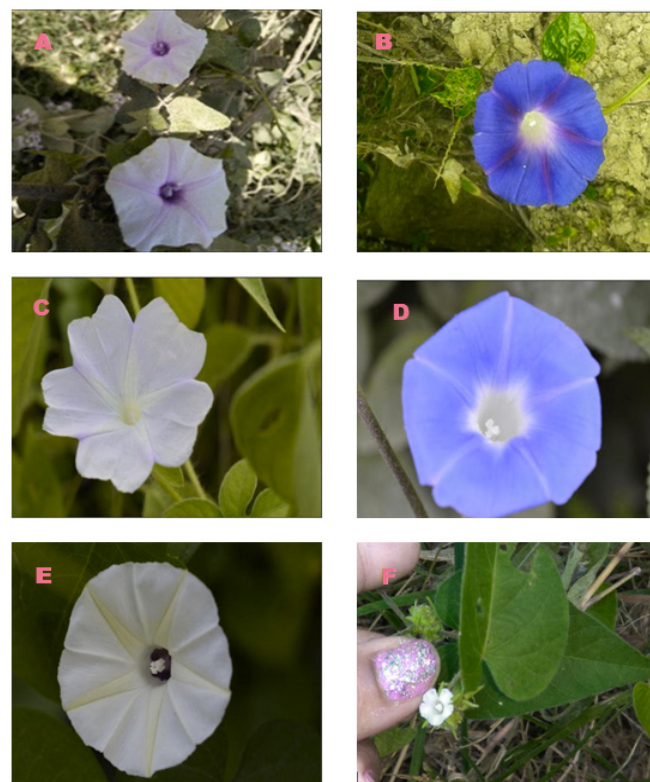
**Fig. 2(A-F):** (A) *Cuscuta reflexa* Roxb.; (B) *Distimake vitifolius* (Burm.f.) Pisuttimarn & Petrongari; (C) *Distimake aegyptius* (L.) A. R. Simões & Staples; (D) *Argyreia barbigera* Choisy; (E) *Evolvulus nummularius* (L.) L.; (F) *Evolvulus alsinoides* (L.) L



**Fig. 3(A-F):** (A) *I. biflora* (L.) Pers.; (B) *I. aquatica* Forssk.; (C) *Rivea hypocrateriformis* (Desr.) Choisy; (D) *I. aitonii* Lindl.; (E) *I. capitellata* Choisy; (F) *I. batatas* (L.) Lam

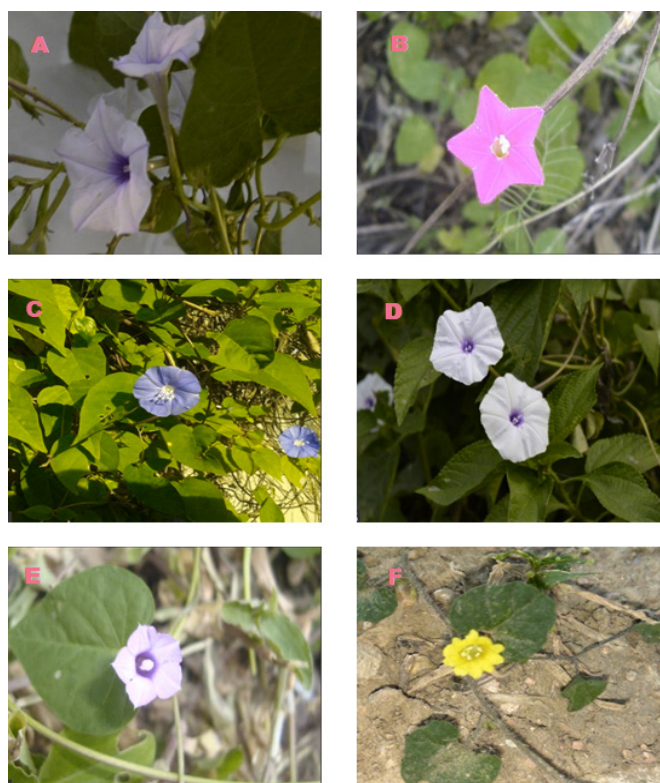


**Fig. 4(A-F):** (A) *I. carnea* Jacq.; (B) *I. cairica* (L.) Sweet; (C) *I. hederifolia* L.; (D) *I. eriocarpa* R. Br.; (E) *I. indica* (Burm.) Merr.; (F) *I. laxiflora* H. J. Chowdhery & Debta



**Fig. 5(A-F):** (A) *I. littoralis* Blume; (B) *Ipomoea littoralis* Blume (C) *I. pes-tigridis* L.; (D) *Ipomoea purpurea* (L.) Roth. (E) *I. obscura* (L.) Ker Gawl.; (F) *I. sindica* Stapf





**Fig. 6(A-F):** (A) *I. muricata* (L.) Jacq.; (B) *I. quamoclit* Linn.; (C) *Jacquemontia pentanthos* (Jacq.) G. Don; (D) *I. sagittifolia* Burm.f.; (E) *I. triloba* L.; (F) *Merremia emarginata* (Burm.f.) Hallier f.



**Fig. 7(A-D):** (A) *Operculina turpethum* (L.) Silva manso; (B) *Merremia hederacea* (Burm. f.) Hallier f.; (C) *Poranopsis paniculata* (Roxb.) Roberty; (D) *Xenostegia tridentata* (L.) D. F. Austin & Staples

ecological roles that these plants play. *Ipomoea*, for instance, is known for its diversity and adaptability in various habitats, ranging from coastal environments to more inland areas. The presence of species like *I. littoralis* and *I. mauritiana* suggests that the study area might support a variety of habitats, including

coastal or disturbed areas, where these species thrive. The diversity within the family *Convolvulaceae* also suggests a rich network of potential pollinators and seed dispersers, which could have broader implications for local biodiversity.

### Significance of the Study

The findings from this study are significant not only in terms of expanding the floristic inventory of the region but also in enhancing the ecological understanding of plant diversity in the *Convolvulaceae* family. The documented species can serve as a baseline for future studies, including those that focus on conservation, ecological interactions, and the potential economic uses of these plants. Furthermore, this work provides a valuable reference for botanists and researchers in the field of plant taxonomy, particularly in the study of plant families that are often underexplored in some regions.

### CONCLUSION

The present study provides a comprehensive taxonomic and ecological assessment of the family *Convolvulaceae* in Uttar Pradesh, India. Through extensive field surveys, herbarium investigations, and a critical review of existing literature, 74 taxa—including 71 species across 20 genera—were identified and documented. Significantly, nine species are recorded here for the first time from the state, expanding the known geographical distribution of these taxa and highlighting the underexplored floristic richness of the region.

The findings affirm the ecological versatility and adaptive strategies of *Convolvulaceae* members, which inhabit a wide range of habitats, including forest edges, wetlands, agricultural fields, wastelands, and riverine systems. The dominance of the genus *Ipomoea*, with 31 species, underscores its ecological success and relevance in both natural and anthropogenic landscapes. Furthermore, the diversity of morphological forms—ranging from twining climbers to parasitic herbs—and reproductive traits such as floral color, dehiscence types, and phenology reflect a complex network of plant-pollinator and plant-disperser interactions.

This study not only enriches the floristic inventory of Uttar Pradesh but also strengthens the foundational knowledge required for biodiversity conservation, ecological restoration, and sustainable management of plant resources. It serves as a critical reference for botanists, ecologists, taxonomists, and conservation planners, encouraging further exploration and safeguarding of India's botanical wealth.

### ACKNOWLEDGEMENT

The authors are grateful to Dr. Vinay Ranjan (Scientist E, BSI Allahabad), Authorities of BSI Dehradun, FRI Dehradun and CNH Kolkata for providing permission to consult their herbaria. We are also thankful to the Head, Department of Botany, University of Allahabad, Prayagraj, for encouragement and for providing laboratory facilities. Lastly, we would like to thank UGC for providing financial assistance.

### CONFLICT OF INTEREST

None

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