

# Periodic Research

## A Check List of Genus *Ipomoea* of family Convolvulaceae in Central Rajasthan



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### Abstract

Rajasthan is the largest State in India. Central Rajasthan comprising of Ajmer, Bhilwara, Nagaur and Tonk districts, is an area of confluence of the western and eastern vegetations. The varied topography associated with peculiar phytography has resulted in a highly diverse nature of vegetation of this region. Family Convolvulaceae occupies a significant position among first ten dominant families of this State. *Ipomoea* is the largest genus in family Convolvulaceae, a total 18 species of *Ipomoea* have been collected from various localities of Central Rajasthan, an attempt has been made to collect information regarding Taxonomic description of plants.

**Keywords:** Topography, Taxonomic Description.

### Introduction

Family Convolvulaceae (Morning Glory Family) is consisting of 1650 species under 52 genera (Mabberley, 2008) distributed in all parts of the world, except the coldest regions, but mainly in warmer regions of Asia and America. The family is represented in India by 158 species of 20 genera (Santapau and Henry, 1973). *Ipomoea* is an exceptionally large and diverse genus in the Convolvulaceae. Over 60 species of *Ipomoea* are reported in India (Oudhia, 2001). Family Convolvulaceae occupies a significant position among first ten dominant families of this State and *Ipomoea* is the largest genus in family Convolvulaceae, The genus is characterized by a wide range of diverse habit and habitat and morphological features. The genus *Ipomoea* consist of mainly climbing herbs and weeds. The present study deals with genus *Ipomoea* of family Convolvulaceae from various localities of Central Rajasthan. A total 18 species of *Ipomoea* covering diverse habit; habitat and morphological features have been collected from various localities of Central Rajasthan. The present paper illustrates Taxonomic description, of the *Ipomoea* species present in Central Rajasthan.

### Material and Methods

Field trips were arranged in such a way as to cover all the localities at regular intervals to collect the plants in flowering and fruiting stages. All the specimens were detailed for habit, habitat, colour of flowers, associations and other pertinent features, which generally cannot be studied from the pressed specimens. All plant species, were enumerated, collected and identified with standard floras. Information of habit, habitat, flowering and fruiting period, Efforts were made to identify the plants from the fresh material; those which could not be satisfactorily identified in the field or in the laboratory at Ajmer, were preserved and later checked and authenticated, by using standard monograph and flora and also submitted to the herbarium Department of Botany S.P.C.Government college. Ajmer.

### Review of Literature

*Ipomoea* is an exceptionally large and diverse genus in the Convolvulaceae. Many investigators have worked on various topics of *Ipomoea* biodiversity, distribution, structure, distribution, development and taxonomic importance of stomata and epidermal studies (Sivdasan1998), (Jangid, 2011) (Leela, 1994), (Singh1974). *Ipomoea carnea* contain variety of bioactive components such as phenolic acid, alkaloids, flavonoids, coumarins and sterols<sup>1-4</sup> Also having an immense biological and pharmacological activities as an anti-inflammatory, (Khalid et.al., 2011) antioxidant (Adsul, 2012), antidiabetic (Abdul Latif, 2012), antimicrobial, wound healing, immunomodulatory, antifungal and hepatoprotective activities (Gupta, 2013) ( Khan, 2015). Phytochemical analysis of *Ipomoea pes-tigridis* confirmed the presence of flavones, flavonols, bioflavonyls, hydrocarbons, auronos, tannins, terpenoids, glycosides and alkaloids in

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varying concentration which supports the authenticity of this plant in traditional medicinal uses (Selvam, 2017).

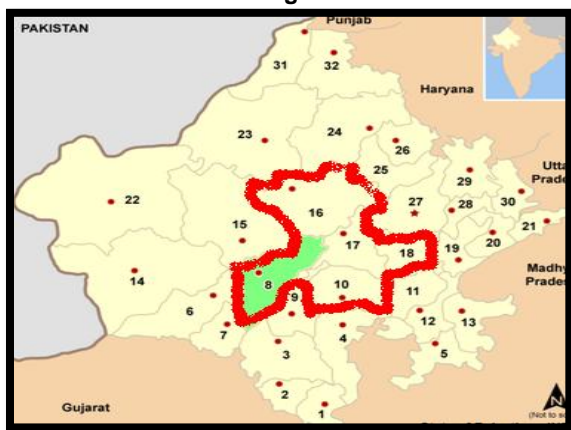
#### Aim of the Study

1. The present biosystematical study aims at utilizing data from morphology, for a better taxonomic understanding and interrelationship of species of *Ipomoea*.
2. Species of *Ipomoea* can be properly documented to use these morphological characters in establishing the phylogenetic relationship and helps to produce a system of classification
3. Species of *Ipomoea* shows the presence of many chemical constituents which are responsible for various pharmacological medicinal properties has a leading capacity for the development of new good efficacy drugs in traditional medicinal uses

#### Study Area

Central Rajasthan comprising of Ajmer, Bhilwara, Nagaur and Tonk districts, is an area of confluence of the western and eastern vegetations. Climate of Central Rajasthan is moderate with a rainfall of about 557mm and average temperature is 24.70C. The climatic factors are responsible for the growth of various vegetation. Topographically this region is characterized by Aravalli ranges of varying heights, rocky terraces, valleys, ponds and lakes on one hand and sandy plains and stabilized dunes of varying nature on the other. This varied topography associated with peculiar phytography has resulted in a highly diverse nature of vegetation of this region.

Fig: 1



#### Enumeration

*Ipomoea* happens to be the largest genus of the family. This genus alone is represented by 18 species in this region which constitutes 54.29% of all the species of family Convolvulaceae collected from this region. Morphological description of these taxa is given below in alphabetical order as follows:

#### *Ipomoea alba* L.

Common names: White morning glory, Moon vine,

Extensive twiners, with mucronate or almost prickly stems. Leaves 7-12 cm long, broadly ovate, acuminate, entire, glabrous, deeply cordate at the base; petioles about as long as the leaves. Peduncles 5-15 cm long, glabrous, 1 to 5 - flowered. Bracts

caducous. Sepals subequal, ovate, mucronate. Corolla white; tube 7-9 cm long. Anthers shortly exerted. Capsules c.2.5 cm long, ovoid - oblong, narrowed upwards. Seeds irregularly 3- gonous, glabrous, yellow.

Fl. & Fr.: October - December.

#### *Ipomoea aquatica* Forsk.

Common names: River spinach, Water morning glory,

Floating or creeping, aquatic, or marshy herbs, rooting on the nodes; stem fistular, glabrous. Leaves variable, 4-8 x 1-5 cm, ovate to oblong, lanceolate - linear, cordate, hastate or sagittate at the base, acute or shortly acuminate at the tip. Flowers in axillary, 1 to 5 - flowered, pedunculate cymes. Sepals subequal, oblong - lanceolate, membranous. Corolla 3-6 cm long, infundibuliform, pale rosy or purple or white ; lobes 5, obscure. Filaments very unequal, hairy at base. Capsules ovoid - globose, glabrous, 2 to 4 - seeded. Seeds minutely pubescent.

Fl. & Fr.: Most part of year.

Common in aquatic and semi - aquatic habitats around tanks, ditches, rice - fields etc.

#### *Ipomoea cairica* (L.) Sweet. var. *cairica*

Common names: Railroad creeper, Coast Morning glory

Perennial twiners, with tuberous root - stock. Leaves palmately 5 to 7 - partite; segments elliptic - obovate or lanceolate, narrowed at both ends, retuse, mucronate at apex, glabrous or punctate. Flowers in 1 to 3 - flowered cymes. Calyx - segments unequal ovate, mucronulate, tuberculate on the back of outer ones. Corolla 6-7 cm long, white or purple. Capsules 2- celled, 4- valved. Seeds pubescent.

Fl. & Fr.: Throughout the year.

#### *Ipomoea carnea* Jacq. subsp. *carnea*

Common names: Railroad creeper, Coast Morning glory

Twining shrubs, upto 3m high. Leaves 10-25 x 6.0-7.5 cm, broadly ovate or ovate - oblong, acute or apiculate, entire. Anatomically diffuse porous in root, radial - row porous in stem, ray cells broad, sheath cells present, phelloderm originates from deeper layer of cortical - cells. Flowers in 1 to many - flowered cymes. Corolla purple. Capsules ovoid, c.2 cm in diam., glabrous. Seeds densely villous, brown.

Fl. & Fr. : Throughout the year.

Rarely found in wastelands in and around the gardens . Usually cultivated in the garden. Plants prefer dry habitats.

#### *Ipomoea carnea* subsp. *fistulosa* (Mart. ex Choisy) Austin.

Common names: Bush Morning Glory, Pink morning glory

Erect, stout shrubs. Leaves ovate - lanceolate, undulate, acuminate. Anatomically radial row porous in root, diffuse porous in stem, ray cells narrow, sheath cells absent, phelloderm just after the epidermal layer.

Fl. & Fr.: Throughout the year.

Common in wastelands and along the roads, particularly near water resources it forms dense community. Easily propagated by stem cutting and its growth is very fast.

## ***Ipomoea coptica* (L.) Roth ex Roem, & Schult.**

Prostrate or twining annuals. Leaves digitately or pedately 3 to 7 - lobed; lobes linear - lanceolate or ovate - elliptic, serrate - dentate; petioles with axillary stipule - like leaves at their base. Flowers axillary, solitary, pedunculate. Bracts near the flowers, minute, lanceolate, acute or flowers subsessile among leaf - like pectinate bracts. Sepals oblong, shortly cuspidate, muricate on the back. Corolla tubular, white, acutely 5 - lobed. Capsules 5-7 mm in diam, subglobose, glabrous, 3 to 6 - valved. Seeds densely pubescent.

Fl. & Fr. : July - March.

Naturalized Among bushes in wastelands and on the edges of fields and gardens.

## ***Ipomoea dichroa* (Roem. & Schult.) Choisy**

Twining, annual herbs, clothed with long, spreading, glandular - based brownish hairs. Leaves 4.5-15.0 x 4-15 cm, ovate - cordate, entire angled or 3-lobed, acute or acuminate, appressed white tomentose beneath. Flowers in lax, axillary; racemose cymes. Bracts ovate- lanceolate, 1.0-1.5 cm long, calyx-lobes ovate- lanceolate, acuminate. Corolla 1.5-3.5 cm long, tube suddenly widened at mouth, bright pink. Capsules c.1 cm in diam., subglobose, glabrous. Seeds cotton hairy.

**Fl. & Fr.: August - December**

Common in open forests in hilly areas and along the boundaries of gardens among hedges. Flowers open in the morning hours. In most habitats the leaves are usually infected by *Albugo* species.

## ***Ipomoea eriocarpa* R. Br.**

Common names: Tiny morning glory, wooly fruit morning glory,

Twining or creeping, annual, hispid herbs. Leaves 3-12 x 0.8-5.0 cm, ovate - lanceolate or oblong, cordate or hastate at the base, acuminate or acute at the tip, pilose. Flowers sessile, in sessile or subsessile, 1 to 7 - flowered clusters. Bracts upto 1 cm long, linear . Calyx - lobes subequal, ovate, acuminate, pilose. Corolla campanulate, pubescent in upper part and with small tuft of hairs at the apices of small acute lobes . Capsules 6-8 mm in diam., ovoid or globose, 2- celled, 4- valved, hairy. Seeds glabrous.

Fl. & Fr. : August - January, rarely most part of the year.

In open forests among bushes, waysides and on the boundaries of fields.

## ***Ipomoea nil* (L.) Roth**

Twining, perennial herbs, with watery sap and grey brown hairy stems . Leaves 3-15 x 2.5-12.0 cm, ovate -cordate, entire or 3-lobed, acuminate, appressed hairy. Flowers in axillary, 1 to 5 flowered, peduncled cymes. Bracts linear. Sepals 1.5-2.5 cm long, ovate lanceolate, acuminate hirsute, ciliate, accrescent. Corolla 4-6 cm long, purple. Capsules 1.0-1.5 cm in diam., 3- valved, 3- celled.

Fl. & Fr.: August - November.

Common in wastelands, forests, boundaries of fields and gardens. Flowers usually close up before noon.

## ***Ipomoea obscura* (L.)**

Common names: small white morning glory

Twining herbs, glabrous or with few spreading hairs. Leaves 2-7 x 2-8 cm, ovate to orbicular or reniform, entire, acute or acuminate, cordate - based. Flowers axillary, solitary or 2 to 3 - together on peduncles. Bracts minute, linear - lanceolate. Sepals subequal, c.5 mm long, oblong, shortly apiculate . Corolla 2-3 cm long, infundibuliform, white with yellow bands and with a small purple eye; lobes apiculate. Capsules ovoid or globose, 2- celled, 4- valved. Seeds brown, velvety.

Fl. & Fr. : July - April.

Common among bushes in wastelands, hedges of fields and gardens and open forests .

## ***Ipomoea pallida* Sant. & Patel**

Glabrous or pubescent, twining herbs. Leaves 3.0-7.5 x 3-5 cm, triangular - ovate, cordate at base with rounded lobes or angular or sagittate to hastate at the base, acute or acuminate at the apex. Petioles with stipule like small leaves in their axils. Flowers white. Sepals 10-12 mm long. Capsules apiculate. Seeds densely tomentose.

Fl. & Fr. : August - November.

## ***Ipomoea pes - caprae* (L.) R. Br.**

Glabrous, perennial, prostrate or twining herbs, with long roots having thick brown bark. Leaves 4-6 x 5.0-7.5 cm, broader than long, deeply 2-lobed or rarely emarginate, fleshy, conspicuously parallel-veined, cuneate or truncate at the base. Flowers solitary or 2 to 3 together ; peduncles 2.5-12.0 cm. Bracts lanceolate, caducous. Two outer sepals oblong, obtuse, apiculate, smaller than inner; 3 inner ones elliptic - oblong, obtuse or emarginate, apiculate . Corolla tubular, infundi-buliform, pink - purple. Filaments dialated and hairy at the base. Capsules ovoid, glabrous. Seeds villous.

Fl. & Fr. : August - March.

Common in the desert area in sandy soils . It is a fast growing plant which may be propagated by vegetative means. It is a good soil binder.

## ***Ipomoea pes - tigridis* L.**

Common names: Tiger-foot morning glory,

Twining herbs, clothed with long spreading hairs. Leaves 3-10 cm in diam., rotundate in outline, palmately 5 to 9 - lobes; lobes elliptic oblong, hirsute. Flowers sessile, 3 or more in a head; peduncles as long or longer than petioles. Bracts 1.5-3.0 cm long, ovate - lanceolate, forming an involucre. Two outer sepals ovate - lanceolate, broader than 3 inner linear - oblong ones . Corolla tubular - campanulate, white or pale pink. Capsules ovoid, glabrous, enclosed in the calyx. Seeds 4, triangular, silky.

Fl. & Fr. : August - December.

Common weed in cultivated fields, grasslands and open jungles. Flowers open in the afternoon. It is a polymorphic species showing qualitative and quantitative variation in leaf character.

## ***Ipomoea sepiaria* Koen. ex Roxb**

Common names: Lakshmana, Manjika.

Twining, perennial or annual herbs. Leaves 3-8 x 3.0-5.5 cm, ovate, cordate to hastate or sagittate at the base, entire, acute or acuminate. Flowers in pedunculate subumbellate cymes; peduncles 2.5-15 cm long, thick Bracts lanceolate, caducous. Pedicels clavate in fruit. Sepals c.7 mm long, elliptic, apiculate,

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membranous - margined, 2 outer shorter than 3 inner ones. Corolla tubular - infundibuliform, pale - purple or white; lobes acute or shortly apiculate. Filaments hairy at the base. Capsules 5-7 mm in diam., globose, glabrous, 2-celled, 4-valved, 2 or 4-seeded. Seeds thinly pubescent.

Fl. & Fr. : August - December.

Occasional, among bushes along the roads and in wastelands.

## ***Ipomoea sindica* Sta pf.**

Common names: Sind Morning glory.

Trailing or creeping, hirsute herbs. Leaves 2-8 x 1-6 cm, oblong or ovate - cordate to triangular hastate or sagittate, entire. Flowers in axillary, 1 to few-flowered cymes. Bracts linear, hairy. Sepals lanceolate, dilated at the base, slightly enlarged in fruit, hispid. Corolla infundibuliform; with a tuft of hairs at the tip of each lobe. Capsules 5-8 mm in diam., globose or ovoid, glabrous. Seeds black, grey velvety.

Fl. & Fr. : August - November.

Common in wastelands and open forests among grasses and bushes. Closely resembles *I. eriocarpa* R. Br.

## ***Ipomoea sinensis* (Desr.) Choisy subsp. *Sinensis***

Twining herbs, clothed with long spreading hairs. Leaves 3-7 x 2.5-6.0 cm, ovate - cordate, acuminate. Flowers 1-3, on short axillary peduncles; pedicels about as long as peduncles. Bracts ovate - lanceolate or linear - lanceolate, acute. Sepals unequal, outer lanceolate - sagittate in fruit with obtuse auricles, the inner linear - lanceolate. Corolla upto 2.5 cm long, tubular, white, pilose outside. Capsules 0.8-1.2 x 0.7-1.0 cm, ovoid or globose, glabrous. Seeds 5-6 mm long, villous, fringed on the margins with soft, white hairs.

Fl. & Fr. : August - December.

Common among bushes in wastelands, open forests and edges of fields and gardens.

## ***Ipomoea trilobata* L.**

Common names: Little bell,

Hindi name: Shakkaria, Ratalu

Twining annual, upto 3 m long. Leaves 2.5-8.5 x 2.4-7.0 cm, broadly ovate - cordate, 3-lobed, entire to coarsely dentate margined; petioles 3 - 8 cm long. Flowers umbelled at the end of axillary peduncles about as long as petioles. Sepals lanceolate, acute. Corolla 0.8-2.0 cm long, pale to bright purple. Capsules ovate or subglobose, glabrous.

Fl. & Fr. : August - November.

Native of tropical America; rare, naturalized along the boundaries of gardens.

## ***Ipomoea turbinata* Lag.**

Twining herbs, with latex and muricated stem. Leaves 4-10 x 4-8 cm, ovate to suborbicular, cordate, acuminate. Flowers axillary. Solitary or 2-5 on short muricated peduncles; pedicels thickened. Bracts caducous. Sepals elliptic - oblong, aristate, 3 outer much broader than 2 inner. Corolla - tube upto 6 cm long, rose purple or white, hairy within. Anthers not twisted. Capsules 1.5 x 1.5-2.0 cm, globose, glabrous, 4-seeded. Seeds black, glabrous.

Fl. & Fr. : August - November.

Common on the edges of fields and in wastelands among bushes. Flowers open in the early night hours and fade away next morning. (Singh and Shetty 1987-1993)

## **Discussion**

The genus includes food crops; the tubers of sweet potatoes (*Ipomoea batatas*) and the leaves of water spinach (*I. aquatica*). *Ipomoea carnea* contain variety of bioactive components such as phenolic acid, alkaloids, flavonoids, coumarins and sterols 1-4. Also having an immense biological and pharmacological activities as an anti-inflammatory, (Khalid *et al.*, 2011) antioxidant (Adsul, 2012), antidiabetic (Abdul Latif, 2012), antimicrobial, wound healing, immunomodulatory, antifungal and hepatoprotective activities (Gupta, 2013) (Khan, 2015). Phytochemical analysis of *Ipomoea pes-tigridis* confirmed the presence of flavones, flavonols, bioflavonyls, hydrocarbons, auronones, tannins, terpenoids, glycosides and alkaloids in varying concentration which supports the authenticity of this plant in traditional medicinal uses (Selvam, 2017). The plants of this genus are rich in phenolics, glycolipids, lignans and alkaloids which are highly potent bioactive medicinal compounds. (Srivastava, 2017). Recent research has shown that these and many other plants of this genus *Ipomoea* possess medicinal potential in various diseases. It has been used in treatment of various ailments such as diabetes, inflammations, rheumatism, arthritis, kidney ailments, digestive disorders and constipation etc. their conservation is needed and also the knowledge of their utility so that their protection can be assured by local people. Agro-industrial effluent of Palm oil mills can be removed by treatment of *Ipomoea aquatica*, which is a new vision for future environmental cleaning (Farraji, 2017). *Ipomoea batatas* has also been reported to affect fertility (Uno, 2017) (Ekpo, 2018).

## **Conclusion**

Family Convolvulaceae is one of the most common families of dicots in the flora of Central Rajasthan. The genus *Ipomoea* has not been much investigated. The present biosystematical study aims at utilizing data from morphology, for a better taxonomic understanding and interrelationship of species of *Ipomoea*. The study will be useful to foresters, phytochemists and to those interested in biodiversity and conservational aspects of plants.

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