



Convolvulaceae: A Morning Glory Plant Review

Sakshi Yadav*, Atul Hemke, Milind Umekar

Department of Quality Assurance, Shrimati Kishoritai Bhojar College of Pharmacy, Kamptee, Dist-Nagpur 441002, India.

*Corresponding author's E-mail: atulhemke321@gmail.com

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ABSTRACT

The convolvulaceae family which is also known as a Morning Glory Plant is a very interesting plant family having a total 57 genera and about 1600 species. The plant of convolvulaceae contains a whole beautiful structure involving flower, leaves, stems etc. The family distribution is widespread across the globe, but individual species are often found in locales where they are alien species, acting as invasive to the local ecology or to productive agriculture. Herbs or shrubs, climbing; leaves alternate, simple, estipulate, rarely stipulate; inflorescence cymose; flowers actinomorphic, hermaphrodite, hypogynous; calyx 5, polysepalous; colrollagamopetalous, campanulate; stamens 5, epipetalous, alternipetalous, disc present; ovary bicarpellary, syncarpous, superior, axile placentation, generally two ovules per loculus; fruit capsule or nut. Chemistry of the Convolvulaceae Secondary metabolites and their contribution to the Classification Secondary metabolites are relatively small chemical constituents (small molecules) that perform nonessential functions in the plant. However, due to their varied range of bioactive potency in dependency on their chemical structure they may provide advantages. 85% of the "convolvulaceous continent" represents uncharted territory with regard to precise information on secondary metabolism. The plants of convolvulaceae family have economical and culinary importance.

Keywords: Morning glory, Migraine and Parkinson's disease, Rheumatism, Piles and Urinary disorders, Snakebite.

INTRODUCTION

Convolvulaceae, the morning glory family of flowering plants, If you have ever seen a morning glory blossom then you will know this family, which includes some 57 genera and about 1,600 species. The family is widespread in both tropical and temperate areas. Convolvulaceae may be defined as a family of twining vines, erect herbs, shrubs, or trees comprising the morning-glory family and having alternate leaves and regular pentamerous flowers with plaited corollas. The sweet potato (*Ipomoea batatas*) is an economic plant of the family, but the ornamental vines are used in horticulture; several species of bindweeds are agricultural pests. The seeds of two species, *Turbinacorymbosa* and *Ipomoea violacea*, are sources of hallucinogenic drugs of historical interest and contemporary concern. The family convolvulaceae is the major group of Angiosperm.^{1,2}

Division of the family and chief genera:

The family is divided into 2 sub-families as follows:

Convolvuloideae

The plants are autotrophic and bear leaves; cotyledons plicate. It includes 8 tribes, viz., Dichondreae, Dicanostyleae, Hidenbrandtieae, Convolvuleae, Poraneae, Ipomoeae, Argyrieae and Erycibrae.

Cuscutioideae

Parasitic members with reduced scale leaves; cotyledons are either absent or reduced; Cuscuta.

Description

The flowers are regular and bisexual with 5 separate sepals and 5 united petals. The corolla (petals) is often slightly twisted and may have a star pattern inside. There are 5 epipetalous stamens attached (stamens fused to the petals) at the base of the flower tube. The ovary is positioned superior. It consists of 2 (sometimes 3 to 5) united carpels (syncarpous) with the partition walls present, forming an equal number of chambers. It matures as a capsule with 1 to 2 seeds per carpel. The stems of these plants are usually winding, hence their Latin name (from *convolvere*, "to wind"). The leaves are simple and alternate, without stipules. In parasitic *Cuscuta* they are reduced to scales. The fruit can be a capsule, berry, or nut, all containing only two seeds per one locule.³ The total genera of convolvulaceae family are as follows:

Tribes

Convolvulaceae, a large family of worldwide distribution, exhibiting a rich diversity of morphological characteristics and ecological habitats, are now circumscribed within twelve tribes. According to the study of D. F. Austin, the family Convolvulaceae can be classified in the various tribes.⁴ They are as follows with their genera:



Table 1: Total Generas of Convolvulaceae family

Sr. No.	Genera	Sr. No.	Genera	Sr. No.	Genera
1.	Aniseia	20.	Epithimum	39.	Monogynella
2.	Argyreia	21.	Erycibe	40.	Neuropeltis
3.	Astripomoea	22.	Evolvulus	41.	Odonellia
4.	Baillaudea	23.	Exogonium	42.	Operculina
5.	Batatas	24.	Falkia	43.	Paralepistemon
6.	Blinkworthia	25.	Grammica	44.	Pharbitis
7.	Bonamia	26.	Hewittia	45.	Porana
8.	Breweria	27.	Hildebrandtia	46.	Poranopsis
9.	Breweriopsis	28.	Humbertia	47.	Quamoclit
10.	Calycobolus	29.	Ipomoea	48.	Rapona
11.	Calystegia	30.	Iseia	49.	Rivea
12.	Camonea	31.	Itzaea	50.	Seddera
13.	Convolvulus	32.	Jacquemontia	51.	Sedderopsis
14.	Cordisepalum	33.	Lepidostemon	52.	Stictocardia
15.	Cressa	34.	Lepistemon	53.	Strophocaulos
16.	Cuscuta	35.	Lysiostyles	54.	Stylisma
17.	Dichondra	36.	Maripa	55.	Thyella
18.	Dicranostyles	37.	Merremia	56.	Tridynamia
19.	Dinetus	38.	Metaporana	57.	Turbina

Table 2: Tribes of Convolvulaceae

Sr. No.	Tribe	Genera
1.	Aniseieae	Aniseia Choisy, Iseia O'Donell, Odonellia K. R. Robertson, Tetralocularia O'Donell
2.	Cardiochlamyaeae	Cardiochlamys Oliv, Cordisepalum Verdc, Dinetus Buch Ham, Poranopsis Roberty, Tridynamia Gagnep.
3.	Convolvuleae	Calystegia R. Br, Convolvulus L., Polymeria R.Br.
4.	Zribe Cresseae	Bonamia Thouars, Cladostigma Radlk., Cressa L, Evolvulus L, Hildebrandtia Vatke, Itzaea Standl. & Steyerem, Neuropeltis Wall, Neuropeltopsis Ooststr. Sabaudiella Chiov, Seddera Hochst, Stylisma Raf, Wilsonia R.Br.
5.	Cuscuteae	Cuscuta L. – dodder
6.	Dichondreae	Calycobolus Willd, Dichondra J. R. Forst. & G. Forst, Falkia Thunb, Metaporana N.E.Br, Nephrophyllum A. Rich, Porana Burm. F, Rapona Baill.
7.	Erycibaeae	Erycibe Roxb.
8.	Humbertieae	Humbertia
9.	Ipomoeaeae	Argyreia Lour, Astripomoea A. Meeuse, Blinkworthia Choisy, Ipomoea L, Lepistemon Blume, Lepistemonopsis Dammer, Paralepistemon Lejoly & Lisowski, Rivea Choisy, Stictocardia Hallier f, Turbina Raf
10.	Jacquemontieae	Jacquemontia Choisy
11.	Maripeae	Dicranostyles Benth, Lysiostyles Benth, Maripa Aubl.
12.	Merremieae	Decalobanthus Ooststr, Hewittia Wight & Arn, Hyalocystis Hallier f, Merremia Dennst, Operculina Silva Manso, Xenostegia D. F. Austin & Staples
13.	Incertae sedis	Pentacrostigma K. Afzel



Statistics

Till now most of the phytochemical studies are done with seeds, but in some studies it was observed that leaves contained maximum phytochemicals. Besides leaves are readily available in all stages of plants in comparison to seeds, which makes them easier to be exploited for the

same. Therefore, more detailed studies are needed to be carried out on leaves, also with regards to its quantitative estimation. The given statistics chart shows the presence of chemical constituents in stem and leaves of convolvulaceae family.⁶

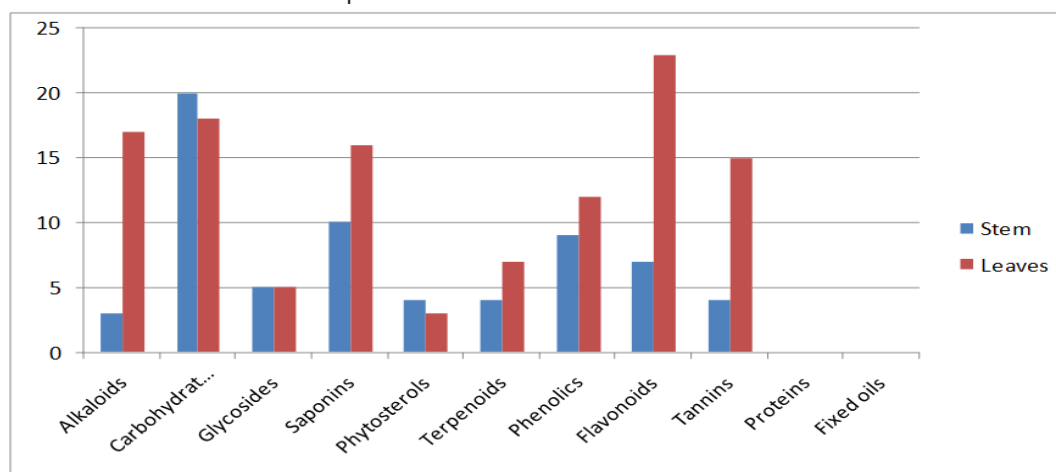


Figure 1: Chemical constituents present in leaves and stem part of Convolvulaceae family

History

Morning glory was first known in China for its medicinal uses, due to the laxative properties of its seeds. It was introduced to the Japanese in the 9th century, and they were the first to cultivate it as an ornamental flower. During the Edo period, it became very popular. The Japanese have led the world in developing varieties. Hundreds have evolved, such as a brownish coloured variant known as Dajuro, and varieties with such evocative names as 'Brocade of Dawn', 'Moon in the Dusk' and 'Wisteria Girl'. It has come to symbolize summer in Japanese horticulture and art. Ancient Mesoamerican civilizations used the morning glory species *Ipomoea alba* to convert the latex from the *Castilla elastica* tree and also the guayule plant to produce bouncing rubber balls. The sulfur in the morning glory's juice served to vulcanize the rubber, a process predating Charles Goodyear's discovery by at least 3,000 years. Aztec priests in Mexico were also known to use the plant's hallucinogenic properties.

Cultivation

In cultivation, most are treated as perennial plants in frost-free areas and as annual plants in colder climates, but some species tolerate winter cold. There are some species which are strictly annual (e.g. *Ipomoea nil*), producing many seeds, and some perennial species (e.g. *Ipomoea indica*) which are propagated by cuttings. Some moonflowers, which flower at night, are also in the morning glory family. Because of their fast growth, twining habit, attractive flowers, and tolerance for poor, dry soils, some morning glories are excellent vines for creating summer shade on building walls when trellised, thus keeping the building cooler and reducing heating and cooling costs. Popular varieties in contemporary western

cultivation include 'Sunspots', 'Heavenly Blue', the moonflower, the cypress vine, and the cardinal climber. The cypress vine is a hybrid, with the cardinal climber as one parent. Many morning glories will self-seed in the garden. They have a hard seed coat which delays germination until late spring, at which time they will grow and flower rapidly. To improve the germination of purchased seeds, soak them in a dish of warm water overnight before planting.

Distribution and Habitats

The family distribution is widespread across the globe, but individual species are often found in locales where they are alien species, acting as invasive to the local ecology or to productive agriculture. In many such cases herbicides are invoked to limit the propagation of some Convolvulaceae species. The Convolvulaceae have a cosmopolitan distribution but 90% of the species can be found in the tropics. The genus *Convolvulus* is present around the Mediterranean basin. *Calystegia* is very diverse on the West Coast of the USA with some species growing in Europe. *Ipomoea* and *Merremia* are most diverse in tropical America but they are also common in Africa and Asia. *Evolvulus* and *Jacquemontia* are primarily American. *Argyria* is a little known Asian genus.

In Africa we can find *Ipomoea*, *Merremia*, *Turbina*, *Operculina* but also endemic genera like *Astripomoea*, *Hildebrandtia*, *Nephrophyllum*. *Humbertia* is a very distinct monospecific genus endemic to Madagascar. In the South American tropical forest, as well as or in the African forests, we can find genera like *Calycobolus*, *Neuropeltis*, *Erycibe* and *Maripa*. This family contains many adventive species and the distribution is linked to human dispersal. Most morning glory flowers unravel into full bloom in the early morning. The flowers usually start

to fade a few hours before the "petals" start showing visible curling. They prefer full solar exposure throughout the day, and mesic soils. Some morning glories, such as *Ipomoea muricata*, are night-blooming flowers. In some

places, such as Australian bushland, some species of morning glories develop thick roots and tend to grow in dense thickets. They can quickly spread by way of long, creeping stems.⁶

The following image shows the distribution of convolvulaceae species around the world:-

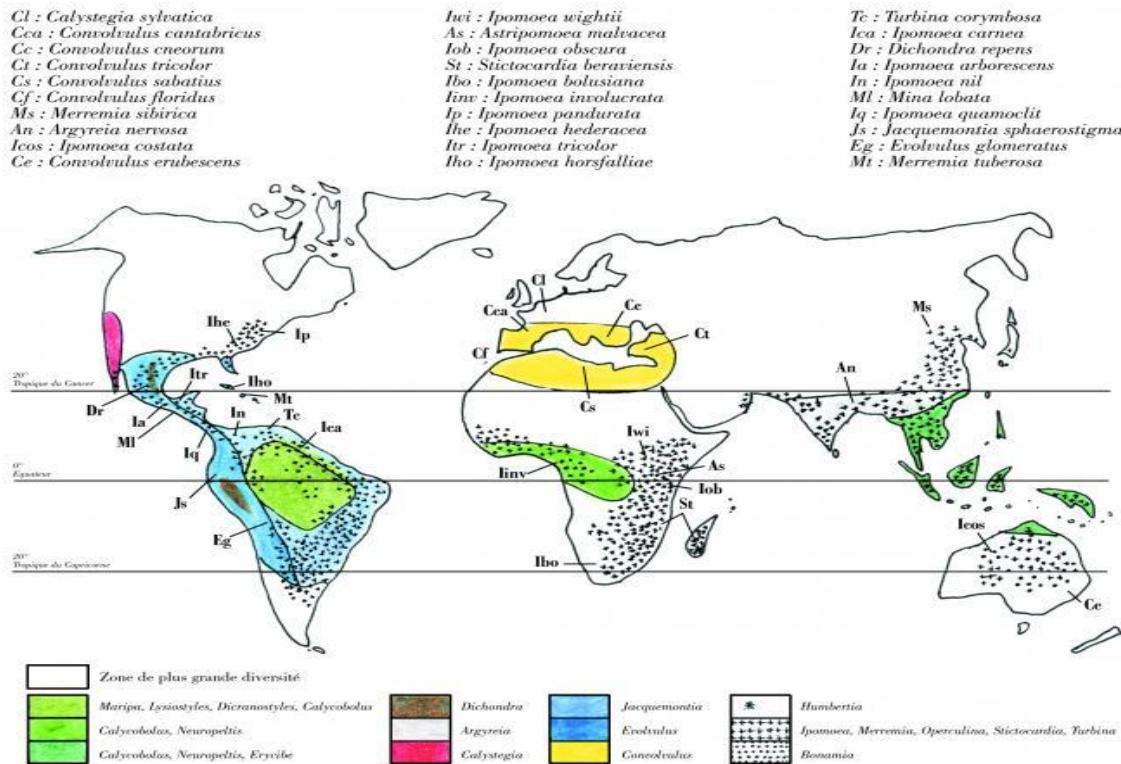


Figure 2: The distribution of convolvulaceae species around the world

Characters of Convolvulaceae

Vegetative characters

Habit

Herbs (*Convolvulus*, *Evolvulus*), shrubs and climbing (*Ipomoea*, *Argyrea*), the plants may be xerophytic, hydrophytic (*Ipomoea aquatica*) or parasitic (*Cuscuta*).

Root

Tap, branched, fleshy (*Ipomoea batatas*; H. Sakarkand). *Cuscuta* without ordinary roots but adventitious haustoria are present.

Stem

Erect, or prostrate, herbaceous, twiner (*Ipomoea* and *Cuscuta*), cylindrical, branched, solid or fistular, tuberous rhizomatous (*Convolvulus*).

Leaves

Alternate, simple, exstipulate, petiolate, entire or palmately lobed, or pinnately divided (*Quamoclit* pinnata), unicostate or multicostate reticulate venation.

Inflorescence

Solitary axillary (*Convolvulus*, *Evolvulus*) or cymes.

Floral characters

Flower

Bracteate, bracteolate, pedicellate, complete hermaphrodite, actinomorphic, pentamerous, (in *Hildebrandtia* the flowers are tetramerous, unisexual) and hypogynous.

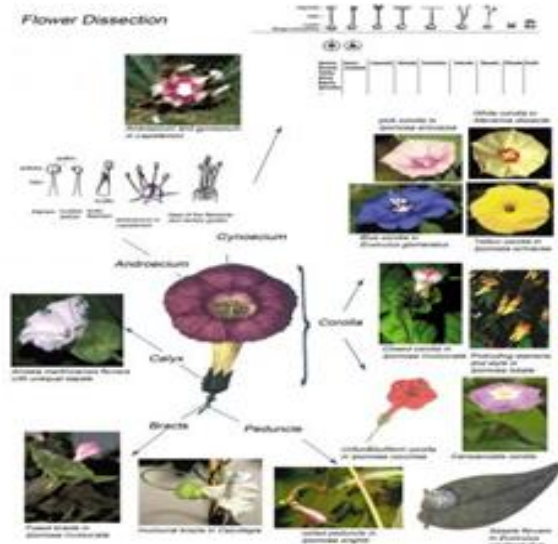


Figure 3: Flower of convolvulaceae

Calyx

Sepals 5, polysepalous rarely gamosepalous, persistent, imbricate, inferior.

Corolla

Petals 5, gamopetalous, campanulate or infundibuliform, imbricate, or valvate, inferior.

Androecium

Stamens 5, polyandrous, epipetalous, length of the filaments variable in the same flower; dorsifixed or basifixed, inserted deep in the corolla tube, ditheous and introrse.

Gynoecium

Bicarpellary, syncarpous, superior, situated on a disc, sometimes tetralocular, axile placentation, two or rarely one ovule per loculus; style simple, or two (*Cuscuta*), filiform, stigma capitate or bifid (*Convolvulus*, *Ipomoea palmata*).

Fruit

Capsule (*Convolvulus*, *Evolvulus*, *Cuscuta*) or berry.



Figure 4: Fruits in Convolvulaceae

A. 4-seeded dehisced casule in *Aniseia sp.*

B. Indehiscent fibrous fruit with acrescent sepals in *Stictocardiatiliifoli*

C. Indehiscent, crustaceous unilocular fruit in *Turbinacorymbosa*

D. Dehiscent capsule in *Ipomoea violacea*L

E. Indehiscent,woody fruit in *Dicranostyles mild*

Seed:-Endospermic



Figure 5: Seeds and cotyledons in *Dicranostyles*

A. Cross section of fruit showing a glutinous perisperm and profusely plicate cotyledons in *Dicranostyles mild braediana* Pilger.

B. Foliaceous, plicate cotyledons in *Dicranostyles mild braediana* Pilger

C. Longitudinal section of fruit showing a glutinous perisperm and profusely plicate.

Some primitive and advanced characters of convolvulaceae family are given in below table:

Table 3: Primitive and Advanced Characters

Sr. No.	Primitive characters	Advanced characters
1.	Presence of shrubs and woody climbers	Plants mostly herbs annual or perennial
2.	Leaves simple and alternate	Leaves reduced and scale-like in <i>Cuscuta</i>
3.	Solitary axillary inflorescence	Parasitic habit
4.	Flowers actinomorphic, hermaphrodite and hypogynous	Leaves exstipulate
5.	Calyx mostly free	Corolla gamopetalous
6.	Stamens polyandrous and ditheous	Number of stamens five; epipetalous
7.	Seeds endospermic	Gynoecium with two fused carpels

Morphology and Microscopy

Leaf anatomy: The leaf lamina dorsiventral, or bifacial (commonly isobilateral), or centric. Stomata mainly confined to one surface, or on both surfaces; paracytic (mostly), or anomocytic, or anomocytic and paracytic.

Hairs present (commonly represented by 2-armed trichomes, Y- or T-shaped forms, and forms with one to several short stalk cells and a long terminal one: see illustration). The mesophyll with sclerenchymatous idioblasts, or without sclerenchymatous idioblasts; containing crystals. The crystals druses and solitary-

prismatic. Minor leaf veins without phloem transfer cells (*Convolvulus, Ipomaea*).⁷

Axial (stem, wood) anatomy: Pith with diaphragms, or without diaphragms. Cork cambium present; initially superficial. Nodes are unilacunar. Primary vascular tissues at least usually in a cylinder, without separate bundles, bicollateral. Cortical bundles absent. Medullary bundles present (by development of xylem associated with the intraxylary phloem, resulting in inversely orientated bundles), or absent. Primary medullary rays narrow. The wood diffuses porous. The vessels are small to large. The vessel end-walls are simple, the axial xylem with tracheids and fibretracheids (in addition to tracheids), or without fibretracheids. 'Included' phloem present, or absent.⁷

Inflorescence, floral, fruit and seed morphology: Flowers solitary, or aggregated in 'inflorescences'; when aggregated, in cymes. The ultimate inflorescence unit is cymose. Inflorescences nearly always are simple or compound dichasia or a cincinnus with involucre bracts (often), or without involucre bracts. Flowers are bracteate; bracteolate or ebracteolate (e.g. *Wilsonia*); medium-sized, or large; regular to somewhat irregular. The floral irregularity involving the perianth.

Flowers usually have 5 merous; cyclic; tetracyclic. Free hypanthium absent and Hypogynous disk present; annular. *Perianth* with distinct calyx and corolla 10:2 whorled; isomerous, Calyx 5:1 whorled; polysepalous, or gamosepalous; persistent; imbricate; with the median member posterior. The corolla is 5:1 whorled; gamopetalous; valvate and plicate, or contorted and plicate; tubular (mostly, more or less), or campanulate, or urceolate; nearly always regular; not fleshy. The Fruits are fleshy, or non-fleshy; when synstylous, an aggregate, or not an aggregate. The fruiting carpels coalescing into a secondary syncarp to not coalescing. The fruiting carpel when synstylous, dehiscent, or indehiscent; nucular, or baccate. Fruit dehiscent, or indehiscent; a capsule, or a berry, anut, Capsules loculicidal, or circumscissile, or splitting.⁷

Seedling: Germination phanerocotylar.⁷ Chemistry of Convolvulaceae Secondary metabolites are relatively small chemical constituents (small molecules) that perform nonessential functions in the plant. In contrast to the (essential) primary metabolism of plants, which is more or less ubiquitously the same in the plant kingdom? Furthermore, phylogenetically related species often share a similar profile of more or less specific secondary metabolites or groups of such. Therefore, they may be also useful as additional characters in plants classification (chemotaxonomy). Secondary metabolites may be accumulated in all parts of the plant or only in specific organs, e.g., seeds or roots.⁹

Chemistry of the Convolvulaceae: Secondary Metabolites and their Contribution to the Classification are given as follows:-

1. Ornithine-Derived Alkaloid

- i. Simple Pyrrolidines
- ii. Nicotinoids
- iii. Calystegines
- iv. Simple tropane

2. 3-A-Acyloxy tropane

- i. Aliphatic esters
- ii. Simple aromatic esters
- iii. Prenylated aromatic ester
- iv. Phenylpropanoid ester
- v. Indolizidines

3. Pyrrolizidines

- i. Ipangulines and Minalobines
- ii. Retronecine derivative

4. Tryptophan-derived alkaloid

- i. β -carbolines
- ii. Ergolines

5. Phenylalanine-derived metabolite

- i. Cyanogenic glycoside
- ii. Phenylmethanoids
- iii. Hydroxycoumarines
- iv. Hydroxycinnamate conjugates
- v. Flavoids
- vi. Lignans & Neolignans

6. Terpenoids

- i. Sesquiterpenoids
- ii. Diterpenoids
- iii. Triterpenoids
- iv. Tetraterpenoids

7. Fatty acids & their derivatives

- i. Fatty acids as components of lipids
- ii. Fatty acid amide
- iii. Aliphatic
- iv. Resinglycosides

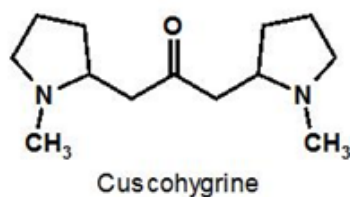
ORNITHINE DERIVED ALKALOIDS⁹

This type of alkaloids is generally shared with the sister family Solanaceae though frequently with individual variations with regard to their chemical structure



(qualitative difference). However, usually such constituents were accumulated in convolvulaceous

Simple Pyrrolidines (e.g., hygrine, cuscohygrine)



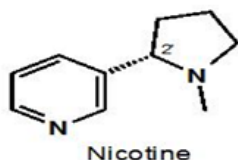
Distribution among the family

Detected in 9 tribes, in all 23 genera checked, and even in almost all of the corresponding species checked. [143 out of 150 species (95%)]; the remaining 3 tribes (Humbertieae, Cardiochlamyaeae, Poraneae) were not checked to date.

Chemotaxonomic relevancy

Significant marker for the family; plesiomorphic characters shared with the sister family Solanaceae; further (erratic) occurrence: different unrelated families throughout the plant kingdom, e.g., Erythroxylaceae, Brassicaceae, Rhizophoraceae.

Nicotinoids (predominantly nicotine)



Distribution among the family

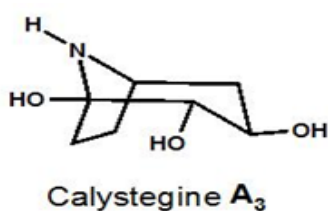
Detected in 99 out of 150 convolvulaceous species (66%) throughout the family in almost all tribes (Humbertieae, Cardiochlamyaeae, Poraneae not checked), almost all genera, and even almost all sections of large genera (*Ipomoea*, *Merremia*)

Chemotaxonomic relevancy

Nicotine (in very low Concentration) is a marker for the family; plesiomorphic character shared with the sister family Solanaceae; further (erratic) occurrence in single

e.g., Erythroxylaceae, Asteraceae.

Calystegines (Polyhydroxy-nortropans) [e.g., calystegine A3]



species in lower concentrations than in their solanaceous sisters (quantitative difference).

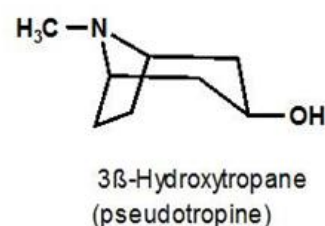
Distribution among the family

Detected in taxa of all tribes (i.e., including Humbertieae, Cardiochlamyaeae, Poraneae) except Cuscutaeae and in a wide array of genera (22 out of 29 genera checked); genera with a remarkable percentage of calystegine-positive species: *Erycibe*, *Ipomoea*, *Argyreia*, *Calystegia*, *Convolvulus*; calystegine-negative species checked: *Polymeria Operculina*, *Cuscuta*.

Chemotaxonomic relevancy

Significant markers for the family; plesiomorphic characters shared with the sister family Solanaceae; further (erratic) occurrence: Erythroxylaceae, Brassicaceae, Rhizophoraceae.

Simple Tropanes (e.g., 3 α -hydroxytropane [syn.: tropine]; 3 β -hydroxytropane [syn.: pseudotropine])



Distribution among the family

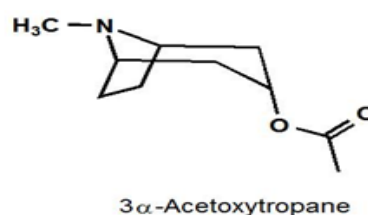
Detected in 9 tribes; the remaining 3 tribes (Humbertieae, Cardiochlamyaeae, Poraneae) were not checked; however, since taxa of these 3 tribes turned out to be calystegine-positive they also must be able to synthesize simple tropanes, because the latter are biogenetic precursors of calystegines. Thus, simple tropanes are metabolites in certain taxa of all 12 tribes. Furthermore, at least one simple tropane was detected in <95% of all species checked.

Chemotaxonomic relevancy

Significant markers for the family; plesiomorphic characters shared with the sister family Solanaceae; no consistent genus-typical trait for *Polymeria* and *Operculina*; further (erratic) occurrence: Erythroxylaceae, Brassicaceae, Rhizophoraceae.

3A-Acyloxy Tropane/Nortropane

Aliphatic esters (e.g., 3 α -acetoxytropane/-nortropane)

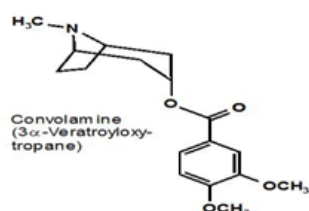


Distribution among the family

Frequent in the tribes Erycibae, Dichondreae, Cresseae; present in one third of the Ipomeeae species checked; rather rare in the Convolvuleae and Merremieae.

Chemotaxonomic relevancy

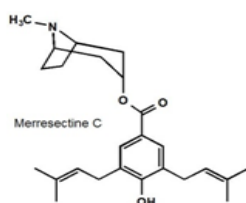
More or less suitable markers for certain tribes (no consistent genus-typical trait); plesiomorphic characters shared with the sister family Solanaceae.

Simple aromatic esters (e.g., convolamine/convolvine)**Distribution among the family**

Erratic occurrence in the genera *Erycibe*, *Bonamia*, *Maripa*, *Jacquemontia*, *Calystegia*, *Merremia*, and *Ipomoea*; more frequent: *Convolvulus*.

Chemotaxonomic relevancy

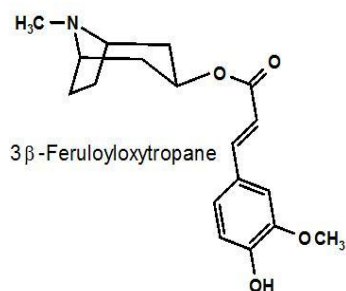
Apomorphic characters, unique occurrence in the plant kingdom; no consistent genus-typical trait.

Prenylated aromatic esters (merresectines) [merresectine C]**Distribution among the family**

Erratic occurrence in the genera *Dichondra*, *Bonamia*, *Evolvulus*, *Convolvulus*, *Ipomoea*; more frequent: *Merremia*.

Chemotaxonomic relevancy

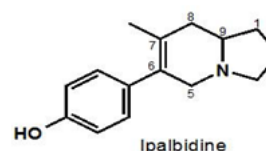
Apomorphic characters, unique occurrence in the plant kingdom; no consistent genus-typical trait.

Phenylpropanoid esters (e.g., 3 α -feruloyloxytropane)**Distribution among the family**

Erratic occurrence in the tribes Dichondreae, Cresseae, Maripeae, Convolvuleae.

Chemotaxonomic relevancy

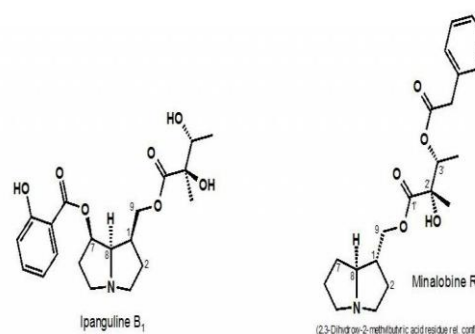
Plesiomorphic characters shared with the sister family Solanaceae; no consistent family-typical trait; further (erratic) occurrence: Erythroxyloaceae, Brassicaceae.

Indolizidines (e.g., ipalbidine)**Distribution among the family**

Only discovered in three *Ipomoea* spp.; not detectable in 150 further convolvulaceous species from altogether 24 genera checked

Chemotaxonomic relevancy

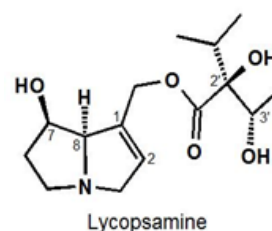
Apomorphic characters, unique occurrence in the plant kingdom.

Pyrrolizidine**Ipangulines and Minalobines****Distribution among the family**

Apparently confined to genus *Ipomoea* subgenus *Quamoclit* sect. *Mina*; no detectable in 150 further convolvulaceous species from altogether 23 genera checked.

Chemotaxonomic relevancy

Apomorphic characters, unique occurrence in the plant kingdom; consistent section-typical trait.

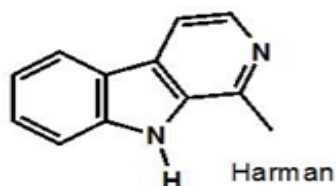
Retronecine Derivatives (e.g., lycopsamine)

Distribution among the family

Only discovered in two *Merremia* spp.; not detectable in 150 further convolvulaceous species from altogether 23 genera checked.

Chemotaxonomic relevancy

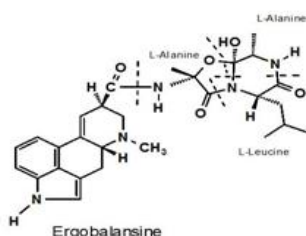
Further occurrence: different unrelated families throughout the plant kingdom.

Tryptophan-Derived Alkaloids **β -Carbolines (e.g., harman)****Distribution among the family**

Erratic occurrence detected in a few species of different genera.

Chemotaxonomic relevancy

No relevancy was there in this.

Ergolines (e.g., agroclavine, ergine, ergobalansine)**Distribution among the family**

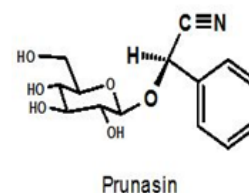
Unambiguous occurrence is confined to four genera belonging to the tribe Ipomoeae (*Argyrea*, *Ipomoea*, *Stictocardia*, *Turbina*).

Chemotaxonomic relevancy

No consistent tribe- and genus-typical trait; *Ipomoea*: infrageneric distribution of limited value, unambiguous Occurrence of ergolines in higher plants is confined to the Convolvulaceae and Poaceae.

Phenylalanine-Derived Metabolite / Phenyl Propanoids

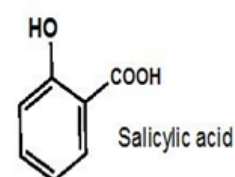
This class/group of metabolites is of less systematic interest; however, there are certain specific individual compounds of rare or even unique occurrence in the plant kingdom.

Cyanogenic glycosides (e.g., prunasin)**Distribution among the family**

No frequent constituents; detected in some *Merremia* and *Ipomoea* species as well as in one *Stictocardia* species.

Chemotaxonomic relevancy

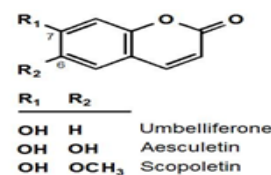
Widely distributed in the plant kingdom.

Phenylmethanoids (e.g., benzoic acid, salicylic acid)**Distribution among the family**

Presumably frequent constituents; detected in a no. of species of different genera.

Chemotaxonomic relevancy

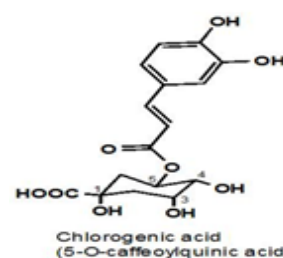
Further occurrence in many family.

Hydroxycoumarins (e.g., umbelliferone, aesculetin, scopoletin)**Distribution among the family**

Frequent constituents; detected in many species of numerous genera

Chemotaxonomic relevancy

Common constituents of plants.

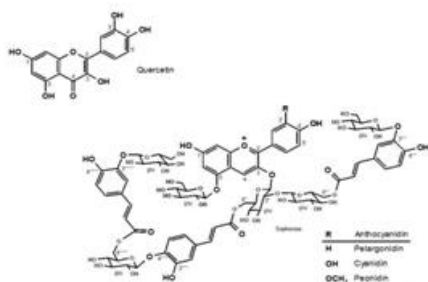
Hydroxycinnamate conjugates / caffeic acid derivatives (e.g., chlorogenic acid)

Distribution among the family

Distinctive tendency to accumulate such metabolites.

Chemotaxonomic relevancy

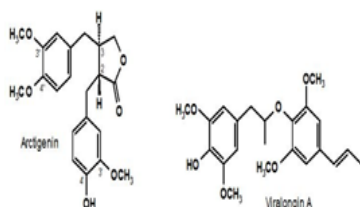
Taxonomic markers within *Cuscuta*, no further relevancy (common constituents in many families)

Flavonoids (e.g. quercetin, anthocyanins)**Distribution among the family**

Frequent constituents; detected in many species of numerous genera; anthocyanins (pigments) only checked within the genera *Calystegia*, *Evolvulus*, and *Ipomoea*.

Chemotaxonomic relevancy

Taxonomic markers within the genus *Cuscuta*, no further relevancy common constituents in many families.

Lignans and Neolignans (e.g., arctigenin and virolongin A, respectively)**Distribution among the family**

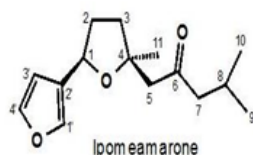
Erratic occurrence of lignans in the genera *Hewittia*, *Ipomoea*, *Jacquemontia*, *Merremia*, *Operculina* (neolignans: *Bonamiaspectabilis*).

Chemotaxonomic relevancy

Widely distributed in the plant kingdom.

TERPENOIDS (ISOPRENOIDS)

This class/group of metabolites is of less systematic interest; however, there are certain specific individual compounds of rare or even unique occurrence in the plant kingdom.

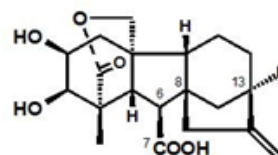
Sesquiterpenoids (C15 Isoprenoids) (e.g. ipomeamarone)**Distribution among the family**

Compounds of this type were discovered in some species as normal constituents or may be formed by a plant species only after a contact with a fungus.

Chemotaxonomic relevancy

Sesquiterpenoids are widely distributed in the plant kingdom; however, one subtype

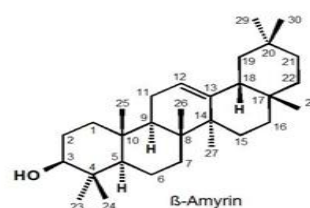
(furanosquiterpenoids) found in this family is rather rare.

Diterpenoids (C20 Isoprenoids) (e.g. gibberellin)**Distribution among the family**

Novel gibberellins could be identified in *Ipomoea nil* and *I. Alba*, respectively, whereas Novel kaurane-type diterpenoids were discovered in *Turbinacorymbosa* and *Merremia aurea* respectively.

Chemotaxonomic relevancy

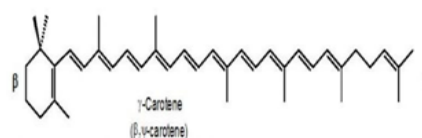
Widely distributed in the plant kingdom.

Triterpenoids (C30 Isoprenoids) (e.g., α- or β-amyrin)**Distribution among the family**

Occurrence detected in *Cressacretica*, *Ipomoea batatas*, *Ipomoea mauritiana*, *Ipomoea quamoclit*, *Argyriacapitata*, *Argyriaspiciosa*.

Chemotaxonomic relevancy

Further occurrence in many families.

Tetraterpenoids/Carotenoids (C40 Isoprenoids)**Distribution among the family**

Reported from *Cuscuta australis*, *Cuscuta salina*, *Cuscuta subinclusa*, *Ipomoea aquatica*, *Ipomoea batatas*, *Ipomoea hederifolia*, *Ipomoea pes-caprae*.

Chemotaxonomic relevancy

Widely distributed in the plant kingdom.

Fatty Acid and their Derivatives**Fatty Acids as Components of Lipids****Distribution among the family**

Seeds of species from this family usually contain about 10% fatty oil; occurrence reported on a remarkable number of taxa.

Chemotaxonomic relevancy

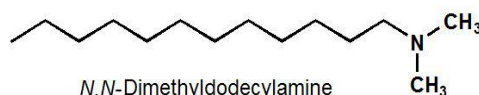
Widely distributed in the plant kingdom.

Fatty Acid Amides {e.g., palmitoylamide, erucamide}**Distribution among the family**

Occurrence detected in *Evolvulus glomeratus*, *Ipomoea plebeia*, *Operculinariedeliana*; not detectable in 150 further convolvulaceous species from altogether 23 genera checked.

Chemotaxonomic relevancy

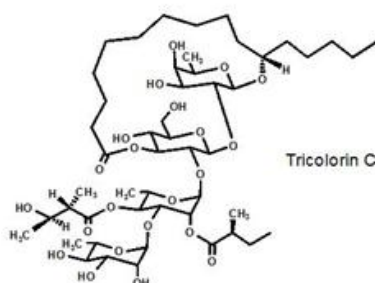
common in some plants.

Aliphatic N-Mono- and N,N-Dimethylamines (e.g., N,N-dimethyldodecylamine)**Distribution among the family**

Erratic occurrence Detected in the tribes Cresseae, Aniseieae, Convolvuleae,

Chemotaxonomic relevancy

Distributed is many Plants.

Resin Glycosides (Glycoresins) [e.g. Tricolorin C]

Resin glycosides are complex molecules characterized in general by three components: (i) Hydroxy fatty acid, (ii) An Oligosaccharide (Formed by 2 – 7 specific monosaccharide units, e.g., glucose, rhamnose), and (iii) Short-chain aliphatic acids and long-chain fatty acids. (i) and (ii) are linked to each other forming a so-called glycosidic acid which as a consequence of specific cyclization provides a acrolactone.

Distribution among the family

Occurrence proved including structural elucidations of components in 34 species belonging to the genera *Calystegia* *Convolvulus* *Cuscuta* *Merremia* *Operculina* *Ipomoea*. It should be added that there are reports on the occurrence of resins in several further *Convolvulus* spp. and *Ipomoea* spp. respectively, without any structural elucidation of their components.

Chemotaxonomic relevancy

Significant markers for the family; apomorphic characters.

Economic Importance**Food**

Tuberous roots of *Ipomoea batatas* (Sweet potato) are rich in starch and edible. Root stock of *Calystegiasepium* are cooked and eaten. The leaves of *Ipomoea aquatica* are used as vegetable.

Medicinal

Due to the purgative property of latex, several species are used as medicine (Exogynumpurga). *Ipomoea hederacea* yields Kaladana. Leaves of *Ipomoea pescarpae* are boiled and applied externally in case of colic while decoction in used as a blood purifier and in bilious disorders. *Ipomoea paniculata* is considered good for rejuvenation, *Merremia tridentata* is used in rheumatism, piles and urinary disorders.

Weed

Convolvulusarvensis, *Evolvulusalsinoides*, are the common weeds. *Cuscuta* is a parasite and ruins many types of plants.

Ornamental

Ipomoeabiloba, *Convolvulus*, *Porana*, *Calystegia* and *Quamoclit* are cultivated as ornamentals.

Medicinal Uses

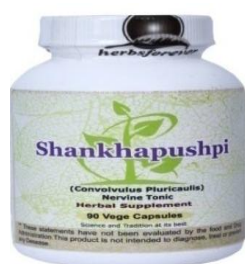
Ipomoea aquatica, known as water spinach, water morning glory, water convolvulus, *ong-choy*, *kang-kung*, or swamp cabbage, is popularly used as a green vegetable, especially in East and Southeast Asian cuisines. In the USA *Ipomoea aquatica* is a federal noxious weed, and can be illegal to grow, import, possess, or sell without permit. However, a market exists for the plant's powerful culinary potential. : USDA weeds factsheet.

As of 2005, the state of Texas has acknowledged that water spinach is a highly prized vegetable in many cultures, and has allowed water spinach to be grown for personal consumption, in part because it is known to have been grown in Texas for more than 15 years and has not yet escaped cultivation.

The genus *Ipomoea* also contains the sweet potato (*Ipomoea batatas*). Though the term "morning glory" is not usually extended to *Ipomoea batatas*, sometimes it may be referred to as a tuberous morning

glory in a horticultural context. Some cultivars of *Ipomoea batatas* are grown for their ornamental value, rather than for the edible tuber.

Fruits of *Maripa* are eaten by humans and other vertebrates (e.g., bats, bird, and monkeys) because of the sweet glutinous material surrounding their seeds; in the Guianas they are called "Monkey Syrup". Because most genera are somewhat poisonous, Many are used medicinally. Several American *Ipomoea* and one *Turbina*, became famous in the 1930s and 1940s because of their hallucinogenic alkaloids used in religious context by indigenous peoples. The original ergoline alkaloids and their derivatives, originally from *Claviceps purpurea* Tul. (Clavicipitaceae), are still used medicinally in obstetrics, and to treat migraine and Parkinson's disease.













Some species such as the "Mary's bean" (*Merremia discoid sperma*) were long thought to have miraculous healing powers because of the "cross" on their surface. In Mexico these seeds are sold as "tomatemarino" and touted as "cures" for hemorrhoids, circulation problems, varicose veins, and high blood pressure. The treatment is achieved by carrying two seeds in a small bag after drinking water in which they floated overnight. Others consider the seeds a treatment for snakebite. People hold other beliefs about several other species. Figure 6 is the example of *Convolvulus Pluricaulis*.






Some Examples of Convolvulaceae Family Plant

The convolvulaceae family have various species some are describe here with their species (common name), genus, images, chemical constituents and uses. They are listed are as follows:

Table 4: Some examples of convolvulaceae species

Sr.No	Genus	Species	Image	Chemical constituents	Medicinal use
1.	Ipomoea	Ipomoea lacunose		Ergot type alkaloids	Hallucinogenic Diabetes mellitus
2.	Ipomoea batatas	Sweet potato		Beta carotene (provit.A) carbohydrates vit.C, m agnese	Dye for cloth food coloring
3.	Convolvulus	Convolvulus arvensis		α –amyrin, βsitosterol, rutin, escul etin	Cancer ,dandruff wounds

4.	Cuscuta	Cuscutareflexaroxb.		A –pinene, 2-carene, limonene, β -phellandrene	Osteoporosis , strengthening of liver and kidney
5.	Calystegiasepium	Calystegiasepium		Calystegine –alkaloids	Cancer diabetes
6.	Ipomoea aquatic	Water spinach		Phenol, tannin, soluble carbohydrates, cyanogenic glycosides	Cough , opium and arsenic poisoning
7.	Calystegia	Calystegia		Alkaloids	Purgative Cholagogue Febrifuge
8.	Argyrea nervosa	Elephant creeper		Ergolinerine, fatty acids, chanoclavine	Adaptogenic, antimalarial, antioxidants.
9.	Dichondrarepens	Dichondrarepens		Tormentic acid, skimming, uracil	Astringent, anti-inflammatory
10.	Evolvulusalinoides	Evolvulusalinoides		Caffeic acid	Epilepsy, ulcer

11.	Turbine corymbosa	Turbine corymbosa		Ergot alkaloids, lysergol	Apathy
12.	Evolvulusnutt alianus	Shaggy dwarf morning glory		Covolvulin, alkaloids	Antibacterial
13.	Cressa cretica	Cressa		Quercenticressatetrai acantanonic acid	Urinary discharge and anthelmintic
14.	Bonamia	Bonamia		Triterpenoidsphenols	Antitumor, leucopenia, hemostatic
15.	Rivea	Midnapore creeper		Polysaccharides, flavonoids Iridoid	Analgesic, weak antibiotic

CONCLUSION

There are millions of plants available in whole world with their specific genera and family, the Convolvulaceae family is one out of the different families of the plants present across the world. The convolvulaceae is the *morning glory* plant which is having a wonderful feature with characteristic importance. This family having around 1600 species and for study of the different kind of plants of this family, we need to require the one complete data on this. This Review will help to research scholars to go deep in this area as plant indicate the vast range of phytochemical related to origin and the chemistry. Because it goes by so many names, it can easily be slipped through import inspections, and it is often available in Asian or specialty produce markets. This review is a merging data of number of information which is spread here and there. The family distribution is widespread across the globe, but individual species are often found in locales where they are alien species, acting as invasive to

the local ecology or to productive agriculture. This morning glory contains various chemicals and having varieties of importance, therefore this review will help in the upcoming research work related to convolvulaceae family species.

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