



## Morphological studies in selected species of *Ipomoea* Linn

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### Abstract

*Ipomoea* is the largest genus of the family Convolvulaceae which consist of nearly 1650 species among which 150 species are from India. They are herbs, shrubs or usually twinning. The present study intended to analyse qualitative and quantitative morphological features of five selected species of genus *Ipomoea* species shows ecological variations. For the morphological analysis plant accessions are collected from different regions of Kerala. The collected plant accessions are conserved in the green house of the college garden. Plant specimens were identified by using the flora, morphological analysis was carried out by using observation and measuring techniques. The observation of the study revealed that certain qualitative characters have similarity among five selected species of *Ipomoea* and some other character shows variation from species to species and accessions especially the colour of corolla and quantitative characters.

**Keywords:** *Ipomoea*, morphology, qualitative and quantitative characters, ecological variation

### Introduction

To build up a natural system of classification of plants, it is necessary to compare the parts like stem, leaf, root, flower, fruit, and seeds. These superficial examinations are helpful for identifying and classifying the different plants. The phenotype of a taxon is unique and this uniqueness itself is a clear identifying feature for taxon. Any data which shows difference from species to species are of taxonomically significant (Stace, 1989) [13]. Morphological features have great advantage because they are easily observable and appreciate variability with much more facility than other kinds of features. Detailed morphological analyses of both inter and intra-specific variation is essential for the characterization of a species since the magnitude and pattern of morphological variations for a particular species are usually valuable. The variant forms might simply be the ecological or geographical race of a species even they be provided with a species or varietal status. Morphological characters, especially floral characters are of primary importance in the classification of higher plants.

The family Convolvulaceae consist of 55 genera and 1650 species, distributed in the both tropical and temperate region of the world. About 20 genera and over 150 species have been reported from India (Rajia Sultana, 2016) [11]. Convolvulaceae may be considered as family of twinning vines, erect herbs, shrubs or trees comprising the morning-glory family and having alternate leaves and regular pentamerous flowers with plaited corolla (Sakshi *et al.*, 2018) [12]. The family is an important a source of food, drugs, ornamentals (Rajia Sultana 2016) [11]. The genus *Ipomoea* have approximately 500-600 species, comprises the large number of species (Austin and Huaman, 1996) [2]. The genus *Ipomoea* occurs in the tropics of world and some of the species also reach to temperate zone (Cao, *et al.*, 2005) [4]. Over half of the species are concentrated in the America where the total 500 taxa mostly native are present and a few are introduced. Although there are recent publications dealing with *Ipomoea* in the floras of several

American countries (O'Donell, 1959; Austin, 1957; Austin and Cavalcanto 1982; Mc Donald and Mabey, 1992; Wilkin 1995) [1, 3, 7, 14]. There is no single reference summarizing all the species currently recognized in the Western hemisphere. The present investigation tries to analyse qualitative and quantitative morphological features of five selected species of genus *Ipomoea* which shows ecological variations.

### Materials and Methods

*Ipomoea* is the largest genus of the family Convolvulaceae and consist of herbs, shrubs or usually twinning. The species such as *I. carnea*, *I. purpurea*, *I. hederifolia*, *I. quamoclit* and *I. aquatica* shows ecological variations. For the morphological analysis plant accessions were collected from different parts of Kerala. The collected plant accessions were cultivated in pots filled with soil from the collection sites and are kept in Botanical garden of the college and dried plant specimens were also preserved in the form of herbarium for further references. Plant specimens were identified by using plant identification flora. The present study mainly concentrates on the morphological features, especially qualitative and quantitative features of the five selected species. In order to know morphological diversity with relation to ecological changes, plant accessions were collected from different areas of Kerala. About thirty accession of each plant species were analysed. Variation in the quantitative and qualitative morphological features were observed and measured directly.

### Observations and Discussion

The present study deals with the analysis of morphological features with regards to ecological changes of five selected species of *Ipomoea*. All qualitative and quantitative morphological characters were observed. The significance of these morphological characters is helpful for establishing the phylogenetic relationship and their taxonomic in future analysis. For morphological analysis plant accessions were collected from different areas of Kerala. The present study

deals with the morphological features of five selected species of *Ipomoea* Linn. showing ecological variations. All quantitative and qualitative morphological characters of accessions collected from different areas were studied. The quantitative features such as length of leaf, sepals, corolla, stamen, carpel, breadth of leaf, sepals, corolla, stamen, carpel and weight of seed shows considerable variations. The qualitative features such as colour of corolla and stamen

shows remarkable variations in different accessions of different areas. The qualitative feature, corolla colour shows remarkable variation in different ecological regions, *I. carnea* shows changes from pink to rose meanwhile, *I. hederifolia* had blood red to pure red, the species such *I. purpurea* and *I. quamoclit* shows slight variation and *I. aquatica* recorded pink to purple (Table:1).

**Table 1:** Qualitative and quantitative morphological features observed in different accessions *Ipomoea*

Characters observed	<i>I. carnea</i>	<i>I. purpurea</i>	<i>I. hederifolia</i>	<i>I. quamoclit</i>	<i>I. aquatica</i>
Habit	Erect, Shrub	Twiner, completely clothed with spreading hairs	Well branched vine	Vine	Branched creeper, normally floating
Nature of Stem	Branch lets hollow	Herbaceous	Obtusely four gonous branches	Quadrangular herbaceous	Hollow
Shape of entire Leaf	Broadly ovate, simple, ex-stipulate	Ovate	Ovate	Pinnatifid, stipular	Sagitate to lanceolate
Length of Leaf (cm)	22.3±15.1	11.3±5.9	12.3±5.1	12.3±4.1	5.1±12.1
Breadth of Leaf (cm)	10.1±4.1	8.6±3.5	11.1±4.1	12.3±3.1	3.1±8.1
Shape of Leaf apex	Atteunuate	Acuminate	Acute	Acute	Clef
Shape of Leaf margin	Entire	Entire	Entire	Entire	Entire
Shape of Leaf base	Lobate	Lobate	Lobate	Truncate	Lobate
Texture of Leaf	Alternate	Alternate	Alternate	Alternate	Alternate
Nature of flower/Inflorescence	Solitary/ Cyme	Solitary	Cyme	Solitary	Axillary cyme
Number of Sepals	5	Large, 3 Small, 2	5	5	5
Nature of Sepals	Poly-sepalous	Poly-sepalous	Poly- sepalous, base jointed persistent and reduced	Poly-sepalous	Poly-sepalous, persistent, imbricate, inferior.
Length of Sepals (cm)	2.1±0.9	Large, 3.4±1.3 Small, 2.1±1.3	2.5±0.8	1.1±0.8	2.5±0.8
Breadth of Sepals(cm)	1.2 ±0.6	Large, 0.9±0.2 Small, 0.6±0.3	0.9±0.1	1.1±0.3	1.1±0.5
Colour of Corolla	Pink to Rose, inner dark pink	Rose with white throat	Blood red to pure red	Cream with a purple throat	Pink to Purple
Shape of Corolla	Com-panulate	Tubular	Salver form	Salver form. slightly funnel shaped	Funnel shaped
Nature of Petals	Gamo-petalous twisted aestivation	Gamo-petalous	Gamo-petalous	Gamo-petalous	Gamo-petalous
Length of Corolla (cm)	12.1±8.1	10.3±6.1	8.5±4.3	9.5±4.1	3.5±1.5
Breadth of Corolla (cm)	10.5±7.2	8.7±4.3	7.3±2.6	4.5±2.3	11.5 ±1.5
Number of Stamens	Large, 2 Small, 3	5	5	5	5
Nature of Stamen	Free, epipetalous, dithecous, hairy	Free, epipetalous, basifixed	Free, epipetalous	Filament unequal, epipetalous, dithecous, introse	Free, epi-petalous
Length of Stamen(cm)	Large 5.5±1.3 Small 3.5±0.5	5.4±2.2	3.9±1.1	6.1±1.3	3.3 ±1.3
Colour of Anther	Yellowish -White	Yellowish	Yellowish-White	Reddish -White	Whitish
Number of Carpel	4	3	4	3	4
Length of Carpel(cm)	0.9±0.1	1.1±0.3	1.4±0.1	1.8±0.2	0.5±0.3
Number of Locule	4	3	2	3	4
Placentation	Axial	Axial	Axial	Axial	Axial
Nature of Ovary	Superior and Syncarpous	Superior	Superior	Superior Syncarpous	Superior
Nature of Style	Simple and terminal	Simple	Simple	Simple	Simple
Nature of Stigma	Bifid	Trifid	Simple	Bifid capitates	Bifid
Nature of Seed	Smooth without hair	Glabrous without hair	Oblong puberatus	Black pubescent glabrous	Broadly trigonous
Number of Seeds	4	3	4	3	4
Nature of Seed wall	Hard	Thin	Thin	Thin	Thin
Length of Seed(cm)	1.3±0.4	1.1±0.2	0.9±0.1	0.8±0.1	0.5±0.1
Breadth of Seed(cm)	1.1±0.4	0.9±0.2	0.7±0.1	0.8±0.1	0.3±0.1
Weight of Seed(gm)	8.1±4.3	5.2±3.3	5.2±2.4	6.2±4.6	1.0±1.5

Nature of Fruit	Loculicidal Capsule	Capsule	Loculicidal Capsule	Globose, capsule septa thin, persistent	Capsule
Flowering Seasons	Throughout the year	Throughout the year	October to December	Throughout the year	September to December

Rabei, *et al.*, (2012) <sup>[10]</sup> in their try to establish a conventional key for Convolvulaceae in the flora of Egypt, they studied general morphology of different plants. The available characters are recorded as well as some micro-morphological characters and pollen and seed characters. They use DELTA programming in their study for building keys. Three keys to 44 species belonging to the family Convolvulaceae in the flora of Egypt are prepared to facilitate the identification of those species, based on 72 characters. Manos and Miller (2001) <sup>[6]</sup>, studied the phylogenetic analysis of *Ipomoea*, *Argyreia*, *Stictocardia* and *Turbina*, suggests a generalized model of morphological evolution in morning glories. Mondal, *et al.*, (2006) <sup>[8]</sup>, studied morphological variation of ten *Ipomoea* species of Bangladesh. Morphological variations among all the ten species of *Ipomoea* were observed both qualitative and quantitatively. Thirteen quantitative characters were taken into consideration and their mean values were compared statistically. Kumar and Dhar (2011) <sup>[5]</sup> conducted the epidermal studies in the selected for *Ipomoea*, it has been revealed that the leaves of all the species show paracytic stomata, of the 16 species investigated, 13 show eglandular and branched trichomes, whereas remaining species are completely devoid of these.

### Conclusions

In the present investigation, certain characters are similar among the five selected species of *Ipomoea* and some other character varies from species to species especially the colour of corolla. The number and nature of stamens are similar in all the species. Even if it is comes under in single genera the five species of *Ipomoea* showed a remarkable variations in morphological characters among the species. Some quantitative characters like length of corolla, breadth of corolla, length of carpels, length of stamens, length of seeds, breadth of seeds and weight of seeds shows considerable variations among the species of different accessions of different ecological area.

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