

**Chapter I**

***INTRODUCTION***

## Introduction:

“The Sky is blue and Earth is Green  
Fresh air is sandwiched between them”

Our mother Earth is green due to the plants. These plants give us fresh air i.e. O<sub>2</sub>. The plants are classified into Algae, Fungi, Bryophyte, Pteridophytes, Gymnosperm and Angiosperm, among which flowering plants are major in number, they play a major role in shaping world civilization as well as biodiversity. Biodiversity is of fundamental importance for human society. About 3 lakh species of flowering plants belonging to different families are present in India. In Maharashtra 217 families with about 5040 species are present.

Family Convolvulaceae comprising 56 genera and about 1650 species, primarily of tropics and subtropics extending in the North and South temperate regions, particularly abundant in tropical America and tropical Asia.

The Convolvulaceae members show variations in all plant parts. Tubers are found in the genus *Ipomoea* and *Merremia*, stems mostly woody (hollow in *Argyreia*) and wide range of variation in leaf is observed such as simple to compound. All the members of Convolvulaceae have bisexual flowers except for the unisexual in African *Cladostigma* and *Hildebrandtia*. There is great diversity in the form of the leaves, which are generally petiolate and exstipulate. Scaly leaves protect the buds on subterranean shoots. The leaf margin is entire, often with a hastate or cordate base, or the blade is more or less deeply digitately or pinnately lobed. Stomata mostly Rubiaceae type, rarely Cruciferous type in *Evolvulus* and *Hildebrandtia* or Ranunculaceae type in *Cressa*. Inflorescence is either terminal or axillary or found at both positions. Inflorescence varies from solitary flowers to complex clusters of flowers derived from dichasia. In this family a wide range of flower size is observed, the smallest flowers have less than 1 cm across (*Dichondra*), whereas the *Ipomoea alba* (9-15 cm long) has the largest flower. The flower shows all the usual floral organs, sepals free, with quincuncial aestivation, the outer often larger than the inner, persistent. They show considerable variation in size, shape and covering, affording valuable systematic characters; they are smooth, warty or variously hairy, orbicular or more or less elongated. Corolla gamopetalous, generally entire or slightly five lobed, and induplicate-valvate and twisted in the bud. Corolla shape varies from rotate to bell-shaped to funnel-shaped to salver-shaped. Stamens attached to the base of corolla tube

tuberculate surface. Also there is a wide range of colour variation in seed from creamy-yellow to orange to brown to black colour. Members of Convolvulaceae show round or triangular or elongate shaped seeds.

Hallier (1893) divided the family into two groups echinoconeae (spiny pollen) and psiloconeae (comparatively smooth pollen). Recent phylogenetic evidence supports the conclusion that the echinoconeae are monophyletic (Austin 1998). These groups are subdivided into several tribes. Since the 1890s most of the people have recognized tribes Argyreieae, Convolvuleae, Cresseae, Dichondreae, Erycibeeae, Hildebrandtieae, Ipomoeae, and Poraneae as tribe. The placement of genera in tribes, however, has changed considerably in the past 30 years as morphology of the species has become better known (Austin 1973, Sebsebe and Austin 1996).

Systematic position of family according to different workers is as follows, according to Englerian scheme the family forms part of the large order Tubiflorae. Bentham and Hooker put this family as order Convolvulaceae, in cohort Polemoniales in series heteromerae. Rendle (1930) separated it for this group and elevated it as separate order Convolvales. Bessey (1955) treated it under his order Polemoniales. Lawrence (1951) treated the family with more or less the same circumscription of Engler. Hutchinson (1959) treated the Convolvulaceae under his order Solanales and higher than Solanaceae. Cronquist (1968) and Takhtajan (1969) include it in their order Polemoniales. Dahlgren *et al.* (1979) included it in super order Solaniflorae under order Solanales. According to APG system (1998) of classification, systematic position of family Convolvulaceae is Eudicot; core Eudicot; Asterid; Euasterid I; Solanales. Several authors have suggested that family Convolvulaceae is closely related with Solanaceae, while others nominate the Polemoniaceae or Boraginaceae. A new study suggests that the Hydrophyllaceae may be closer to the Convolvulaceae than either of these (Austin 1998). (Cited from the text Books of V. N. Naik, Gurucharan Singh, Mondal and Rendle.)

In India the family is represented by 20 genera and 180 species. The Convolvulaceae is dominated by twining or climbing woody or herbaceous plants that often have heart-shaped leaves and funnel-shaped flowers. Although the members of family show wide range of morphological variation, such as erect, creeping, herbs, climber (*Porana* is large woody climber) and rarely shrubs (*Rivea* is climbing shrub) or trees (*Humbertia madagascariensis* in Madagascar) and ecological habitats (Aquatic plant is *Ipomoea aquatica*, Xerophyte like *Hildebrandtia*). Plants of this

- To survey and collect members of Convolvulaceae from Western Ghats of Maharashtra and allied area.
- Critical account on their morphology and distribution.
- To study pollen morphology with the help of SEM.
- To make chromosome counts for some species.
- To study seed germination and biochemical characterization.

It is planned to review the results of pertinent investigations carried out previously as well as to highlight the important observations made in the present study in the succeeding chapters.

### **Economic, ornamental and medicinal uses:**

Perhaps the oldest use for the family is as a purgative. Many species were famous and became called 'jalap,' after the original source *Ipomoea jalapa*. This intestinal use persists in many places. Chemicals involved with alimentary stimulation, and other actions, are resins, calystegines, tropinone, hygrine alkaloids, pyrrolizidine alkaloids, coumarins (umbelliferon and scopoletin), and hydroxycinnamic acid alkyl esters (hexadecyl p-coumarate and octadecyl p-coumarate)

The 'sweet potato,' 'camote,' 'batata,' or 'yam,' (*Ipomoea batatas*) is the world's 7<sup>th</sup> largest food crop. Although of New World origin, this species is now eaten through the world, with China growing about 80% of the crop. The tuberous lateral roots are rich in starch and sugars forming the sweet potato. Tubers are eaten, boiled, steamed, baked, fried and boiled with rice. When its supply is short mashed after being steamed in to a delicacy, or dried after being boiled for later use. Chopped and dried tubers are boiled with rice or ground in to flour, which is mixed with wheat flour and made in to cake or bread. When refined sweet potato starch is obtained, it is used variously in food industry; especially in the manufacture of dextrose and brewery of liquors. Some varieties contain rich vitamin A in tubers. Leaves are eaten as vegetable like *I. aquatica*. Leaves and stems of *Ipomoea eriocarpa* are eaten as vegetable. Young shoots of *Ipomoea companulata* are eaten in curries. Roots and stems of *Ipomoea pes-caprae* was used as food in famine; but the large amount of plant parts are more or less poisonous. The rootstalk of *Calystegia sepium* is also

introduced in to gardens, and it is naturalized in Maharashtra. *I. cairica* an American species planted in gardens and homes as hedges, or on walls for ornamental purpose. It is commonly known as railway-creeper. *Ipomoea indica*, which is native of Tropical America grown in gardens. *I. purpurea* native of American tropics, probably Mexico cultivated for their attractive flowers. *I. quamoclit* native of Mexico cultivated for ornamental value. *I. horsfalliae* is cultivated in gardens for its beautiful flowers. *Jacquemontia coerulea* native of South America cultivated in gardens for its beautiful flowers. *Merremia tuberosa* native of Tropical America mostly cultivated in gardens or as escape along hedges. It is commonly known as wood-rose.

The whole plant of *Evolvulus alsinodes* is used for medicinal purpose, externally; the medicated oil of the herb is useful as a hair tonic, to promote the hair growth. Its paste is also used externally in skin diseases. Sankhapushpi hair oil prevents the premature graying and falling of hair. Internally, the plant is used in vast range of diseases. The whole plant juice is traditionally used in various mental disorders. Leaves are made in to cigarettes to be smoked in cases of chronic bronchitis and asthmas. As one of the best psychotropic drugs, the ancient sages of India held sankhapushpi in high esteem. In Chota Nagpur, the bark of *Erycibe paniculata* is given for cholera. *Rivea ornata* in Konkan used for piles. In Hindu medicine root of *Argyreia nervosa* is regarded as alternative tonic and useful in diseases of nervous system, the powdered root is mixed with vinegar, the sap is rubbed over the body to reduce obesity. The seeds of *Ipomoea muricata* in Konkan used internally and externally in the treatment of *Echis carianata* bites. They are also applied externally in guinea-worm; In Chota Nagpur due to their bitter nature, powder is taken to cure fever. The juice of whole plant is used to destroy bugs. In Bombay the leaves of *Ipomoea quamoclit* are used as a lep for carbuncles. The leaves of *Ipomoea mauritiana* enrich the blood. The large tuberous roots are very much used in medicine as tonic, lactagogue. The powdered rootstalk is given with wine, for the purpose of increasing secretion of milk. The powdered root is used in spleen disease; it is purgative in its action. The root enters in to snake remedies but it is not an antidote to snake-venom. Not is it an antidote to scorpion-venom, though recommended for use in the treatment of scorpion sting. The root of *Ipomoea pes-tigridis* is purgative. It is also used for boils and carbuncles, and in the treatment of dog-bite. In western India the flowers of *Operculina turpethum* are applied to the head in hemicrania. In Ceylon, the tuberous roots are used as a purgative and considered a good substitute for Jalap.