

**Chapter VI**

***DISCUSSIONS***

## Discussions:

## Taxonomy:

Biodiversity is having of fundamental importance for human society. Plants provide food, cloths and shelter to human being. Majority of biodiversity exist in tropics. India is one of the 8<sup>th</sup> hottest hotspot of world. About 3 lack species of flowering plant belonging to different families are present in India. Our Western Ghats is one of the hotspot of India. In Maharashtra there are 217 families with about 5040 species are present. (Sardesai and Yadav, 2004) Each family has its own significance in plant world.

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. In India the family is represented by 20 genera and 180 species. The members of family show wide range of morphological variation, such as erect, creeping, twinning herbs and rarely shrubs. In Maharashtra family Convolvulaceae is represented by 16 genera and about 75 species including 4 species endemic to Maharashtra which are belonging to endangered and critically endangered categories (Mishra and Singh, 2001).

In present study 35 species were collected viz. 21 species of *Ipomoea*, 5 species of *Merremia*, 4 species of *Argyreia* and single species from *Bonamia*, *Convolvulus*, *Jacquemontia* and *Stictocardia* from Western Ghats of Maharashtra. From above studied plants *I. aquatica* is aquatic and remaining plants are observed on terrestrial habitat. Most of them are climbers and twinners. *Argyreia cuneata* and *Ipomoea carnea* subsp. *fistulosa* shows erect shrubby habit. *Ipomoea batatas*, *Ipomoea mauritiana*, *Merremia rhyncorhiza* and *Merremia tuberosa* are tuberous plants. Leaves show variation such as simple to compound type with different shapes. *Ipomoea arachnosperma* is distinct due to its wooliness of leaf at lower surface. Also *Ipomoea pes-caprae* is distinct due to its bilobed leaves. Flowers show variation in size, shapes and color. Flowers of *Ipomoea eriocarpa* are small among present studies species; whereas flowers of *Ipomoea alba* is larger in size. Calyx is aristate in *Ipomoea alba* and *Ipomoea turbinata*, whereas tuberculate calyx is observed in *Ipomoea marginata* forma *candida*, *Ipomoea marginata* forma *marginata*, *Ipomoea obscura* forma *obscura* and *Ipomoea triloba* and remaining *Ipomoea* species shows

zonocolpate or 4-zonocolpate or 5-zonocolpate or 6-zonocolpate to pantoporate types of pollen grains as compared with other families of order Tubiflorae.

Convolvulaceae is characterized by two main pollen morphotypes. The exine surfaces of the pollen grains are either provided with excrescences (spinose or verrucose) and other without excrescences. Those pollens, which are with spinulose or spinose, are mostly pantoporate, while others pollen grains, which are without spine are either 3-zonocolpate or 4-zonocolpate or 5-zonocolpate or 6-zonocolpate.

In SEM studies the pollen surfaces shows wide range in exine ornamentations. There are two major groups i.e. spinulose and nonspinulose pollen grains. Among studied pollen grains *Argyreia*, *Ipomoea* and *Stictocardia* are spiny while the pollen grains of *Bonamia*, *Convolvulus*, *Jacquemontia* and *Merremia* are not spiny. In *Argyreia* the pollen grains are pantoporate. The spines show blunt ends with bulbous base. In *Ipomoea* the pollen grains are pantoporate. The spines show variations in the shape. Some are with bulbous base or some are with gradually tapering towards ends. The Spine ends are pointed, rounded or blunt. The pollen grains of *Ipomoea* are divided in to three groups viz.

- A) *Ipomoea* I type: Spines small; with blunt ends.
- B) *Ipomoea* II type: Spines long with blunt/rounded ends.
- C) *Ipomoea* III type: Spines long with pointed ends.

Some times in the *Ipomoea staphylina* and *Ipomoea turbinata* pair of spine are observed. In *Ipomoea aquatica*, *Ipomoea batatas*, *Ipomoea cairica*, *Ipomoea campanulata*, *Ipomoea carnea* subsp. *fistulosa*, *Ipomoea hederifolia*, *Ipomoea marginata* forma *candida*, *Ipomoea marginata* forma *marginata*, *Ipomoea nil*, *Ipomoea quamoclit*, *Ipomoea triloba* the spines and bacula around each extraporal region form a distinct hexagonal area. The pollen grains of *Stictocardia* are pantoporate, spine bulbous at base and gradually tapering towards ends, with blunt ends.

The pollen grains of *Bonamia semidigyna* are tricolpate, exine is reticulate to foveolate. The pollen grains of *Convolvulus arvensis* are tricolpate and exine is reticulate. The Pollen grains of *Jacquemontia paniculata* are 5-zonocolpate, exine is foveolate slightly granular; granules are very small, spine like with pointed tip. In the gnus *Merremia* the pollen grains are 3-zonocolpate or 4-zonocolpate or 5-zonocolpate or 6-zonocolpate, exine is foveolate and granular. In *Merremia tuberosa* the granules are very small with pointed tip. The similar results were reported by Nair and Rehman

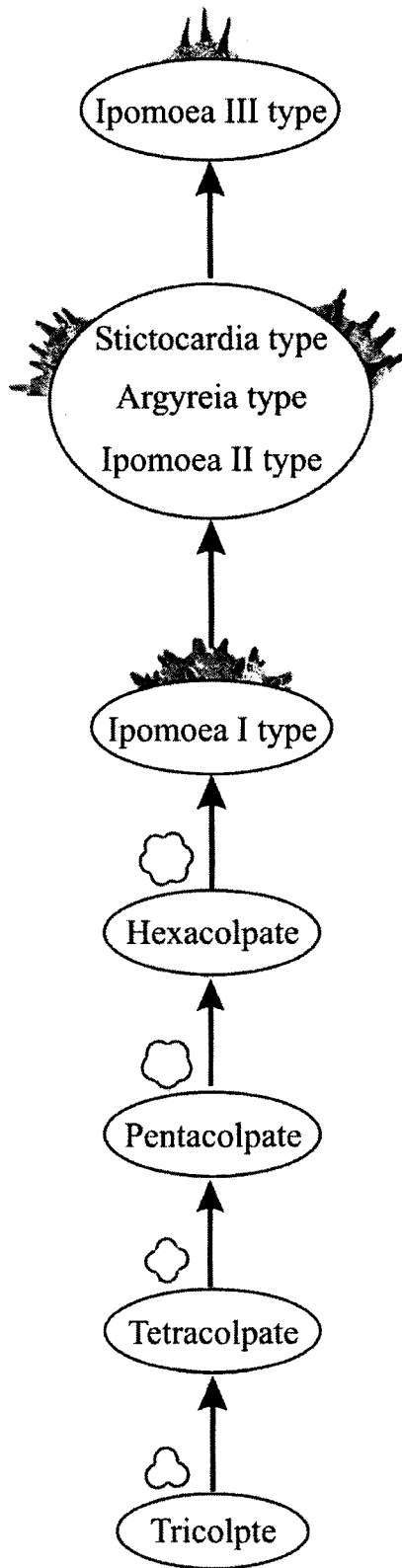


Fig. 1: Evolutionary trend in pollen grains of Convolvulaceae

earlier worker; Sharma and Datta (1958), Nakajima (1963), Jones (1964), Hsu (1967), Sampathkumar (1969, 1979), Miege and Josserand (1972) and Vij *et al.* (1974, 1977).

### **Seed morphology:**

The plants having larger seeds are considered to be primitive. They are mostly perennials and woody. In the present study it was observed that seed size of *Merremia tuberosa* is largest whereas seed size of *Jacquemontia paniculata* is smallest one. The seed color ranges from black to yellow to brown to gray in *Ipomoea*, *Bonamia* and *Jacquemontia* respectively, whereas in case of *Merremia* seed color ranges from black to orange-brown to creamy-yellow to whitish-gray.

Similar findings are supported Das *et al.* (1995), Naik (1998), Singh *et al.* (2001), Almeida (2001) and Yadav and Sardesai (2002). Govil (1971) found that seeds of Convolvulaceae species are characterized by pad like structure present between funiculus and micropyle. The similar results were found in the present study.

### **Seed germination:**

The process of seed germination leads eventually to the development of the embryo in to a seedling. During the seed germination study hypogeal germination was found in the *Merremia tuberosa* while in other species it was epigeal in nature, in which the cotyledons are above the ground and usually photosynthetic. Though the cotyledonary leaves in the Convolvulaceae have very significant value in identification during their germination stage. In present investigation cotyledonary leaves of 14 species encompassing 3 genera have been studied. Depth of lobing and venation pattern is the important character in taxonomical studies. It is clear that small seeds have small cotyledonary leaves as in *Jacquemontia paniculata*, whereas large seeds have large cotyledonary leaves but germination must be epigeal except in *M. tuberosa*. The cotyledonary leaves are wrinkled in *Ipomoea alba* and nearly wrinkled in *Ipomoea campanulata*. In *Ipomoea alba*, *Ipomoea campanulata*, *Ipomoea turbinata* and *Jacquemontia paniculata* the leaves are nearly lobed. Cotyledonary leaves of most of the species are lobed and depth of lobes and shape of lobe is different in different species i.e. just below or just above  $\frac{1}{2}$  or  $\frac{1}{3}$  or  $\frac{1}{4}$ . The nerves are distinct in each species but its branches are not distinct in each species. The leaves of *Ipomoea*