## PREFACE

The "gourd family" Cucurbitaceae is a moderately large family of about 118 genera and 825 species (Jeffrey 1990). Members of this family occur mostly in the tropical region, only a few are represented in the temperate regions of the two hemispheres, but all species are frost-sensitive. The plants are chiefly tendril climbing or prostrate annual herbs or occasionally perennials. They are either monoecious or dioecious with extremely rapid growth. The family is of considerable economic importance on account of its edible fruits. Most of the edible species are cultivated throughout India. The wild species belonging to genera like Trichosanthes, Momordica, Mukia, Diplocyclos and Citrullus are used as sources of biomedicines in indigenous systems. This also adds to the economic importance of the family.

The family is characterised by its synandrous stamens with conduplicate anthers. The leaves are simple and mostly 3 - 5 lobed. Flowers are actinomorphic, epigynous and pentamerous, arising solitary or borne in inflorescence from axils. Corolla is polypetalous or sympetalous. Stamens basically 5 in number but usually 3, of which 2 are two locular and one, unilocular. Ovary is inferior with numerous ovules arranged on parietal placenta. Fruit is usually a berry, dehiscent or indehiscent.

Bentham and Hooker (1867) described the family as comprising of 68 genera and 470 species, while Hutchinson (1967) recognised about 1280 species in 126 genera. In Flora of British India, Clarke (1879)

enumerated 71 species belonging to 29 genera. Elaborate accounts on Indian Cucurbitaceae are found in the Monograph on Indian Cucurbitaceae and in the Fascicles of Flora of India II (Chakravarty 1959, 1982). The most recent comprehensive account of the family in the Indian subcontinent was published by Jeffrey (1980a). He has listed 90 species under 37 genera of which 24 genera occur in South India.

Though considerable work has already been done on the taxonomy and interrelationships of the family, many points of disagreement and dispute still exist. It is essential to have more objective methods other than the use of data from comparative morphology for ascertaining the phylogenetic relationships and to work out the classification of the family. During recent decades experimental taxonomists have adopted several new criteria to form a much more broad based experimental and evolutionary approach to classification. During the present investigation data from cytology, palynology, leaf surface characters and hybridization studies were collected to interpret the phylogeny and taxonomy of the family. The results are presented in the following parts.

**Part I - Cytological studies:**

In this part data on 41 taxa belonging to 33 species under 19 genera are presented. Various aspects of cytological evolution in the family such as evolution of basic chromosome numbers and the role of polyploidy and aneuploidy in speciation and evolution are discussed.

**Part II - Palynological studies:**

Palynological data on 39 taxa of 32 species representing 19 genera are presented here. Various pollen characters such as aperture, exine ornamentation, pollen size and shape and their evolutionary significance are discussed.

**Part III - Foliar epidermal studies:**

This part embodies the study of leaf surface characters such as the structure of stomata, stomatal density and distribution, epidermal cell wall patterns and trichomes of 39 taxa of 32 species coming under 19 genera. The significance of these characters in establishing the phylogenetic relationships in the family at the generic, specific and infraspecific levels is discussed.

**Part IV - Hybridization studies:**

Details of two intergeneric crosses, six interspecific crosses and seven infraspecific crosses are presented in this part. Cytomorphology of the hybrids obtained is also studied. The results are utilized to discuss the interrelationships and evolutionary patterns among the domesticates.

The interrelationships and taxonomy of various species and genera in the family are reviewed in the light of the evidences gathered in this study.