INTRODUCTION

The members of the family Malvaceae are represented in all regions of the world except for the very cold ones. The family comprises of 88 genera and 2300 species, most of them found to be distributed in warm temperate and tropical countries (Hutchinson, 1967). The knowledge of the genus 'Gossypium' dates back to the old civilization.

The genus Gossypium along with other members of modern Malvaceae were grouped together under 'Columniferae' (one of the natural groups) by Linnaeus in his publication 'Philosophia Botanica' (1763). Thereafter De Jussieu (1789) recognized the family Malvaceae, which was properly classified by Bentham & Hooker (1862). Taxonomists like Masters (1868); Schumann (1890); Warming (1895); Edlin (1935); Hutchinson & Dalziel (1958); Exell & Meeuse (1961) have studied the members of the family in greater details and further classified them into various defined categories. The views expressed by them concerning delimitation of various taxa are different. In recent past, evidences gathered from the works in other disciplines viz. floral anatomy - Rao (1952) and Ahuja (1964), pollen morphology - Prasad (1963), Chaudhuri and Malik (1965) do not

show a consensus and support to one or the other classification proposed. Kearney (1951), while working with American genera of Malvaceae has remarked "The family offers many problems to the taxonomists. Opinions differ, especially as to where to draw the line between genera and between tribes". All these different view points when viewed as a whole, create confusion regarding the delimitations of various taxa (groups) within the family.

Today's taxonomy is not just a science of recognition of similarities and dissimilarities between the individuals with common characters and geographic distribution. There is now a growing consciousness among the workers to interpret a large number of anomalies which crept into the so-called "Natural classification" of seed plants. Answer for which must naturally be sought in the experimental sciences, variously known as Experimental Taxonomy (Clements and Hall, 1920), Genecology (Turresson, 1923), Biosystematy (Camp and Gilly, 1943) and Synthetic Taxonomy (Turrill, 1954).

The role of cytology in modern approaches to taxonomy (cytotaxonomy) forms an outstanding feature and is best exemplified by classical works of Babcock (1942) in

Crepidineae, Goodspeed (1954) in Nicotiana, Chennaveeraiah (1960, 1962) in Aegilops etc. and a similar attempt has been made in the present work. The taxonomic situation of different taxa in the family Malvaceae, together with its economic importance (fibre-yielding), demands a thorough cytological study of its members for better understanding of their phylogeny.

The cytological work in the family has been attempted by a number of workers, prominent among them being Youngman (1927); Hutchinson (1931); Davie (1933); Skovsted (1935, 1941); Purewal and Randhawa (1947); Thombre (1959); Sharma and Sharma (1962); Menzel and Wilson (1961, 1963); Menzel (1966); Bates (1965, 1967); Chennaveeraiah and Subbarao (1965); Bates and Blanchard (1970); Singh and Khoshoo (1970); Hazra and Sharma (1971- a and b); Kachecheba (1972) and Wise (1973). Most of the earlier works were confined to reports of chromosome numbers of various taxa, though the cultivated or ornamental taxa were worked out in detail. There is no consensus in the conclusions drawn regarding the basic number or numbers and the envisaged phylogenetic relationships in these works.

A perusal of literature on the taxonomy and cytology of the family indicated the need of detailed studies, keeping in view the population concept of a species.

In the present work an attempt is made to understand the phylogenetic relationships of the allied taxa and to evaluate their systematic positions as understood at present. A comparative study will lead to a better understanding of the probable course of evolution followed for speciation in the different genera selected. The scrutiny of different populations will also help to detect the existence of ecotypes or cytotypes within the species, which may be of some help in better understanding the infrageneric and infraspecific taxa created by taxonomists solely on morphological criteria.

The present work is confined to the study of 18 species belonging to 7 genera, and 4 varieties of Hibiscus sabdariffa. The genera Hibiscus, Abelmoschus, Azanza, Thespesia belonging to the tribe Hibisceae and Urena, Pavonia, Malachra belonging to the tribe Ureneae are selected, which are commonly available in Gujarat and adjoining States. Taxa belonging to two different tribes are selected for comparison and better understanding of the delimitation of the tribes.

The present investigation was planned as follows :-

I) The populations of selected genera and species were collected from different localities and habitats. These were, then grown in identical conditions to see the morphological behaviour of these populations, and compare them with earlier observed morphological features. Striking morphological characters and their variations encountered in different populations of a taxon, are represented by polygraphs and a polygram, for simultaneous expression of similarities and dissimilarities.

II) A detailed karyotypic analysis and meiotic behaviour of all the populations, yielded useful data for comparison of allied taxa and for detecting cytotypes or ecotypes within the circumscription of the species under investigation. The data concerning chromosome numbers and morphology gathered, were used for comparison and for better understanding of the phylogeny as well as the probable course followed for speciation.

III) Apparent pollen fertility was determined for each population.

IV) Along with these, estimation of total DNA, and

protein was carried out for most of the species investigated(Appendix).

All the above mentioned aspects of the study are presented in the following pages in different parts of the thesis.

The first part includes the methods adopted and materials used for the taxonomical, polygraphic and cytological studies.

The second part deals with taxonomical studies which includes a brief history of the family, its taxonomic position, delimitations of tribes, genera and species as suggested by different taxonomists. The genera and species selected for the present investigation, are arranged following Schumann's treatment as modified by Hutchinson (1967). The necessary nomenclature (recent name, basyonyms and synonyms) and the morphological description of individual species (taking into consideration the different populations) are given. Wherever necessary, the variations observed in different populations are subjected to polygraphic studies.

In the third part, cytological observations pertaining to somatic and pollen mother cells for each species and its

populations are described. The present observations are compared with the earlier available cytological investigations for a species.

Along with the data of karyomorphological differences, the exomorphological variations observed in different populations of a species are taken into consideration to detect the existence of ecotypes or cytotypes present if any.

A uniform categorisation based on length and arm ratios of chromosomes has been followed for better comparison of the karyotypes of allied tribes, genera and species selected.

At the end of this part, the phylogenetic relationship and the probable course of evolution has been discussed at length. On the basis of previous works and the present observations the basic number or numbers for the family, tribes and genera are discussed.

In summary and conclusions the observations made in the present work and their importance for understanding the phylogenetic relationships at various levels of classification are given.