

Introduction

Family Liliaceae (including Amaryllidaceae) as defined by Cronquist (1981) consists of about 280 genera and nearly 4000 species, wide spread throughout the world, but most abundant and varied in fairly dry, temperate to subtropical regions. In recent classifications the family is segregated into as many as 21 families which indicate the diversity of the family, but the mutual affinity among all the members is also widely recognised and accepted. Hutchinson (1958) divided family Liliaceae into 28 tribes and family Amaryllidaceae into 13 tribes, however, Cronquist merges later family with Liliaceae (1981).

Many members of Liliaceae are familiar garden or indoor ornamentals. Species of Amaryllis, Aspidistra, Chionodora, Convallaria, Galanthus, Gloriosa, Hemerocallis, Hippeastrum, Hosta, Lilium, Hyacinthus, Muscari, Narsissus, Ornithogalum, Scilla, Trillium, Chlorophyton, Tulipa etc. are grown as ornamentals. Similarly species of Asparagus and Allium are cultivated for food. The bulbs of Camassia were a favorite food of Western Amerindians. Many Lilies are highly poisonous. Zigadenus has the approximate common name of death Camas, and Veratrum has been identified as the cause of a congenital deforming in lambs. Species of Urginea, Allium and Asparagus have medicinal value.

Among monocotyledons family Liliaceae is found to be very ideal material for various types of studies especially cytology (Taylor, 1925, Newton, 1927, Raghvan, 1935, Sato, 1942, Jones and Smith 1967-68), Palynology (Nair and Sharma, 1965, Diez and Pastor, 1984) and embryology (Davis, 1966). A fund of research work on various aspects of Liliaceae has been carried out.

Scilloideae (=Hyacinthaceae) of Liliaceae is characterized by tunicated bulbous habit and forms very ideal material especially for cytological and embryological studies. Therefore members of Scilloideae have received considerable attention by number of Workers (Sato, 1942; Wet, 1952; Maugini, 1960; Pienaar, 1963; Jones and Smith, 1967; Oyewole, 1971, 1975, 1984; Jessep 1972, 1977; Fluetten, 1973; Sen, 1973, 1974; Jha and Sen, 1983; Naik 1973,74,76,83; Vosa, 1980; Nersveen, 1983; Stedje, 1982; Stedje and Nordal, 1985, 87; Dixit and Yadav, 1989; Yadav and Dixit, 1990 etc.)

Genus Dipcadi Medik belong to Scilloidae. It is represented by about 30 species distributed in Africa, Madagascar, Socotra, Mediterranean region and India (Dyer, 1976) however, according to Willis (1973) there are about 55 species of the genus. The difference in number of species is most probably due to recognition of species

as there are no good qualitative characters for delimiting species and most of the species are recognised on the basis of quantitative characters (bad characters). The greatest diversity in the genus is found in Africa South of the Sahara and South Africa is, therefore, probably a centre of dispersal (and Origin?) for this genus (Stedje and Nordal, 1987).

Genus Dipcadi is represented in India by about 9 species out of which 3 are endemic to the country (Deb and Dasgupta, 1981). The endemic taxa include D. concanense, D. saxorum and D. ursulae, all of them are endemic and restricted to Maharashtra. Indian species of Dipcadi centre around Deccan Peninsula from Maharashtra to Tamil Nadu and extend through Rajasthan to Kashmir, Himachal Pradesh and Uttar Pradesh in the north and Pakistan in the West and through Madhya Pradesh to Orissa in the east.

All the Indian species of Dipcadi have short lived aerial shoot in monsoon season. Taxonomy of Indian species has based on exomorphic character alone. Even the most recent taxonomic treatment on Indian species of Dipcadi by Deb and Dasgupta (1981) is based on Characters such as leaf length and breadth, length of Scape, number of flowers per inflorescence, relative lengths of bracts, pedicel nature

etc. All the species of Dipcadi behave as monsoon perennials which sprout out by the beginning of monsoon and complete their life cycle within about two months. The growth and development of aerial parts is largely controlled by time and amount of precipitation together with dry spell between the two showers and edaphic factors. This obviously leads to great variation in quantitative characters of the species which makes it difficult to delimit various taxa on the exomorphic characters.

Due to rarity and short span of aerial shoots and difficulties involved in collection of species little work has been done on few populations of Indian species of Dipcadi. Cytology of 4 Indian species viz. D. montanum ($2n = 20,12,10$) D. saxorum ($2n = 12,14$), D. ursulae ($2n = 20$) and D. concanense ($2n = 12$) has been worked out (Mahabale and Chennaveeraiah, 1954, 1961; Naik, 1974, 1983; Kanmani, 1975; Dixit, et al. 1991). So far cytology of D. erythraeum, D. maharashtrensis, D. minor and D. reidii have remained unexplored. Work on the embryology of few species of Dipcadi has been done by Schnarf (1931), Eynus (1950), Cave (1953), Wunderlich (1937), Buchner (1948), Chennaveeraiah and Mahabale (1959, 1961).

Literature survey shows that the genus Dipcadi have received little attention. Most of the work is related to

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Cytology and embryology. Similarly the specific delimitation in the genus is difficult to make as it is based on quantitative characters which vary with precipitation and edaphic factors.

In present investigation, therefore, attempts have been made to study characters of plants species growing in Maharashtra both in field and botanical garden. The plant species were grown in approximately similar climatic, edaphic and irrigation condition. Attempts have been made to study exomorphological features, cytology, palynology, scape and leaf anatomy and cuticle of all the species growing in Maharashtra. The thesis is divided into five chapters.

The Introductory Chapter - I incorporates the introduction to the subject.

Chapter - II - deals with review of literature in which extensive survey of literature on Liliaceae in general and scilloidae and genus Dipcadi in particular have been done.

Materials and methods are described in Chapter-III.

Chapter - IV - forms a main part of the thesis which incorporates data on detailed field observation,

external morphology, distribution of different species in Maharashtra, Cytological studies, scape and leaf anatomy, cuticular studies of species found in Maharashtra and embryology of D. concanense.

In Chapter - V - the result are discussed with reference to relevant and pertaining literature.

Finally Summary and Conclusions are given at the end of discussion.

Detailed references are cited in Bibliography at the end of thesis.

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