Review of Literature

REVIEW OF LITERATURE :

The family commelinaceae as defined by cronguist (1981), consists of about 50 genera and 700 species, wide spread through out world, but most abundent in tropical and subtropical regions of Africa and Asia. Wide spread genera are **Floscopa, Aneilema** and **Commelina** which found distributed through out the tropical belt. **Pillia , Cyanotis,** and **Forrestia** are distributed in tropics of Asia and Africa. **Palisota, Buforrestia, Coleotrype, Antheriocopsis** and **Polyspatha** are found in tropical Africa. 16 genera are restricted to tropical America. **Spathilirion** is distributed in Malayan region, and western part of China. **Souvellea** is ristricted to Cuba.

The family is represented in India by 10 genera, and about 80 species. They include **Aneilema** (24 species), **Commelina** (20 species), **Cyanotis** (16 species), **Pollia** (5 species), **Forrestia** (5 species), **Floscopa** (15 species), and **Streptolirion** (1 species). **Streptolirion volubile,** Edgew a climbing member of family is ristricted to Himalayan region, including N.E., F.A., **Khasia** and **Jaintia** Hills of Assam, growing at an attitude of 5000-9000 feet. The other genera are distributed through out the country.

The systematic position of family commelinaceae is different in different systems of classification. Bentham and Hooker (1883) put it in the series "Coronariae" along with the Families, Roxburghiaceae, Liliaceae, Pontaderiaceae, Phyilydraceae, Xyridaceae, Mayaceae and Rapateaceae, Engler (1889) and Rendle (1904) place the family in order

"Farinosae" under sub order "Commelinae" consisting of single family commelinaceae; order Farinosae of Engler and prantle also includes Flagellariaceae, Restionaceae, Centro lepidaceae, Mayaceae, Xyridaceae, Friocaulaceae, Thurniaceae, Raptaceae, Bromiliaceae, Pontaderiaceae, Cynastraceae and Phyllidraceae; and is characterised by copious mealy endosperm. Bessay (1915) place the in his "Liliales", which include Liliaceae and Najadaceae, along with many families of Farinosae of Engler and Graminae. Hutchinson (1934) thinks his order commelinales including commelinaceae, Mayaceae, Flagellariaceae and Cartonemataceae, to be a basic terrestrial stock of his calyciflorae, from which has evolved his order zingiberales. The seeds of his members of commelinales are characterised by having an "embryotega, a special development of microphyle".

The family commelinaceae consists of 50 genera and 700 species. Pichon (1946) Bruckner (1930), classified the genera of commelinaceae on the basis of Perianth and androecial characters. They divided the family in to two sub families; "Tradescantieae" with actinomorphic, and "Commelineae" with zygomorphic flowers. Tradescantieae is further divided into, "Declinatae" and "Inclinatae determined by flower buds being bent away or towards the axis respectively. He separated the genus **Murdannia** Royle, from **Aneilema** R.Br. According to him **Aneilema** in the ristricted sense belongs to sub family commelineae, tribe Dellinatae, where as **Murdannia** to **Triandrae** of **Tradescantieae.**

Woods on (1942) distinguished two tribes in the family viz. Tradescantiae and commelineae the former has paired sessile scorpioid

cymes which appear as two sided unit superficially, where as in the latter the ultimate branches of infloresence are composed of individual scorpioid cymes which appear one sided. Superficially he rejected the idea of separating **Murdannia** from **Aneilema** and kept the latter in his tribe commelinae.

Pichon (1946) redefined the family separating from the Austraian **Cartonema** as Cartonemataceae. Cartonema is more primitive than the majority of commelinaceae (Nussen (1983). Hutchinson (1959) accepted the family as defined by Pichon (1946). He formulated a new classification of the family using mainly infloresence characters, he split the genus **Tradescantia** in to 4 genera.

Among the different classification proposed so far, Hulchinson's classification is most useful since it enables the generic identification of harbarium specimens which often lack well preserved flowers.

Hooker (1897) describes 7 genera and 76 species of commelinaceae from british India. Cooke (1907) describes 12 species of commelina, 13 species of **Aneilema**, 7 species of **Cyanotis** and 1 species of **Floscopa**, namely **Floscopa scandens** to occuring in Bombay State. Gamble (1928) records 6 genera and 49 species from Madras presidency, he has raised **Cyanotis kewensis** cl. and **Cyanotis vivipara** Fischer to a genera rank **Belosynapsis.** These species have terminal or subterminal infloresence, subtended by biseriate bract.

Among the monocotyledons, family commelinaceae is found to be very ideal for cytological studies, because of their large nuclei,

chromosomes and ease with which the material takes the usual cytological stains. It forms classical material for cytological studies and class room work. The family is well studied cytologically by, Raghavan (1961, 1965, 1968); Rolla Rao (1961, 1961b, 1964, 1965, 1968, 1970); Kammathy (1961, 1961b, 1964, 1965, 1968); Shetty and subramanyam (1952), Sharma (1955); Sharm and Sharma (1958); Panigrahi (1963, 1964); Malik (1961); Ganguly (1964); Murthy (1934); Lewis and Taddesse (1951, 1954), Morton (1955, 1956), Anderson and Sax (1936); Darlington (1929), Islam nad Bataen (1952), Simmonds (1954); Harvey (1900), A critical review on the importance of the commelinaceae, from phyogenetic point of view has been discussed by Rolla Rao, Raghavan and Kammathy (1970).

For under standing evolution, cytology and embryology of family Commelinaceae has been stuided extensively by Raghavan (1958, 1961, 1965), Rolla Rao and Kammathy (1961, 1961b, 1964, 1965, 1968, 1970); Shetty and Subramanyam (1962); Solmslaubach (1878); Strasburger (1979); Guignard (1882); Park (1935); Sougeges (1958a, 1958b), Maheswari and Belder (1958), Chikkannaiah (1950, 1961, 1963, 1964, 1970), Kulkarni and Patil (1969).

A good amount of embryological work has been done on the members of commelinaceae. The family has received attention of early embryologists like stras-burger and Guignard. earliest contribution is of solmslaubach (1978), who studied the emhryo development in **Tinantia** and **Heterochia**, and noted that embryos are nonsuspensoric, and the shoot apex originates from the terminal Hers of proembryo and is latter pushed

to the latteral side by strong growth of single cototy**e**don. Following him strasburger (1979), described the polygonum type of embryosac development in **Tradescantia virginica.** Guignard (1882) however reported **Scilla** type of embryosac, in certain species of **Tradescantia** and **Commelina Stricta.** The details of development of tapetal periplasmodium in microsporogenesis have been noted by early workers like, Tischler (1915), Magcre (1925) and Stenar (1925). Schnarf (1931) has reviewed the literature on the embryology of this family upto (1931). After publication of schnarf's book "Verocichende Embryology der Angiospermen," number of articles have appeared dealing with the embryology of several members of family Commelinaceae. Main contributors being, Maheswari and Singh (1934), Murthy (1934, 1938), Park (1935), Maccollum (1939) Tschermak Woess (1947), Sougages (1958a, 1958b); Maheshwari and Beder (1958) and Chikkannaiah (1960, 1961, 1963, 1964, 1970).

There have been little work on polynology of the family. Pollen wall structure has been reported for 11 taxa, **Callisia, Rhoeo Setcreasea, Spironema Zebrina** (Rowley, 1959), **Coleotrype, Commelina, Tinantia** (Poole and Hunt 1980), **Tradescantia** (Horvet 1966), **Mepham and Lane** (1969, 1970), **Rowley** (1959, 1975), **Commelinata** Rowl (1959), Rowley and Dahl (1962) and **Tripogandra** Mattson (1970). The pollen wall structure of **Dichorisandra, thyrciflora** Mikan, is described by zavada (1983), Pollen is predominently monofulcate; however triaperturate pollen is known in the genera **Commelinata** and **Tinantia.** Exine sculpturing varies considerably. The pollen wall structure of **Callisa, Coletryp,**

Commelina, Rhoeo SetCreasea, Spironema, Zebrina is fimilar, tectate, columellate with irregular to branching coloumellate. The tectum is periodically transversed by small perforations, the foot layer is thick to very thin and may be interupted in some taxa by endoperforations, no endoexine is errident in any of these taxa. Zavada 1983 studied comparatively marphology of pollen and evolutionary trends and wall structures of commelinaceae.

Family commelinaceae is characterised by glandular microharis, and often also with unicellular or uniseriate Microhairs, musilage containing bundle of Raphids, and with Idioblasts containing silica bodies; in the epidermis of the stem and leaf of some species of **Tradescantia** and other genera.

Anotomical studies on various members of commelinaceae have been done by many workers Cambell (1881), Bary (1884) Caro (1903), Clark (1904), Holm (1906), Trachain (1932), Rohweder (1963) Tomilson (1964). The value of Anotomical data in the classification of Commelinaceae has been reviewed by Tomilson (1966) and according to Tomilson anatomical information may be very helpful in general diagnosis of family commelinaceae but subject needs much more detailed investigation.

A Genus **Cyanotis** D.Don. of about 55 species widely represented in Asia and Africa of which hardly 20 species have been cytologically worked out. Amongst 20 species worked out 16 species have a basic number x = 12. The chromosome number reported in different species are represented in Table 1. In India out of the 16 species 14 species have been worked out Cytologically. However most of the reports in India are based on meiotic studies, Rolla Rao, Raghavan and Kammathy (1970).

Hooker (1897) described 16 species of Cyanotis from British India. Cooke (1907) describes 7 species of **Cyanotis** occuring in Bombay State.

Morphological evidense on three sections of the genus **Cyanotis** Don. shows unnatural assemblage, (Kammathy Rolla Rao (1964). The chromosome number of 2 newly recorded taka togethr with the new populations of other species of **Cyanotis; Eucyanotis** Section of Clarke, normally shows n = 11. The chromosome number of the two newly recorded take together. With the new populations of the other species of **Cyanotis**, further supports the uniformly in all species of **Cyanotis.** This is further supported by Lewis (1964), Africa with n = 12. He however records **Cyanotis vaga** (Lour.) Schulf F. (**Cyanotis barbata**) of Africa showing n = 11 (**Lewis** 1964 a + b) but several populations of these species from shillong and Darjelling showed distinctly (Kammathy and Rolla Rao (1964). Cyanits fasciculata variety glabrescens has also been observed in the field as a good variety though not a distinct species and is common mostly along 1000-1500 metres altitude of western ghats. The gigantic hexaploid reported under **Cyanotis tubrosa** Roxh. from Mahableshwar by Kammathy and Rolla (1961), has been found to be distinctly associated with only higher altitudes of 1000-1500 m. having high rain fall. It is easily distinguishable in the field by its habit and other characters from **Cyanotis tuberosa** (Roxb) schult F. and its variety adsendens. a. (diploid and tetraploid), and has so far not been collected outside the Sahyadri ranges. Blatter (1928) named this as a distinct species, **Cyanotis sahyadrica Blatt.** The chromosome number in

in other populations of **Cyanotis sahyadrica Bott.** have reported by Kammathy and Rolla (1961) and now it is known as a **Cyanotis concanensis,** Hassk (**Karthickeyan, & Jain 1989**) Shetty and subramanyam (1962) reported n = 8 for C. **Papilionacea** such number in **Cyanotis** is rather usual on cytological basis kammathy and Rolla Rao (1964) are of the opinion than **Cyanotis burmanniana and Cyanotis papillionacea** are two distinct species. **Sharma** (1955) Shetty and Subramanyam (1962); and Rolla Roa and Kammathy (1962), Suggested that, **Cyanotis axillaris** Schult F. and **Cyanotis cucullata,** Kunth which have axillary non scorpioid infloresence should be raised to a generic status. Following this opinion Kammathy and Rolla (1964) have included these two species under new genus **Amischophacelus.** The genus is represented by only two species which are confined to trophical ragions as far as Malesia and Africa, and recently reported occuring in, West India as well. However the cytological data available showed that the three genera **Amischophaselus, Belosynapsis** and **Cyanotis** are quite distinct with basic sets of x = 10, x = 12, x = 13, respectively (Bhattacharya (1975)) occuring in the highest frequency. Infact the suggestion made by Sharma (1955) of the separation of the species **Cyanotis axillaris** into a different genus on the basis of its chromosome number and advanced nature of Karyotype was fully. Justified by Conversion of this species in to Amischophacelus axillaris as done by Rao Rolla and Kammathy (1.c.) on morphological grounds.

In India species of **Cyanotis** are mostly distributed; in trophical India, Mostly in peninscular India and hills of South West

India. The species like **Cyanotis tubersoa** Roxb. **Cyanotis concanensis Hassk** (C.**Sahyadrica**) having tuberous roots and **Cyanotis fasciculata Heyne,** and meny others are mostly distributed in hills of arid regions. In scrab Jungles, in crevices of rocks and forest floor while some species like **Amischophacelus cucullata** (Roth.) **Amischophacelus axillaris** (Linn) Rollo Raw, **Cyanotis cristata** (L.) D. Don., **Cyanotis fascullata,** Heyne, are grown as weeds, on black cotton soils of cultivated field, various species show of signficiant morphological variations in different populations of same species growing at different localities.

TABLE - (1)

SHOWING SPECIES OF AMISCHOPHACELUS (L.) AND CYANOTIS D.DON. FOUND IN INDIA THEIR DISTRIBUTION AND CHROMOSOME NUMBER RECORDED.

Sr.No.	Name of Species	Distribution	chromosome Number Recorded	Author
I)	**Amischophacelus**, Rolla Rao,	Through Out India	n=10	Murthy (1934), Raghavan and Rao Rolla (1961 b).
(1)	**Amischophacelus axillaris** (L.) Rolla Rao (**C. axillaris**)	Peninsular India	2n=20	Islam and Baten 1952 ; Sharma (1955), Shetty and Subramanyam (1962).
(2)	**Amischophacelus cucculata** (Roth), (**C. cucculata** Roth)	Peninsular India	n=10	Raghavan and Rao Rolla (1961), Kammathy and Rao Rolla (1961 b).
II)	**Cyanotis**, D.Don. Prodr.			
(1)	**Cyanotis arachinoidea** C.B.El.	Peninsular India	n=12, 2n=24, n=11	Kammathy and Rao Rolla (1961 b), Shetty and Subramanyam 1962.
(2)	**Cyanotis arcutensis**, Rolla Rao (**C. papilionacea** C.B.Cl.)	South India	n=8 n=11,13	Raghavan and Rao Rolla (1965).
(3)	**Cyanotis burmanniana**, wight (**C.papilionacea**, Var.burmanniana wight C.B.Cl.)	South India	n=12	Kammathy and Rao Rolla (1964).
(4)	**Cyanotis concanensis**, Hassk, (**Cyanotis sahyadrica**, Blath.)	Peninsular India	n=36	Raghavan, Rao Rolla 1961 under **C.tuberasa** and 1964 under **C.sahyadrica**
(5)	**Cyanotis cerifolia** Rolla Rao,kammathy	South India	n=12	Kammathy and Rolla Rao (1964).
(6)	**Cyanotis cristata**, (L.) D.Don.	Through Out Trophical India	n=12, 2n=24,+OIB	Islam and Bataen (1952), Sharm (1955) Shetty and Subramanyam (1962).
(7)	**Cyanotis fasciculata**, Heyne ex.Roth.	Peninsular and N.E.India, Bhutan, Cylon	n=12	Raghavan and Rao Rolla S. (1961) ; Shetty and Subramanyam (1962).
(8)	**Cyanotis karliana**, Hassk.	Peninsular India	---	---
(9)	**Cyanotis nilagirica**, Hassk.	Tamil Nadu (Nilgiris)	---	---
(10)	**Cyanotis obtusa** Trim, Hand b. (**C.arachinoidea** Sensu Hook.)	Peninsular India	n=12	Kammathy and Rolla Rao (1961 b) under **C. arachinoidea**

Contd..2/-

Sr.No.	Name of Species	Distribution	Chromosome Number Recorded	Author
(11)	**Cyanotis papilionacea** (L.)	Peninsular India	n=8	Shetty and Subramanyam 1962.
(12)	**Cyanotis Pilosa**, Schult f. (**Cyanotis wightii** C.B.Cl.)	Peninsular India (w.Peninsula)	n=12	Kammathy and Rao Rolla (1961 b)
(13)	**Cyanotis thwaitesii**, Hassk. (**Cyanotis arachnoidea** C.B.Cl.)	Peninsular India	n=11	Kammathy and Rao Rolla (1961 b).
(14)	**Cyanotis tuborosa** (Roxb.) J.A.and J.H. Schult.	Peninsular India	n=12	Raghavan and Rao Rolla (1961), Kammathy and (1961 b), Shetty and Subrananyam (1962).
	Tradescantia tuberosa, Roxb.,var. tuberosa, var. adsendens (Dalz.)C.B.Cl.			
	Cyanotis adsendens Dalz. **Cyanotis sarmentosus**, Whight)	Peninsular India and North and East India	n=24	Raghavan and Rao Rolla (1961).
(15)	**Cyanotis vaga** (lour) J.A. and J.H.Schult (**Cyanotis barbata** D.Don., prodr.	Subtrophical Himalaya	n=12	Sharma A.K. and Sharma A.(1958) ; Kammathy and Rao Rolla (1964).
(16)	**Cyanotis villosa** (Spr.) J.A. and J.H. Schult. (**Tradescantia villosa** Spr.)	Peninsular India	n=11	Lewis (1964).