REVIEW OF LITERATURE

The genus Ceropegia Linn. is one of the largest genera of Asclepiadaceae consisting of about 200 species (Bruyns, 1985) distributed over most of the Africa, Madagascar, The Arabian peninsula , the Indian subcontinent, the East and into the northern part of Australia. Huber (1957) published a revision of the genus Ceropegia for the whole world and reported about 150 species, however, after his revision many species have been added to his list from various parts of world as well as from India. The list of species along with country from which they are described is given in table - 2.

The genus Ceropegia was first proposed by Linnaeus. The generic name is derived from the world Keros = Wax and pege = fountain meaning that the flowers look like fountain of wax. Linnaeus distinguished this genus from allied genera for its tubular corolla which is swollen at base, funnel shaped and the corolla lobes more or less connate at the tip.

Roxburgh (1795 - 1819) for the first time described and illustrated three species of Ceropegia occurring in Bombay in his "Plants of the coast of Coromandel". He also reported these three species in his "Hortus Bengalensis" (Roxburgh, 1814). Hooker (1883) reported 36 species of genus Ceropegia from British India. In recent revision on Indian species of Ceropegia, Ansari (1984) reports 44 species, out of which 28 are endemic to India.

T. Cooke (1904) hardly recorded 8 species of Ceropegia from Bombay presidency. L.J. Sedgwick (1921) described one of

the most striking species- C. fantastica. In this species the sepals are as long as corolla. Blatter and McCann (1931) described C. polyantha and C. hispida from western ghats. Blatter (1933) described C. panchgaiensis from Panchagani plateau. McCann (1945) added one more species C. evansii from Khandala.

Studies on the occurrence, taxonomy and distribution of Ceropegia species has been made by various workers like Blatter and McCann (1931), Blatter (1931, 1933), McCann (1943) Santapau (1948), Santapau and Irani (1958, 1960), Kanodia and Reddi (1964), Vankatareddi (1968), Hemadri (1968), Wadhawa and Ansari (1968), Ansari (1968, 1969, 1971, 1972, 1984), Ansari and Kulkarni (1971), Hemadri and Ansari (1971), Sabnis and Bedi (1971), Reghvan and Ansari (1975), Yadav et. al. (1989).

Almost all the eight new species described in last two decades for India are from Maharashtra. The species described from Maharashtra are listed in table - 2. In recent revision on Ceropegia Ansari (1984) records 22 species from Maharashtra, out of which 17 are endemic to Maharashtra. The genus is famous for its rarity and endemism (Santapau and Irani, 1958). Recently Yadav et. al. (1989) reported C. juncea from Satara district of Maharashtra. Huber (1957) does not recognise two varieties of C. bulbosa, however Ansari recognizes two distinct varieties of C. bulbosa such as C. bulbosa var. bulbosa and C. bulbosa var. lushii (Grah.) Hook. According to him, these two varieties breed true in nature.

Govindappa & Ramakrishna (1978) also support the retension of var.lushii as distinct from var. bulbosa.

Ansari (1971) studied various species of Ceropegia critically and found that C. hirsuta Wt. et. Arn. var. vincaefolia, C. stocksii Hook, C. polyantha Blatt. & McCann and C. oculata Hook var. subhirsuta are one and same belonging to C. vincaefolia and all above names were reduced to synonyms.

Ceropegia odorata Hook. is a very rare endemic species. It was re-collected after a gap of more than 100 years from Panchamahal district of Gujarat state and described in full length by Sabnis and Bedi (1971).

Huber (1957) divided genus Ceropegia into 21 sections. Sections are divided into subsections. Most of the Indian species belong to section Ceropegia, Indopegia, Buprestis and Tiloris. The different Indian species of Ceropegia with their sections and subsections are given in table - 3.

The plants of family Asclepiadaceae are highly specialized for pollination. They show specialized pollination mechanisms. Extensive work on pollination mechanism, floral morphology, pollinia, pollen germination have been done on cultivated as well as wild species of Asclepiadaceae (Sprengel 1793, Hilde brand 1866, Fritz Muller 1877, Correy 1883, Harman Muller 1883, Knuth 1908, Woodson 1954, Gall and Zeroni 1965, Macior 1965, Percival 1969, Proctor and Yeo 1973, Schill and Jakel 1978, Wyatt 1976, 1980,

Schnepf et. al 1979, Bookman 1981, Harold 1985, Kanaval et. al. 1989). Newton (1984) described terminology of structures associated with pollinia of the Asclepiadaceae. Mechanisms of pollination in some Indian Asclepiads have been described by Bhatnagar (1975), Dnyansagar and Tijari (1979), Ramakrishna and Govindappa (1979), Pant et. al. (1982), Chaturvedi & Pant (1986), Chaturvedi (1987, 1989).

Gazzer et al. (1974) gave comparative account of the morphological variation in the twin pollinia, caudicles, corpuscles of 57 species from twenty genera of Asclepiadaceae. The genera are grouped into three assamblages which shows classical grouping within the family. Kunze Henning (1981) described the developmental morphology of stamens and coronas of three tribes in Asclepiadaceae such as Asclepiadaceae, Marsdeniaceae and Ceropegieae. Similarly development of staminal coronas is described. Namboodiri (1982) described the germination of pollinium and the organisation of germ furrow in Ceropgia candelabrum and stated that pollinium germinates through a specific region of the pollinial wall designated as germ furrow. Bruyns (1985) described pollinia of C. arabica and of allied members.

Rintz (1979) discovered new species of Ceropegia from peninslar Malaya i.e. C. langkawiensis and stated that the flower of the species acts as an insect retainer as a part of its pollination mechanism. McCann (1943) studied light windows in Cryptocoryne and Ceropegia with respect to pollination mechanism.

According to him some parts of the swollen base of corolla are especially thinned so that they form a sort of translucent window and the window is so arranged that the light is focussed on the reproductive organs.

The work on pollination mechanism in Ceropegia is little probably due to rarity of the species. Pollinia, caudicles and corpuscles have been studied in some detail in C. elegans (Gazzer, 1974) & in C. arabica (Bruyns, 1985). Light windows & their probable function in Ceropegia have been discussed by Mc Cann (1943) while the importance of inflated corolla of C. langkawiensis is given by Rintz (1979). Presently Dr. Chaturvedi is working on pollination mechanism in Indian species of Ceropegia (Project sponsored by D.S.T.). He has observed in situ germination of pollinia in C. noorjahaniae and some other species.

Many members of family Asclepiadaceae are of medicinal importance and various plant parts are used in medicine. Pharmagnostical studies of some of Indian members of the family have been done viz. Desmotrichum fimbriatum Blume. (Gupta et. al. 1970), Leptadenia reticulata Wt. & Arn. and Asclepias tuberosa Roxb. (Gupta and Kapoor, 1971), Asclepias curassavica Linn. (Mitra et. al. 1974), Parnassia nubicola (Kapoor et. al. 1975) Sarcostemma brevistigma Wt. & Arn. (Gupta and Wahl, 1978), Dregea volubilis (Linn.f) Benth. (Gupta, 1985). Their study is useful in checking adulterations.

Phytochemical analysis of some of the Asclepiadaceae members have been investigated such as Sarcostigma brevistigma W. & A. (Van, 1937, Beri and Sharma 1963; Hajarnavis 1964; Sharma and Misra 1975), Dregea volubilis (L.) Benth. ex Hook.f. (Chopara et. al 1956, Saucer et. al. 1965, 1966; Allgei 1968), Marsdenia formosana (Ito et. al. 1978, 1982), Panchycarpus lineolatus, Asclepias lilacina, Dregea volubilis and D. abyssinica (Allgeir, 1968), Asclepias curassavica (Tschesche et. al. 1958, 1959; Kupchan et. al. 1964; Singh & Rasrogi 1969; Patnaik & Dhawan 1971), Asclepias species (Hassan et. al. 1952). Immunocytochemical identification of laticifers have been done by Wilson et. al. (1984).

Anatomical studies on various members of Asclepiadaceae have been done by many workers (Glabisz 1908; Starr 1912; Zemke 1915, Punch 1912, Lendner 1924, Sabnis 1919, 1920, 1921; Venerning 1923, 1924; Francke 1927; Trochain 1932; Honda 1930; Saunders 1939; Sayeedud - Din and Suxena 1940; Singh 1943; Blaser 1945; Hassan et. al. 1951[a-e]; Colonvalelenkar and Malaisee 1984; Bruyns 1986; Lucansky and Clough 1986).

Metcalf and Chalk (1957) have given an account of anatomical characters of the family Asclepiadaceae. Family Asclepiadaceae is characterized by presence of laticiferous tubes, intraxylary phloem, frequently rubiaceous stomata, generally dorsiventral leaves & pericycle marked by cellulosic fibres. Several anomalous structures are found in climbing species of Asclepiadaceae. Similarly pitcher-

like leaves of Dischidia rafflesiana Wall. are noteworthy and represent a biological specialization. They do not possess any carnivorous function, but according to Scott and Sargant (1893) serve rather for accumulation of detritus and for the collection of condensed water.

Leaves in Ceropegia are usually dorsiventral & hypostomatic however, fleshy leaved Ceropegias have isobilateral and amphistomatic leaves (Metcalfe and Chalk 1957). In xerophytic species of Ceropegia the cuticle is very thick. Stomata are usually paracytic. Petiole exhibit crescentric bicollateral vascular bundle. Sphaerocrystals of calcium phosphate are recorded in Ceropegia. Deeply seated intraxylary pholem in the pith is observed in few species of Ceropegia. Similarly areas of unlignified xylem and islands of intraxylary pholem have been recorded in some species of Ceropegia.

Colonval-elenkor and Malaisee (1984) investigated the leaf anatomy of 13 species of Ceropegia and found that it is possible to establish a key guide to sterile material of the genus, however according to them the leaf anatomy is of secondary importance whose usefulness is limited.

Important investigations on the floral anatomy of Asclepiadaceae include those of Brown (1883), Carry (1884), Fry (1902), Saunder (1939), Safwat (1962), Rao and Ganguli (1963), Mulay et al. (1965). Christ and Schnept (1886) studied the nectaries of Cynanchum vincetoxicum. Mulay et al. (1965) found that certain floral, anatomical

and embrylogical characters are of diagnostic value which could be used to distinguish between Periplocoideae and Cynanchoideae. Arkal et al. (1981) studied extrafloral nectaries of Calotropis gigantea (Linn) R. Br. and Kattakaka valubilis (Linn f.) Stapf.

Cuticle, cuticular striations are found to be of diagnostic value in many Asclepiadaceae. Cuticle and pharmacognosy of certain members have been investigated. They include Calotropis gigantea R. Br. Leptadenia reticulata W. & A., Daemia extensa R. Br., Hemidesmus indicus R. Br., Telosma minor Crab. (Krishnamurthy and Sundaran, 1967); Ceropegia juncea Roxb., Cryptostegia grandiflora R. Br., Cynanchum pauciflorum R. Br., Heterostemma tanjorense W. & A. Dregea volubilis (Linn. f) Benth. & Hook. f. and Tylophora indica (Brum.) Merr. (Krishnamurthy and Kannabiram, 1970). Histomorphological details of the foliar epidermis revealed that features such as cuticle, cuticular striations are of diagnostic value which could be used in classification.

Many members of Asclepiadaceae are succulent. Several succulent members are grown in gardens for their curious flowers and succulent nature. The occurrence of CAM has been demonstrated in several members of the family Asclepiadaceae such as Hoya carnosa Br., Stapelia variegata Linn., S. nobilis N. E. Br., Carraluma joannis Maire., C. lasiantha N. E. Br., C. mammillanis (L) N. E. Br., C. negerensis ZOH, Frerea indica Dalzell, Stapelia leendertizidae R. N. E. Br., and Trichocaulon pedicellatum Schinz. (Nuernbergk 1961,

Milber et. al. 1968, Szarek and Ting 1977, Szarek 1979), Frerea indica represents an interesting case with CAM, performing a succulent stem and deciduous C3 leaves (Lange and Zuber, 1978).

Occurrence of crassulean acid metabolism in genus Ceropegia has been demonstrated for first time by Gaikwad et al. (1989). They have found CAM in stem tissue of Ceropegia juncea Roxb. The species has very reduced leaves or leaves are absent. CAM features were also noticed in leafy forms of Ceropegia i.e. C. bulbosa var. bulbosa and C. bulbosa var. lushii (Grah.) Hook, however CAM features were not noticed in C. hirsuta which has got membranous leaves (Supate et al., 1989). Ceropegia is thus an interesting genus, since stem CAM (C. juncea), leaf CAM (C. bulbosa) and non CAM (C. hirsuta) species exist. According to Bruyns (1986) the highly succulent reduced stem & the greatly reduced breadth of the leaf are advanced characters in some Ceropegia species. Development of CAM features in some stem tissue represents a major metabolic adaptation. (Gaikwad et al. 1989).

Very little cytological work has been done on genus Ceropegia. No detailed study on karyomorphy has been done, however chromosome number in several species of the genus is recorded The chromosome numbers reported in different species of Ceropgia is given in Table - 4. Most of the species investigated show somatic chromosome number as 2n = 22. Thus the basic chromosome number for the genus is n = 11. Sundara - Rhaghavan and Ansari (1975) reported chromosome numbers in 5 species and all of them showed 2n=22 chromosomes.

Polyploidy has been reported in C. debilis & C. woodii showing 2n=44 (Bolkovshish et.al. 1969) Lakshmirayanna & Krishnappa, 1988) reported polyploidy in C. juncea which shows 2n=66. They also reported 2n=33 in one of the taxa which differs from other reported species. The diploids, triploids, tetraploids & hexaploids are reported in the genus.

Embryological studies on the family include those of Gujer (1902), Finn (1925), Sabet (1931), Schnarf (1931), Narula (1945), Crete (1950), Patwardhan (1953), Rao and Rao (1954), Biswas (1957), Deshpande and Joneja (1962), Devi (1964), Devi and Krishnamurthy (1977), Devi and Lakshminarayan (1979).

Davis (1966) has given review of embryological characters of Asclepiadaceae. According to her, except Secamone, all other members studied have bisporangiate anthers. A thick undifferentiated anther wall is common in Asclepiadaceae, however a fibrous endothecium has been reported in C. elegans and Vincetoxicum nigrum. Fibrous endothecium is also reported in Caralluma (Rao & Rao 1954, Devi and Lakshiminarayan, 1978). Usually simultaneous type of cytokinesis is observed in Asclepiadaceae, however Cynanchoideae is characterized by successive type. Microspore tetrads are of linear type and pollen grains are shed in 3-celled condition. Family Asclepiadaceae is characterised by anatropous, unitegmic, pseudocrassinucellate ovules. Chalazal megaspore of tetrad gives rise to normal embryo sac. In Ceropegia the egg apparatus occupies nearly half the embryo sac. Antipodals are usually ephemeral, however, in Ceropegia and Cynanchum they are persistent. Endosperm formation is of nuclear type and embryogeny is of solanad type.

Dunber et al. (1986) studied the laticifers in embryoides

derived from callus suspension cultures of Asclepias species.

Asclepiadaceae has ornamental & medicinal value. Some members of Asclepiadaceae are grown as succulents. Many members of the family are of great medicinal value. The medicinal importance of various members is given by (Kirtikar and Basu, 1975, Agharkar 1953, Chopra and Chopra 1958, Agarwal, 1986.)

The genus Ceropegia is not of much importance economically and medicinally. The tubers are edible. They are starchy, somewhat bitter in taste and are used as a nutritive tonic in the bowel complaints of children that cure dysentry and diarrhoea. (Kirtikar and Basu, 1975). The leaves of C. bulbosa are acidic and used as vegetable (Agarwal, 1986). The alkaloid named ceropegin is extracted from the tuberous roots of C. bulbosa and this drug is used in Bihar in colds and eye-diseases to cure sneezing (Kirtikar and Basu, 1975). C. tuberosa is bitter, cures diarrhoea and dysentry, inflammation of the gums, delirious fevers of parturition (Ayurveda).

Genus Brachystelma R. Br. is another interesting genus of family Asclepiadaceae which is famous for its rarity and endemism. None of the species of Brachystelma are of common occurrence. It is a small genus consisting of about 40 species.

In the flora of British India, Hooker (1883) recorded 7 species of Brachstelma. Three of them were originally described by Wight under the genus Eriopetalum. One was described by Beddome under the

genus Ceropegia and remaining three were described by Hooker himself. Hooker remarks that the descriptions were all very imperfect and based on single flower and meagre materials. Gamble (1921) recorded 6 species from South India. Cooke (1904) has not recorded any species of this genus as occurring within the limits of Bombay presidency. Gamble described two new species from Madras presidency, viz. such as Brachystelma bourneae Gamble, B. rangachari Gamble.

Since then many species have been added to the genus. About 13 species have been recorded from India. Arekal and Ramakrishna (1981) reported a new species B. kolarenses Arekal et Ramakrishna sp. nov. from Kolar district of Karnataka State. They also described another species viz. Brachystelma ciliatum Arekal et Ramakrishna sp. nov. from Karnataka (Arekal & Ramakrishna 1981).

Brachystelma elenoduensis M. B. Char sp. nov. has been described from India (Char, 1978). Similarly B. edulis found in Thiland has been recently recorded from Kolhapur and Satara district of Maharashtra (Yadav et al. 1989). During present survey of Brachystelma species of Maharashtra author has collected an interesting species of the genus which is new to science. Determination of species was done by Dr. D. J. Goyder, Kew botanical gardens and found to be new showing affinities with B. edulis. Most of the species dealt with by Gamble are not represented in herbaria Due to restricted distribution and tiny nature of the species, locating the species in field is not easy. Similarly the tubers are edible and destructed by wild animals like hare, rats, wild bear and man. Thus the species

are extremely rare and need careful collections which will come out to be fruitful. Vajravelu (1987) has recently collected B. glabrum from Shevaroy hills of Tamil Nadu.

Similarly some new species have been described from various parts of the world. (Dassanayache & Jayasuriya (1975), Dyer (1976, 77, 78).

As these species are rare, endemic & difficult to collect in field due to tiny nature, a comparative account of 13 Indian species based on literature and own observation is given in table 5 in Chapter on observation (morphology).

Except taxonomical work, there is no work on other aspect of the genus. Somatic chromosome number have been reported for some of the species and it is 2n = 22 suggesting 11 as a basic chromosome number for the genus. The chromosome number of some of the species is given in Table 4.

Table - 1

TABLE - 2 : New species of *Ceropegia* and *Brachystelma* described after Huber's (1957) revision

Name of the species	Author and Year	Country
1 *C. praetemissia*	Raynal J & A. Raynal, 1967.	Senegal
2 *C. bhutanica*	Hara H, 1968.	Bhutan
3 *C. mendesii*	"	
4. *C. bonatouxii* var. *linearifolia*	Stopp & Klaus, 1971.	Angola
5 *C. de-vecchii* var. *adelaidae*	Bally P.R.O. & Susan Corter, 1974.	Tropical East, Africa
6 *C. paohsingensis*	Tsing, Ying & L.T. Ping-Tao, 1974.	China
7 *C. arenria*	"	
8 *C. cycniflora*	Dyer R. A. 1978.	Africa
9 *C. occidentalis*	"	
10 *C. langkawiensis*	Rintz R. E., 1979.	Peninsular Malaya
11 *C. swaziorum*	Field D.V., 1982.	Swaziland
12 *C. powysii*	Field D. V., 1982.	Kenya

Table contd.

Name of the species	Author & Year	Country
13 C. distincta	Field D. V., 1982.	S. Africa
14 C. superba	Field D. V., & I.S. Collenette, 1982.	Arabia
15 C. mansomriana	Chaudhary, Shaukat A. & J.J. Lavranos 1985.	Arabia
16 C. tihamana		
17 C. dichotoma	Bruyns Peter, 1986.	Canary Island
18 C. fusca		
19 C. rupicola		
20 C. huberi	Ansari, 1969.	Maharashtra (India)
21 C. santapaui	Wadhwa et Ans. 1968 (1969).	Maharashtra (India)
22 C. rollae	Hemadri 1968 (1969)	Maharashtra (India)
23 C. mahabalei	Hemadri et Ans. 1971.	Maharashtra (India)
24 C. sahyadrica	Ans. et. Kul. 1971.	Maharashtra (India)
25 C. noorjahaniae	Ansari, 1972.	Maharashtra (India).

Name of the species	Author & Year	Country
26 C. maccannii	Ansari 1980 (1982).	Maharashtra (India)
27 C. jainii	Ans. et. Kulk 1980 (1982).	Maharashtra (India)
28 Brachystelma parvulum	Dyer R.A., 1978	Africa
29 B. minimum		
30 B. delicatum		
31 B. glenense		
32 B. caudatum	Dyer R.A., 1976	Africa
33 B. remotum		
34 B. swazicum		
35 B. incanum		
36 B. kolarense	Arkel & Ramakrishna 1981 a.	Karnataka (India)
37 B. ciliatum	Arkel & Ramakrishna 1981 b.	Karnataka (India)
38 B. elenaduensis	Char, 1978.	Karnataka (India).

TABLE - 3 : Showing distribution of various species of Ceropegia belonging to various sections of the genus (after Huber, 1957)

	Oreopegia	Chinopegia
1	C. wallichii Wight	C. pubescens Wall.
2.	C. longifolia Wall.	C. hookeri C.B. Clarke
3	C. macranatha Wight	

	Sinopegia	Hylopegia
1	C. pusilla Wight & Arn.	C. lucida Wall.
2	C. jainii Ans. et Kul.	
3	C. arnottiana Wight	
4	C. kachinehsis Prain	

	Ceropegia	Indopegia
1	C. candelabrum L.	C. hirsuta Wight & Arn.
2	C. bulbosa var. bulbosa	C. vincaefolia Hook. f
3	C. bulbosa (Roxb.) var. lushii Grah.	C. fantastica Sedwick
4	C. intermedia Wight	C. oculata Hook. f.
5		C. metziana Mig.
6		C. decaisneana Wight
7		C. beddomei Hook. f.
8		C. rollae Hemadri
9		C. barnsii Bruce & Chatterjee

Buprestis

1 C. evansii MaCann.

2 C. lawii Hook. f.

3 C. odorata Hook. f.

4 C. rollae Hemadri.

5 C. panchganensis Blatter & MaCann.

6 C. maccannii Ans.

7 C. santapaui Wadhawa et Ans.

8 C. media (Huber) Ans.

9 C. sahyadrica Ans. et Kul.

10 C. ensifolia Bedd.

11 C. omissa Huber

Janthina

1 C. elegans Wall.

2 C. thwaitesii Hook. f.

12. C. huberi Ans.

13. C. ciliata Wight

Sarcodactytus

1 C. dichotoma Haw.

Phalaena

1 C. juncea Roxb.

Tiloris

1 C. attenuata Hook.

2 C. mahabalei Alemadri et Kul.

3 C. noorjahaniae Ans.

4 C. spiralis Wight

5 C. limbriifera Beddome

6 C. augustifolia Dalz.

TABLE - 4 : Showing diploid chromosomes number in species of Ceropegia & Brachystelma

Sr. No.	Name of the species	Chromosome Number '2n'	Author and Year	Remarks
1	Ceropegia attenuata Hook.	22	Raghvan & Ansari, 1975	Erect, leaves membranous
2	C. bulbosa Roxb var. bulbosa	22	--"--"--	Twiner, leaves fleshy glabrous
3	C. bulbosa Roxb var. lushii (Grah.) Hook.	22	--"--"--	Twiner, leaves fleshy glabrous
4	C. debilis	44	Bolkovshish et.al 1969	Twiner, leaves fleshy glabrous
5	C. hirsuta Wt. et Arn.	22	Patil (Own observations)	Twiner, leaves membranous
6	C. huberi Ans.	22	Raghavan & Ansari 1975	Twiner, leaves membranous

1	2	3	4	5
7	C. juncea Roxb.	66	Lakshiminarayana & D.G. Krishnappa	Twiner, leaves reduced to scales or absent
8	C. maccannii Ans.	22	Ansari 1984	Erect, leaves membranous
9	C. media (Huber) Ans.	22	Ansari 1984	Twiner, leaves membranous
10	C. oculata Hook.f.	22	Ansari 1984	Twiner, leaves membranous
11	C. sahyadrica Ans. et Kul.	22	Ansari 1984	Erect, leaves membranous
12	C. santapaui Wadhwa et Ans.	22	Ansari 1984	Twiner, leaves membranous
13	C. spiralis Wight	22	Bolkovshish et. al. 1969	Erect, leaves membranous

1	2	3	4	5
14	C. tuberosa = C. bulbosa	22	Lakshimarayana & Krishnapa 1988	Climber, leaves fleshy
15	C. woodii	44	Bolkovshish et. al. 1969	Climber, leaves fleshy & glabrous
16	Brachystelma ciliatum	22	Arekal & Ramakrishna (1981)	Erect leaves membranous
17	Brachystelma kolarense	22	Arekal and Ramakrishna (1981)	Erect, leaves membranous