

AMENDMENTS TO APPENDICES I AND II OF THE CONVENTION

Other Proposals

A. PROPOSAL

Transfer of all dwarf species (and their natural hybrids) of Euphorbia subgenus Lacanthis in Madagascar from Appendix II to Appendix I (species named below).

B. PROPONENT

The United States of America.

C. SUPPORTING STATEMENT

1. Taxonomy

11. Class: Magnoliopsida (Dicotyledonae)
12. Order: Euphorbiales
13. Family: Euphorbiaceae
14. Species: succulent Euphorbia L.
subgenus Lacanthis (Raf.) M. Gilbert 1987
dwarf, usually nonspiny species; thereby
excluding Malagasy groups E. lophogona Lam.,
E. perrieri Drake, E. mili Desmoulins and E.
ankarensis Boiteau as to nondwarf, often
strongly spiny species
15. Distribution: Madagascar taxa only

- E. ambovombensis Rauh & Razafindratsira 1987
- E. cylindrifolia Marnier-Lapostolle & Rauh 1961
subsp. cylindrifolia
subsp. tuberifera Rauh 1963
- E. decaryi Guillaumin 1933
var. ampanihyensis Cremers 1985
var. cap-saintemariensis (Rauh) Cremers 1985
var. decaryi
var. spirosticha Rauh & Buchloh 1987
- E. francoisii Leandri 1946
var. francoisii
var. rakotozafyi Cremers 1985
- E. moratii Rauh 1970
var. antsingiensis Cremers 1985
var. bemarahensis Cremers 1985
var. moratii
- E. parvicyathophora Rauh 1986
- E. primulifolia Baker 1881
var. begardii Cremers 1985
var. primulifolia
[syn. = E. subapoda Baillon]
- E. quartziticola Leandri 1946
- E. tulearensis (Rauh) Rauh 1988
[syn. = E. cap-saintemariensis var. tulearensis Rauh 1978;
syn.? = E. decaryi var. robinsonii Cremers 1985]

This proposal covers all known dwarf succulent Euphorbia species and infraspecific taxa (and any of their natural hybrids) in Madagascar, and any similar taxa yet to be recognized or discovered there, in this morphologically distinct, taxonomically undetermined group. There has been no difficulty for taxonomists to assign taxa to the dwarf category. Gilbert (1987; pers. comm. to S. Knees, 1989) considers that this whole dwarf (less 50 cm tall) group of geophytes and succulent-leaved hemicryptophytes, which usually are nonspiny with hairy, feathery or papery stipules or enations, to be part of the subgenus Lacanthis [see below, topic 5. Information on Similar Species for these two life-form terms, and topic 7. Additional Remarks for the subgenus, which on the African mainland includes a few other species which are not part of this proposal]. Most of the subgenus (also not part of this proposal) is in Madagascar, and consists of shrubby species (less than 50 cm tall) without the dwarf habit, and often with strong spines or stiff bristles (Rauh, 1985, 1987a; S. Carter-Holmes, pers. comm. to Knees, 1989).

Malagasy species of Euphorbia now in subgenus Lacanthis have been put in informal quasitaxonomic groups by Leandri and Jacobsen: M. II = E. lophogona group (includes E. neohumbertii Boiteau); M. III = E. perrieri group (includes E. didierioides Denis ex Leandri); M. VI = E. milii group, and M. VII = E. ankarensis group (Gilbert, 1987; Jacobsen, 1977; Rauh 1984, 1985, 1987a). Five of the six dwarf species known to Jacobsen are in Leandri's group M. VII (along with three nondwarf species), but E. quartiziticola is initially in group M. VI because of its inconspicuous stipular spines, although it may be related to E. primulifolia in group M. VII (Rauh, 1984, 1987a). Of the newer dwarf taxa (since Jacobsen, 1977), E. decaryi var. ampanihyensis, E. parvicyathophora and E. tulearensis (both close to E. decaryi) are variously spiny. (The dwarf species also have been placed in widespread sections or subgenera, and some Leandri groups or other groups, of sometimes unclear scope, have been recognized by some as formal taxonomic sections or groups: M. VI = Diacanthium in part, Splendentes or Sterigmanthe; M. VII = Rhizanthium in part, or Rhizanthopsis.)

Cremers (1985) has published the most recent revision of these Madagascar dwarf endemics, but he did not mention E. cap-sainte-mariensis var. tulearensis, which he probably would have made a variety of E. decaryi instead of creating E. decaryi var. robinsonii [see observations by Rauh (1988) that the two come from the same area and are probably identical]. Rauh (1986, 1987b, 1988), and Rauh and Buchloh (1987) have published three additional taxa and some disagreement with Cremers' revision. Fully five of these nine species (or probably eight, if E. tulearensis is a variety of E. decaryi) have been described only from 1970-1987, which limits our knowledge and adds to their novelty appeal to collectors. Alternative names may be used in the horticultural trade, including even varieties (subspecies) casually and incorrectly as species. Euphorbia ambovombensis was traded as "aff. E. decaryi with caudex" before it was described in 1987 (C. Hanson, pers. comm. to B. MacBryde, 1989).

2. Biological Data

21. Distribution: With the exception of E. primulifolia var. primulifolia, these dwarf taxa are narrow endemics in central and southern Madagascar, mostly known only from the immediate vicinity of the type locality. Madagascar is recognized for its

high endemism; for example, Koechlin (1972) reports that the South Domain has a generic endemism of 48% and specific endemism of 95%; six of these eight/nine dwarf euphorbias occur in the South Domain. Detailed distributional data are given by Cremers (1985), Rauh (1984, 1985, 1987a, and op. cit. above), Rauh and Buchloh (1987), and Knees (1989).

22. Population: Precise population data are unknown. Euphorbia primulifolia var. primulifolia is widespread in the central highlands; E. decaryi var. decaryi has a somewhat extended but local distribution in the South. Both are inconspicuous species, easily overlooked because of their small size, and like most other species in the group, most of the plant is below ground level, and noticeable only when in leaf (Knees, 1989). However, the remaining 15 varieties (subspecies) and species in the group are only known from single or few populations that may have become fragmented so that they appear isolated (or some might represent extremes of extant and continuous populations whose limits are insufficiently known).
23. Habitat: The dwarf euphorbias occur in a variety of habitats that can be broadly classified into four principal vegetation types: xerophytic thorn bush, deciduous xerophyllous forest, evergreen xerophyllous forest, and evergreen mountain forest (Rauh, 1979, 1983; Koechlin, 1972; Cremers, 1985). Collection for export, and habitat destruction due to agricultural, industrial, communication and urban development, dam construction, and mining activities all contribute toward the decline in species' numbers over recent decades (Battistini and Verin, 1972; Chauvet, 1972; Fourie, 1984; Jenkins, 1987; Jolly and Jolly, 1984; Knees, 1989; Millot, 1972; Rauh, 1979).

3. Trade Data

31. National Utilization: A small amount of trade in these and other succulent species of Euphorbia exists in Madagascar, where plants are taken from habitat and kept in nurseries before resale, according to a 1986 site review (Knees, 1989).
32. Legal International Trade: As one of the succulent groups most sought, trade in dwarf euphorbias has increased in recent decades, with relatively large numbers being exported to Europe, Japan and the United States. In 1978, Madagascar is recorded to have exported 380 specimens of all Euphorbiaceae, mostly to Japan (137) and U.S.A. (110); in 1979, 830 exported specimens were recorded, mostly to U.S.A. (350), U.K. (191) and Japan (135) (DeFilipps, 1987). In 1982, 200,073 specimens of all Euphorbia were exported directly from Madagascar to the Federal Republic of Germany. Oldfield (1985) reviewed the limited import data available from western Europe, stating that most imports from Madagascar were thought to go first to France. Recent trade data on known imports of wild specimens of the dwarf euphorbias from Madagascar to four countries are in the following table (plus probable re-exports via F.R. Germany):

COUNTRY & SPECIES	YEAR	NUMBER SPECIMENS	RE-EXPORTS
DENMARK			
<u>E. cylindrifolia</u>	1986	10,000	
<u>E. decaryi</u>	1984	5	
<u>E. primulifolia</u>	1986	300	
JAPAN			
<u>E. cylindrifolia</u>	1985	20	
<u>E. decaryi</u>			
var. <u>cap-saintemariensis</u>	1985	50	
<u>E. francoisii</u>	1985	5	
<u>E. moratii</u> -----	-- 1984	100	
	1985	5	
	1986	15	
<u>E. primulifolia</u> ---	-- 1984	110	
	1985	20	
	1986	10	
<u>E. quartziticola</u> --	-- 1984	100	
	1985	50	
	1986	5	
UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND			
<u>E. francoisii</u>	1985	20	
<u>E. moratii</u>	1983	100	
	1985	30	
<u>E. primulifolia</u>	1985	40	
<u>E. quartziticola</u>	1985	20	
UNITED STATES OF AMERICA			
<u>E. cylindrifolia</u>	1983	51	FRG
	1984	413	"
	1985	1	"
	1986	500	FRG
	1987	25	
<u>E. decaryi</u>			
var. <u>cap-saintemariensis</u>	1983	60	FRG
	1984	96	"
	1985	278	FRG
	1986	25	
	1987	150	
<u>E. francoisii</u> -----	-- 1983	21	-- FRG
	1984	42	"
	1985	153	FRG
	1986	25	
<u>E. moratii</u> -----	-- 1985	1	
	1986	50	
<u>E. primulifolia</u> * -	-- 1986	50	
	1987	100	
<u>E. quartziticola</u> --	-- 1986	25	
	1987	100	

* LaFon (1984a) noted that wild-collected plants of E. primulifolia have "been on the market at rather inflated prices" (at least in U.S.A.).

33. Illegal Trade: Extent unknown, but perhaps quite extensive in these species and varieties (subspecies). Most are very local; E. moratii is only known from Réserve Naturelle Intégrale du Tsingy de Bemaraha (No. 9) (Cremers, 1985; Andriamampianina, 1984; Jenkins, 1987); and as with so many plant taxa, a few specimens of these dwarf euphorbs can be easily smuggled. Many plants exported from Madagascar have been under official CITES certificates that stated they were artificially propagated, when clearly the majority were wild taken (Knees, 1989; Oldfield, 1985; Davis et al., 1986). In April 1987, the European Community placed a ban on import of plants from Madagascar that were claimed to be artificially propagated. At the 6th meeting of the Conference of the Parties to CITES (Ottawa, 1987), there was discussion of the problem with Madagascar during the meeting of the Plant Working Group, and Madagascar acknowledged the problem and their intent to resolve it in a statement before the Parties. Plant consignments now are accompanied by permits from Madagascar giving wild as the origin of the plants. Although the export of the wild plants now may be legal (except perhaps E. moratii), the fragile populations of some species such as the dwarf euphorbias are even more clearly at risk. The trade is considered detrimental by various persons and groups [e.g. the IUCN/SSC Cacti and Other Succulents Specialist Group; the International Organization for Succulent Plant Study (April 1989 meeting); the CITES Plants Committee (November 1988 1st meeting); the Cactus and Succulent Society of America Conservation Committee (Barad, 1989)].

34. Potential Trade Threats:

341. Live Specimens: As interest in these species has grown among collectors, commercial suppliers have attempted to keep pace. Some species are now available from reliable sources who propagate and raise plants from cuttings and seeds taken in cultivation (e.g. LaFon, 1984a; Hanson, pers. comm. to MacBryde, 1989; Malcolm, 1987; Glass and Foster, 1988), and thus have specimens that fully qualify as artificially propagated under CITES Resolution Conf. 2.12.

This must be strongly encouraged to reduce the pressure on the diminishing wild populations. However, as long as it is commercially viable to import these plants from the wild from Madagascar, compared with expensive production in user countries, the decline is highly likely to continue. Disadvantages with some artificially propagated plants of some species can include the species' very slow growth rates (and thus young, smaller plants than wild ones), and an apparent lack of sufficient resemblance to the characteristics of wild plants (as the different growing conditions of some nurserymen sometimes can result in characters not appearing in cultivated specimens).

Seed dispersal in the wild is explosive, so there is little opportunity to collect seeds from plants in habitat without concerted effort (see also 342. Parts and Derivatives below). Plants removed from habitat may not survive to produce another generation even in cultivation. Furthermore, the pressure on these small plants is greater than that on larger, shrubby species where collection is usually limited

to cuttings and doesn't result in the complete removal of whole plants. Collection is a bit better documented in México (Sánchez-Mejorada et al., 1986), where the threats to the small, threatened cacti (Cactaceae) are analogous with threats to these dwarf euphorbs. Both groups can be stripped from their habitats because of their small size; it is possible to collect an entire population into a suitcase. The result is a serious loss of genetic diversity in any remaining populations. Some cacti have been collected almost to extinction (e.g. Pelecyphora strobiliformis) and a similar fate may await these dwarf euphorbias if further protection is not afforded them very soon (Knees, 1988, 1989).

342. Parts and Derivatives: All trade data on these species are for whole plants. Trade in seeds of Appendix II species usually is not monitored by CITES, so its extent in these species is unknown.

4. Protection Status

41. National: Madagascar appears to have a law that forbids export of wild plants in CITES appendices, but not those "reproduced artificially by approved growers" or those that appear in CITES Appendix II "but are not endangered (scientific evidence in support supplied by the Department responsible for scientific research)" according to Decree No. 83-108 of 31 March 1983 (cf. Davis et al., 1986). Euphorbia quartziticola may be protected directly by such a law, as it is on a list of species adopted by the Malagasy Direction des eaux et forêts that need national and some also international protection (P. Lowry in litt. to J. MacKnight, 1989). Access to the Réserves Naturelles Intégrales is strictly forbidden, other than for scientific research (Jenkins, 1987). Such research does not seem to have been the purpose of the recent exports of E. moratii.
42. International: All succulent species of Euphorbia have been included in Appendix II of CITES since 1973.
43. Additional Protection Needs: In addition to CITES to curtail the threat from international trade, the Malagasy dwarf euphorbias need further local protection. Réserves Spéciales Botaniques can be established (Jenkins, 1987). Most of these species' habitats are vulnerable or severely threatened, and the species are potentially or definitely threatened (Knees, 1989; Jenkins, 1987). Extensive burning, and grazing and/or trampling by cattle are amongst the many hazards facing the survival of these species (Rauh, 1979; Jolly and Jolly, 1984; Chauvet, 1972). Euphorbia cylindrifolia grows in Alluaudia forests close to sisal plantations (Agave sisalana Perr.) and could be destroyed if agricultural development continues (Knees, 1989; Rauh, 1979). Although Jenkins (1987) includes a preliminary IUCN list that categorizes E. francoisii as not threatened (the only one of these dwarf euphorbs so treated), Knees (1988) visited the type locality in 1986 and found much of the habitat destroyed; only two plants were located. She was with D. Supthut, who had been there in 1982 when the habitat was still intact. The inclusion of these eight/nine dwarf species in Appendix I will encourage

artificial propagation in the countries that traditionally import these plants, and perhaps in Madagascar as well, and so help to reduce demand for wild-collected specimens.

5. Information on Similar Species

Although there are about 1,600 species of Euphorbia, only about 600-700 of these can be described as succulent (Gilbert, pers. comm. to Knees, 1989; DeFilipps, 1987). An early regional account of the genus is given by Denis (1921), who only knew E. primulifolia of this group. The eight/nine dwarf Malagasy species are readily identified by their geophytic habit and/or their unusual, characteristically fleshy (succulent) leaves (Rauh, 1987a), unlike other species of succulent Euphorbia in Madagascar (Singer, 1985; Rauh, 1984, 1985; LaFlon, 1983-1988). [Geophytes have underground dormant parts, e.g. tubers, stolons or rhizomes, and underground renewal buds; the aboveground habit of these euphorbs is always small (dwarfed) (Rowley, 1987)] Rauh (1987a) considered Euphorbia cylindrifolia ssp. tuberifera, E. decaryi var. cap-saintemariensis and E. tulearensis hemicryptophytes (which have renewal buds at ground level) or, because these euphorbs' buds are only near the ground, transitional from chamaephytes (stems no higher than 20-50 cm) to hemicryptophytes. Euphorbia cylindrifolia ssp. cylindrifolia, E. decaryi var. decaryi and E. francoisii Rauh (1987a) considered transitional from hemicryptophytes to geophytes, because they have aerial stems during the dormant season. Therefore, Cremers' (1985) inclusion of them all as geophytes is not strictly correct, as Rauh (1987a) considered only E. primulifolia, E. quartziticola and probably E. moratii true geophytes, as they are without aerial stems, leafless and hidden underground during the dry season. The new species E. ambovombensis and E. parvicyathophora appear to be hemicryptophytes in this interpretation of the life-form classification.

Within this group of dwarf euphorbias some may be difficult to distinguish from others (Cremers, 1985). For this reason the group in its entirety is proposed for inclusion in Appendix I, despite the fact E. primulifolia var. primulifolia is quite widespread (Cremers, 1985), although it varies considerably between populations (Gilbert, pers. comm. to Knees, 1989; Rauh, 1987a). Dwarf succulent Euphorbia occur on the African mainland, but most of the species are in subgenus Esula or subgenus Euphorbia (Gilbert, 1987). Size apart, there are no other similarities. Eleven geophytic succulent Euphorbia from the African mainland and central-South Asia are listed by Gilbert (1987) in four informal groups that he placed in subgenera, characterized and named after E. tuberosa L., E. rubella Pax, E. бага A. Cheval. and E. fusiformis Ham. Although other tuberous and tuberoid genera and species exist in Madagascar and on the African mainland and in other dry parts of the world, their vegetative and/or floral characteristics are distinct from these Malagasy Euphorbia species (Rowley, 1980, 1987).

6. Comments from Countries of Origin

None, to be sought.

7. Additional Remarks

The succulent Malagasy species with well-developed leaves, axillary inflorescences, petaloid bracts, and usually stipular spines, Gilbert (1987) placed in Euphorbia subgenus Lacanthis (Raf.) M. Gilbert, which

includes all the taxa proposed here (Gilbert, pers. comm. to Knees, 1989; cf. Rauh, 1987a). Earlier all Euphorbia species with the geophytic growth form, in which vegetative stems are reduced to underground tubers, stolons or rhizomes, were placed in subgenus Rhizanthium by Wheeler (1943), but the inhomogeneity of this subgenus was queried initially by Bally (1967) and then clarified by Gilbert (1987). (Subgenus Lacanthis is characterized by the following features: leaves nearly always well developed; spine shield absent; stipules mostly forming well-developed spines, rarely with additional smaller spinescent enations or fused longitudinally into wings, sometimes almost filiform or absent. Inflorescence always axillary, never terminal; bracts longer than the involucre, often brightly colored and petaloid; cyathial glands always entire, glabrous; seeds cylindrical, obscurely 4-angled, carunculate.) The current division of the geophytic euphorbs in three subgenera and five groups (the continental four discussed in topic 5. Information on Similar Species above and the E. primulifolia group of Malagasy species, listed in section 14. Species above) improves the situation, as these groups are based on fundamental morphological similarity rather than life-style alone, and now correlate better with distribution. The subgenus Lacanthis includes 40 some Malagasy species (8/9 dwarfs) in Leandri's Groups M. II, M. III, M. VI and M. VII indicated above in section 1. Taxonomy, the small African mainland E. rubella groups of geophytes (about 4 species) mainly in Ethiopia as well as Kenya and Uganda, and perhaps E. piscidermis M. Gilbert of Ethiopia.

8. References

- Andriamampianina, J., 1984. Nature reserves and nature conservation in Madagascar, pp. 219-228 in A. Jolly, P. Oberlé and R. Albignac, eds., Madagascar. Key Environments series. Pergamon Press, Oxford, England. 239 pp.
- Bally, P.R.O., 1967. Miscellaneous notes on the flora of Tropical East Africa, including descriptions of new taxa. 37: Notes on Euphorbia rubella. Candollea 22: 261-263.
- Barad, G.S., 1989. Just say no. Cactus and Succulent J. (U.S.) 61(2): 87-88.
- Battistini, R. and P. Verin, 1972. Man and the environment in Madagascar, pp. 311-337 in R. Battistini and G. Richard-Vindard, eds., Biogeography and Ecology in Madagascar. Monogr. Biol. Vol. 21. W. Junk, The Hague. 765 pp.
- Chauvet, B., 1972. The forests of Madagascar, pp. 191-199 in Battistini and Richard-Vindard, op. cit. above at Battistini and Verin.
- Cremers, G., 1984 [publ. 1985]. Les euphorbes géophytes de Madagascar. Bull. Jard. Bot. Nat. Belg. 54: 367-391. [Includes a key.] Davis, S.D. et al. 1986. Plants in Danger: What do We Know?. Threatened Plants Unit, IUCN Conservation Monitoring Centre. IUCN, Gland, Switzerland and Cambridge, U.K. 461 pp.
- DeFilipps, R.A., 1987. Topics in the succulent plant trade: Euphorbias, pp. 11-31 in D. Fuller and S. Fitzgerald, Conservation and Commerce of Cacti and Other Succulents. TRAFFIC (U.S.A.), Washington, D.C.

- Denis, M., 1921. Les Euphorbiées des Iles Australes d'Afrique. Imprimerie Nemourienne, Nemours. [1922. Les Euphorbes des Iles Australes d'Afrique. Rev. Gén. Bot. 34: 1-64, 96-123, 171-177, 214-236, 287-299, 346-366.
- Fourie, S.P., 1984. Threatened euphorbias of the Transvaal. *Euphorbia J.* 2: 75-98. Gilbert, M.G. 1987. Two new geophytic species of Euphorbia with comments on the subgeneric grouping of its African members. *Kew Bull.* 42: 231-244.
- Gilbert, M.G., 1987. Two new geophytic species of Euphorbia with comments on the subgeneric grouping of its African members. *Kew Bull.* 42: 231-244.
- Glass, C. and B. Foster, 1988. Cactic and succulents for the beginner. *Cactus and Succulents J. (U.S.)* 60(6): 258-261.
- Jacobsen, H., 1977. *Lexicon of Succulent Plants*, 2nd ed. Blandford Press, Poole, Dorset, U.K. 682 pp.
- Jenkins, M.D., ed., 1987. *Madagascar: An Environmental Profile*. IUCN Conservation Monitoring Centre. IUCN, Gland, Switzerland and Cambridge, U.K. 374 pp. (Includes IUCN preliminary category on vulnerability).
- Jolly, A. and R. Jolly, 1984. Malagasy economics and conservation: A tragedy without villains, pp. 211-217 in Jolly et al., op. cit. above at Andriamampianina.
- Knees, S., 1988. Plants in Peril 12. *Kew Mag.* 5: 88-92.
- Knees, S.G., 1989. A report of threats to the survival of endemic succulents in Madagascar. *Bradleya*: in press.
- Koechlin, J., 1972. Flora and vegetation of Madagascar, pp. 145-190 in Battistini and Richard-Vindard, op. cit. above at Battistini and Verin.
- (LaFon, R.), 1984a. Euphorbia primulifolia Bak. *Euphorbia J.* 2: 128.
- (LaFon, R.), 1984b. Variations of Euphorbia francoisii. *Euphorbia J.* 2: 74.
- (LaFon, R.), 1983-1988-. The succulent Euphorbiaceae: Photographic collection and descriptions. *Euphorbia J.* 1-5- (Includes colour photographs of at least 11 of these 17 Malagasy dwarf taxa.).
- Malcolm, S., 1987. Growing Madagascar euphorbias from cuttings. *Euphorbia J.* 4: 27-28.
- Millot, J., 1972. In conclusion, pp. 741-756 in Battistini and Richard-Vindard, op. cit. above at Battistini and Verin.
- Oldfield, S., 1985. The western European trade in cacti and other succulents. *IUCN TRAFFIC Bull.* 7(3/4), reprinted on pp. 32-65 in Fuller and Fitzgerald, op. cit. above at DeFilipps.
- Rauh, W., 1979. Problems of biological conservation in Madagascar, pp. 405-421 in D. Bramwell, ed., *Plants and Islands*. Academic Press, London, England.

- Rauh, W., 1983. The succulent vegetation of central Madagascar, (part 1). The "Plateau-Central." Cactus and Succulent J. (U.S.) 55(3): 124-127.
- Rauh, W., 1984. The Wonderful World of Succulents, 2nd. ed. Smithsonian Institution Press, Washington, D.C., U.S.A. 164 pp.
- Rauh, W., 1985. Madagascarian euphorbias: Life & growth forms, (part 1). Euphorbia J. 3: 18-37.
- Rauh, W., 1986. Euphorbia parvicyathophora Rauh, sp. nov. A new dwarf Euphorbia from Madagascar. Cactus and Succulent J. (U.S.) 58(4): 143-145.
- Rauh, W., 1987a. Madagascan euphorbias: Life & growth forms, part 2. Euphorbia J. 4: 11-26.
- Rauh, W., 1987b. New & little known euphorbias from Madagascar. Cactus and Succulent J. (U.S.) 59(6): 251-255.
- Rauh, W. 1988. New and little known euphorbias from Madagascar. Cactus and Succulent J. (U.S.) 60(4): 184-191.
- Rauh, W. and G. Buchloh, 1987. Euphorbia decaryi var. spirosticha Rauh & Buchloh: A new variety from South-western Madagascar. Cactus and Succulent J. (U.S.) 59(1): 9-12.
- Rowley, G.D., 1980. Name that Succulent. Stanley Thornes, Cheltenham, England. 268 pp.
- Rowley, G.D., 1987. Caudiciform & Pachycaul Succulents. Strawberry Press, Mill Valley, Calif. 282 pp.
- Sánchez-Mejorada, H., et al., 1986. Succulent Plant Conservation Studies and Training in México. World Wildlife Fund-U.S., Washington, D.C.
- Singer, M., 1985. Famata of Malagasy. Euphorbia J. 3: 14-17.
- Wheeler, L.C., 1943. The genera of the living Euphorbieae. Amer. Midl. Nat. 30: 456-503.