CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

Twenty-second meeting of the Plants Committee
Tbilisi (Georgia), 19-23 October 2015

Interpretation and implementation of the Convention

Species trade and conservation

Periodic Review of species included in Appendices I and II
[Resolution Conf. 14.8 (Rev. CoP16)]

PERIODIC REVIEW OF DIDIERACEAE, *ALOE* SPP. AND *EUPHORBIA* SPP.

1. This document has been submitted by Madagascar.*

* *The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.*

PERIODIC REVIEW OF SPECIES INCLUDED IN THE CITES APPENDICES

This report includes information based on a bibliographic summary of studies carried out on the species in this review.

It refers to: - 11 species of Didieraceae spp. in Appendix II

- 17 species of *Aloe spp*. in Appendix I

- 10 species of *Euporbia spp*. in Appendix I

I- DIDIERACEAE Family

These are all thorny plants, characterized by the presence of long and short branches greatly adapted to drought. This family that is endemic to Madagascar comprises four genuses (Didierea, Alluaudia, Alluaudiopsis, Decaryia) of 11 species (Applequist W.L. & Wallace R.S., 2003). The *Didieraceae* species have been listed in CITES Appendix II since 1977.

Table 1 : Conservation status, range area and conservation area of the species (with AP : Protected Area, NAP : New Protected Areas, PN : National park, RS : Special Reserve)

Scientific name	Authors	CITES Appendix	IUCN status	Proposed status	Habitat and range area	Ecological range	Presence in AP (in situ conservation)	Collectors' stock (ex situ conservation)
Alluaudia ascendens Synonym *: Didierea ascendens Drake*	Drake	II	-	VU D2	- Bioclimate : Semi-arid - Altitude: 0–499 m - Strictly located in the Mandrare valley, on alluvial sand (Anosy region)	Restricted	- Andohahela National Park (PN) - Berenty Reserve	75
Alluaudia comosa Synonym *: Didierea comosa Drake*	Drake	II		LC	- Altitude: 0–499 m - on the limestone plateaus around Toliara (Atsimo-Andrefana region) - Menarandra Valley and Mandrare basin (Anosy region)	Restricted	- Cap Sainte Marie Special Reserve (RS) - Tsimanampetsotsa National Park (PN) - La Table/St Augustin New Protected Area (NAP)	200
Alluaudia dumosa Synonym *: Didierea dumosa Drake*	Drake	II		LC	- Distributed from the vicinity of Ampanihy (Atsimo Andrefana region) to the transition area of plot 3 of the Andohahela National Park and in the Petriky forest in the west of Fort Dauphin (Anosy region) - Vegetation type : undergrowth	Broad	- Andohahela National Park (PN)	11

Scientific name	Authors	CITES Appendix	IUCN status	Proposed status	Habitat and range area	Ecological range	Presence in AP (in situ conservation)	Collectors' stock (ex situ conservation)
					- Bioclimate : Semi-arid - Altitude: 0–499 m, 500–999 m			
Alluaudia humbertii	Choux	II		LC	- In the isolated area around and to the north-east of Ilhosy (Ihorombe region) - Vegetation type : Inselberg, undergrowth - Bioclimate: Humid, Semi-arid, Sub-humid - Altitude: 0–499 m, 500–999 m	Large	Andohahela National Park (PN), Beza Mahafaly Reserve	50
Alluaudia montagnacii	Rauh	II		VU D2	- Sand dunes to the sounth of Itampolo (Atsimo-Andrefana region) - Vegetation type: Undergrowth - Bioclimate: Semi-arid - Altitude : 0–499 m - Only known in 2–5 locations	Large	-	20
Alluaudia procera	Drake	II	LR/nt see 2.3	-	- regions: Androy, Anosy, Atsimo-Andrefana, Menabe - Vegetation type: Undergrowth - Bioclimate: Semi-arid - Altitude: 0–499 m	Restricted	Andohahela National Park (PN), Beza Mahafaly Reserve	150
Alluaudiopsis fiherenensis	Humbert& Choux	II		VU D2	- Limited to the limestone substratum in semi-arid deciduous undergrowth from the Cap Sainte Marie Special Reserve (Androy region) to the north of Toliary (Atsimo-Andrefana region) - Vegetation type: Undergrowth - Bioclimate: Semi-arid - Altitude: 0–499 m	Restricted	- Cap Sainte Marie Special Reserve (RS) - Tsimanapetsotsa National Park (PN) - St Augustin New Protected Area (NAP)	200
Alluaudiopsis marnieriana	Rauh	II	-	EN	- Limited to the limestone substratum in semi-arid deciduous undergrowth from the Cap Sainte Marie Special Reserve (Androy region) to the north of Toliary (Atsimo-Andrefana region) - Vegetation type: Undergrowth - Bioclimate: Semi-arid - Altitude: 0–499 m - Only known in 2–5 locations	Restricted	- St Augustin New Protected Area (NAP)	70

Scientific name	Authors	CITES Appendix	IUCN status	Proposed status	Habitat and range area	Ecological range	Presence in AP (in situ conservation)	Collectors' stock (ex situ conservation)
Decarya madagascariensis	Choux	II	-	LC	- Vegetation type: Undergrowth - Bioclimate: Semi-arid - Altitude: 0–499 m - Only known in 2–5 locations	Large	- Andohahela National Park (PN)	-
Didierea madagascariensis Synonym *: Didierea mirabilis Baill.*	Baill	II	-	LC	- Bioclimate: Semi-arid - Altitude: 0-499 m - In the forest and semi-arid deciduous undergrowth from Tolilara (region Atsimo Andrefana) to the south of Morondava (Menabe region)	Large	- Tsimanampetsotsa National Park (PN) - St Augustin New Protected Area (NAP)	389
Didierea trollii	*Capuron & Rauh*	II	-	VU	-Vegetation type: Undergrowth - Altitude : 0-499 m - Androy, Anosy and Atsimo-Andrefana regions	Large	Beza Mahafaly Reserve	340

- Didieraceae, a family that is endemic to Madagascar, has a very precise geographical location. The species that make up the family have particular ecological requirements (soil conditions and rain) and their systematic likeness have posed numerous problems to taxonomists. The range area corresponds to very severe climatic conditions (poor rainfall, long dry season, sometimes up to 12 dry months) (Rakotovao, L. H. et al., 1996).

- Only *Alluaudia procera* has an IUCN conservation status. For the remaining species, the proposed statuses are based on knowledge of the species among groups of specialists in the Missouri Botanical Garden-Madagascar programme (data available from http://www.tropicos.org/Project/MADA)

- The presence of the species in Protected Areas is beneficial for their longevity.

- Ex situ conservation is guaranteed by the propagation of the species in collectors' garden centres. The collectors are invited and encouraged to propagate the species in order to ensure their sustainable use. Currently, three collectors are active in the ex situ propagation and conservation of these species. The status of collectors' stock for these species is summarized in the last column of the table (CITES Permanent Secretariat for Plants, Madagascar, 2014).

International trade

All species of Didiereaceae are sold as whole living plants.

The table summarizes the quantities of DIDIERACEAE species exported since 2005. *Alluaudia ascendens* was the most sold in 2005 and trade as disappeared over time for all species.

Table 2 : Trade data for DIDIERACEAE

Scientific name	2005	2006	2007	2008	2009	2010	2011	2012	2013
Alluaudia ascendens	2206	2	720	-	-	-	-	-	-
Alluaudia comosa	89	90	-	-	-	-	-	-	-
Alluaudia dumosa	-	52	40	-	-	-	-	-	-
Alluaudia humbertii	-	-	-	-	-	-	-	-	-
Alluaudia montagnacii	6	-	-	-	-	-	-	-	-
Alluaudia procera	7	4	17	-	-	-	-	-	-
Alluaudiopsis fiherenensis	-	215	-	-	-	-	-	-	-
Alluaudiopsis marnieriana	-	3	-	-	-	-	-	-	-
Decarya madagascariensis	-	-	-	-	-	-	-	-	-
Didierea madagascariensis	34	-	-	-	-	-	-	-	2
Didierea trollii	25	10	180	-	-	50	-	-	-

(Source : CITES Plant Management Authority, Madagascar, 2015)

II- Family : LILIACEAE

These 17 species of *Aloe* have been listed in CITES Appendix I since 1995.

Table 3 : Conservation status, range area and conservation area of the species (NAP : New Protected Areas, PN : National Park). *

Scientific name	Authors	CITES Appendix	IUCN status	Proposed status	Habitat and range area	Ecological range	Presence in Protected Areas	Collectors' stock (ex situ conservation)
Aloe albiflora - Synonym : *Guillauminia albiflora (Guillaumin) A. Bertrand*	Guillaumin	I	-	DD	- Vegetation type: Undergrowth - Bioclimat: Semi-arid - Altitude: 0–499 m - Anosy region - Only on type of specimen known	Restricted	-	-
Aloe alfredii	Rauh	I	-	DD	- Vegetation type: Inselberg - Bioclimate: Sub-humid mountain - Altitude: 1500–1999 m, 2000–2499 m - Vakinankaratra region - Known in only one location.	Restricted	Ibity New Protected Area (NAP)	310
Aloe bakeri	Scott-Elliot	I		NT	- Vegetation type: Inselberg - Bioclimate: Humid, Sub-humid - Altitude: 0–499 m - Only known in farming - Natural position (a rocky hill near to Taolagnaro) disappeared due to industrial and urban expansion.	Restricted	-	517
Aloe bellatula	Reynolds	I	-	VU	- Vegetation type: Inselberg - Bioclimate: Sub-humid mountain - Altitude: 1500–1999 m - Amoron'i Mania region - Only known in 2–5 locations	Restricted	Itremo New Protected Area (NAP)	-
Aloe calcairophila	Reynolds	I	-	CR	- Vegetation type: Inselberg - Bioclimate: Sub-humid mountain - Altitude: 1000–1499 m - Amoron'i Mania region - Only known in 2–5 locations	Restricted	Itremo New Protected Area (NAP)	450

Scientific name	Authors	CITES Appendix	IUCN status	Proposed status	Habitat and range area	Ecological range	Presence in Protected Areas	Collectors' stock (ex situ conservation)
Aloe delphinensis	Rauh	I	-	DD	- Vegetation type: Inselberg - Bioclimate: humid - known in only one location (Anosy-Toliara region) - Altitude : 0–499 m, 500–999 m	Restricted	-	
Aloe compressa *Varieties :* *- A. compressa var. compressa* *- A. compressa var. paucituberculata Lavranos* *- A. compressa var. rugosquamosa H. Perrier = Aloe rugosquamosa (H. Perrier) J.-B. Castillon& J.-P. Castillon* *- A. compressa var. schistophila H. Perrier*	H. Perrier	I	-	VU	- Vegetation type: Inselberg - Bioclimate: Sub-humid - Altitude: 1000–1499 m, 1500–1999 m - On quartzite on Ivohibe Mountain and Iarambo Mountain and schistose rocks to the north of Ambatofinandrahana (Amoron'i Mania region)	Restricted	- Itremo New Protected Area (NAP)	1413
Aloe haworthioides *Varieties:* *- A. haworthioides var. aurantiaca H. Perrier* *- A. haworthioides var. haworthioides*	Baker	I	-	VU	- Vegetation type: Inselberg - Bioclimate: Sub-humid - Altitude: 1000–1499 m, 1500–1999 - Amoron'i Mania and Vakinankaratra regions	Restricted	- Andringitra Protected Area (AP)	175
Aloe descoingsii	Reynolds	I	-	CR	- Vegetation type: Inselberg - Bioclimate: Sub-humid - Altitude: 0–499 m - Atsimo-Andrefana region	Restricted	- St Augustin New Protected Area (NAP)	350
Aloe helenae	Danguy	-	CR D		- Vegetation type: Inselberg - Bioclimate: Sub-humid - Altitude: 1000 - 1499 m, 1500 – 1999 m - Amoron'I Mania, Vakinankaratra, Anosy, Androy regions - Only known in 2–5 locations	Restricted	- Ibity New Protected Area (NAP)	-

Scientific name	Authors	CITES Appendix	IUCN status	Proposed status	Habitat and range area	Ecological range	Presence in Protected Areas	Collectors' stock (ex situ conservation)
Aloe laeta *Varieties:* *- A. laeta var. laeta* *- A. laeta var. maniaensis H. Perrier*	A. Berger	I	-	EN	- Vegetation type: Inselberg - Bioclimate: Sub-humid - Altitude: 1000–1499 m, 1500–1999 m - Vakinankaratra and Amoron'I Mania regions -	Restricted	- Ibity New Protected Area (NAP)	20
Aloe parallelifolia	H. Perrier	I	-	EN	- Vegetation type: Inselberg - Bioclimate: Sub-humid - Altitude: 1500–1999 m - Vakinankaratra and Amoron'I Mania regions	Restricted	- Ibity New Protected Area (NAP) - Itremo New Protected Area (NAP)	320
Aloe parvula	A. Berger	I	-	EN	- Vegetation type: Inselberg - Bioclimate: Sub-humid - Altitude: 1000–1499 m, 1500–1999 m	Localized	- Itremo New Protected Area (NAP)	50
Aloe suzannae	Decary	I	CR D	-	- Vegetation type: Fourré - Bioclimate: Sub-humid - Altitude: 0–499 m - Only known in 2–5 locations (Anosy and Atsimo-Andrefana regions)	Restricted	-	-
Aloe rauhii	Reynolds	I	-	EN	- Vegetation type: Undergrowth - Bioclimate: Semi-arid - Altitude: 0–499 m - Androy and Atsimo-Andrefana regions	Restricted	-	-
Aloe versicolor	Guillaumin	I	-	EN	- Vegetation type: Inselberg - Bioclimate: Sub-humid - Altitude: 0–499 m - Ampasimena (Toliara)	Restricted	-	-

- All species of *Aloe* in Madagascar are listed in the CITES Appendices, which means that their trade is controlled in order to not harm their survival. Among the 21 *Aloe* species in Appendix I, 17 are species from Madagascar. This is an indication of the vast threat to the conservation of these species. Only two of these species currently appear in the IUCN Red List (*Aloe suzannae* Decary and *Aloe helenae* Danguy), which are both critically endangered (CR D). Preliminary analysis of the conservation status of the *Aloe* L. genus of Madagascar, carried out by the Royal Botanic Gardens Kew team in Madagascar has enabled observation of the dominance of the status of at risk species (Rakotoarisoa S.E. et *al.*, 2014).

- The majority of species have restricted distribution.

- The natural habitat of the species is protected when it is found within Protected Areas.

- Collectors propagate the species in their garden centres in order to ensure the ex situ conservation of the species. Three collectors are active in the ex situ propagation and conservation of Aloes. The status collectors' stock of Aloes is summarized in the last column of Table 3 (CITES Permanent Secretariat for Plants, Madagascar, 2014).

III- Family : EUPHORBIACEAE

These 10 species of *Euphorbia* have been listed in Appendix I since 1990, except *Euphorbia cremersii*, which was listed in 1995 with its varieties.

Table 4 : Conservation status, range area and conservation area of the specie (with AP : Protected Areas, NAP : New Protected Areas, PN : National Park, RS : Special Reserve).

Scientific name	Authors	CITES Appendix	IUCN status	Habitat and range area	Ecological range	Presence in Protected Areas (in situ conservation)	Collectors' stock (ex situ conservation)
Euphorbia ambovombensis	Rauh & Razaf	I	VU D2 ver 3.1	- Vegetation type: Inselberg - Bioclimate: Semi-arid - Limited to Ambovombe (Androy region)	Localized	-	20
Euphorbia capsaintemariensis	(Rauh) Rauh	I	CR ver 3.1	- Cap Sainte Marie (Région Androy , Itampolo (Région Atsimo Andrefana)	Localized Fragmented	Cap Sainte Marie Special Reserve (RS)	600
Euphorbia cylindrifolia *Varieties:* *- E. cylindrifoliasubsp. cylindrifolia* *- E. cylindrifolia subsp. tuberiferaRauh*	Rauh&Marn.-Lap	I	EN B1ab(iii)+ 2ab(iii) ver 3.1	- Vegetation type: Undergrowth - Bioclimate: Humid, Semi-arid - Altitude : 0–499 m - Only known in 2–5 locations- between Amboasary-Atsimo andt Fort Dauphin (Anosy region)	Large	-	1480

Scientific name	Authors	CITES Appendix	IUCN status	Habitat and range area	Ecological range	Presence in Protected Areas (in situ conservation)	Collectors' stock (ex situ conservation)
Euphorbia cremersii *Varieties:* *- E. cremersii var. cremersii* *- E. cremersii var. rakotozafyi (Cremers) Rauh* *- E. cremersiifo. viridifolia Rauh*	Rauh & Razaf	I	VU D2 ver 3.1	- Vegetation type: Forest - Bioclimate: Dry - Altitude : 0–499 m, 500–999 m - Boeny and Betsiboka regions	Restricted	-	1236
Euphorbia decaryi *Varieties:* *- E. decaryi var. ampanihyensis Cremers* *- E. decaryi var. capsaintemariensis Cremers* *- E. decaryi var. decaryi* *- E. decaryi var. robinsoniiCremers* *- E. decaryi var. spirosticha Rauh & Buchloh*	Guillaumin	I	EN B1ab(iii)+ 2ab(iii)	- Vegetation type: Undergrowth - Bioclimate: Semi-arid - Altitude : 0–499 m - Ampanihy (Atsimo-Andrefana region), Androy region, Fort Dauphin (Anosy region)	Restricted	-	50
Euphorbia françoisii	Leandri	I	CR B1ab (iii,v)	- Vegetation type: Undergrowth - Altitude : 0–499 m - Fort Dauphin (Anosy region)	Localized	-	30
Euphorbia moratii *Varieties:* *- E. moratii var. antsingiensis Cremers* *- E. moratii var. bemarahensisCremers* *- E. moratii var. moratii* *- E. moratii var. multiflora Rauh*	Rauh	I	VU D2	- Vegetation type: Inselberg - Bioclimate: Dry - Altitude : 0–499 m, 500–999 m - Tsingy de Bemaraha (Melaky region), Maevatanana (Betsiboka region), Boeny region	Localized	- Tsingy de Bemaraha National Park (PN)	300
Euphorbia quartziticola	Leandri	I	EN B1ab (iii)+2ab(iii)	- Vegetation type: Inselberg - Bioclimate: Humid - Altitude : 1500–1999 m - On the high central plateaus: Itremo massif (Amoron'I Mania region).	Large	- Itremo New Protected Area (NAP)	100

Scientific name	Authors	CITES Appendix	IUCN status	Habitat and range area	Ecological range	Presence in Protected Areas (in situ conservation)	Collectors' stock (ex situ conservation)
Euphorbia parvicyathophora	Rauh	I	CR B1ab(iii)+ 2ab(iii)	- Vegetation type: Undergrowth - Bioclimate: Semi-arid - Altitude : 0-499 m - Near to Anjamalala (Atsimo-Andrefana region)	Localized	-	125
Euphorbia tulearensis	Rauh	I	CR B1ab(iii,v) +2ab(iii,v)	- Vegetation type: Undergrowth - Bioclimate: Semi-arid - Altitude : 0–499 m - Atsimo-Andrefana region	Localized	St Augustin New Protected Area (NAP)	75

- All of the species of Euphorbiaceae in Appendix I have a severe IUCN status, which demonstrates the threats that influence these species.

- The presence of the species in Protected Areas is beneficial for their longevity, which ensures their in situ conservation.

- The ex situ conservation of the species is ensured by collectors that carry out propagation in their garden centres. The collectors are obliged to propagate the species that they wish to export and the quantities authorized for export depend on this propagation. Three collectors actively participate in ex situ conservation of these species. The status of collectors' stock is given in Table 4 (CITES Permanent Secretariat for Plants, Madagascar, 2014).

IV- Threats

Habitat degradation, bush fires and clearing fires are the main threats to the species examined.

V- Conclusion and recommendation

The data on the abundance of the species studied in their natural habitat are insufficient. The proposed statuses are mostly based on the range of occurrence of the species. International trade does not constitute a threat to the species. Nevertheless, continuous degradation of their natural habitat increases the risk of extinction of these species.

In-depth scientific studies mainly on the biology and ecology of each species are needed. Moreover, the listing of these species in the relevant Appendices is currently appropriate until the acquisiton of new information.

VI- Bibliographical References

- Applequist W.L. & Wallace R.S., 2003. Expanded circumscription of Didiereaceae and its division into three subfamilies. ADANSONIA, sér. 3, 25 (1) : pages 13-16
- Haevermans, T. 2003. Le genre Euphorbia L. (Euphorbiaceae) à Madagascar: phylogénie moléculaire et systématique. Thèse de doctorat. Paris, MNHN.

- Rakotoarisoa S.E., 2014. A preliminary assessment of the conservation status of the genus Aloe L. in Madagascar. Bradleya 32/2014 : pages 81–91

- Rakotovao Lala H. et al., 1996. Les Didieraceae : origine, affinités systématiques et répartition à Madagascar. Biogéographie de Madagascar : pages 183 – 186.

- Sehen, L.R. 2006. Etat de la population et caractéristiques écologiques des habitats de Aloe laeta var. laeta Berger et Aloe trachyticola (H.Perrier) reynolds (ASPHODELACEAE) dans le Massif d'Ibity . Mémoire de DEA. Université d'Antananarivo.

- Rapport Secrétariat CITES Flore Madagascar, 2015
- Organe de Gestion CITES Flore Madagascar, 2015
- http://www.tropicos.org/Project/MADA
- http://www.iucnredlist.org/research