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

Seventeenth meeting of the Conference of the Parties
Johannesburg (South Africa), 24 September – 5 October 2016

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Delete *Tillandsia mauryana* from CITES Appendix II, as it does not meet the listing criteria set out in Article II (paragraphs 2 a) and b)) of the Convention text or the criteria laid down in Annexes 2a) and 2b) of Resolution Conf. 9.24 (Rev. CoP16).

B. Proponent

Mexico [*]

C. Supporting statement

1. Taxonomy

1.1	Class:	Liliopsida
1.2	Order:	Poales
1.3	Family:	Bromeliaceae Juss.
1.4	Subfamily:	Tillandsioidea
1.5	Genus:	*Tillandsia*
1.6	Species:	*Tillandsia mauryana* L.B. Sm
1.7	Scientific synonyms:	*Viridantha mauryana* (L.B. Sm.) Espejo.
1.8	Common names:	Tecolotito.
1.7	Code numbers:	N/A

2. Overview

At its 15th meeting (Geneva, 2005), the Plants Committee approved a list of taxa to be included in the periodic review process in order to consider them during the period between the 13th and 15th meetings of the Conference of the Parties (Bangkok, Thailand, 2004, and Doha, Qatar, 2010, respectively); the aforementioned list included *Tillandsia mauryana* (listed in Appendix II since 1992, with Annotation #4), a plant that is endemic to Mexico.

[*] *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.*

At the 19th meeting of the Plants Committee (Geneva, 2011), Mexico offered to conduct the review of *Tillandsia mauryana*. To this end, during 2012 and 2013 the CITES Scientific Authority of Mexico (CONABIO) funded the project entitled *Evaluación de la situación de Tillandsia mauryana en el Apéndice II de la CITES, según su estado de conservación y comercio* [Review of the status of *Tillandsia mauryana* in CITES Appendix II based on its conservation and trade], coordinated by Dr. María Teresa Valverde Valdés of the National Autonomous University of Mexico (UNAM). The purpose of the project was to assess the conservation status, use, management, threats to and trade of *T. mauryana*. Its main conclusions were the following:

a) *Tillandsia mauryana* is a species that is endemic to Mexico; its range occupies less than 2,259 km^2 in the state of Hidalgo.

b) *T. mauryana* is a rock-dwelling species and occurs on the vertical faces of limestone cliffs. Although the species has relatively high abundance values, demographic analyses show that the population growth rate (λ) is less than one, which suggests that the population is decreasing.

c) The range of *T. mauryana* is located mainly in the Barranca de Metztitlán (Meztitlán Canyon) Biosphere Reserve; however, there is some pressure from rock mining (of rocks where the plants grow), road building, and urban development.

d) At a national level, there are no records of utilization or of legal or illegal trade of the species.

e) At an international level, although there is no record of exports from Mexico in the UNEP-WCMC database, there are records of exports from other countries using source code 'A' (artificially propagated). There are also web pages of countries that offer the species for sale outside Mexico.

Based on an analysis of the species according to the criteria laid down in Resolution Conf. 9.24 (Rev. CoP16), it can be concluded that:

a) *T. mauryana* is not subject to international trade and does not resemble any other species currently listed in Appendix II; it therefore does not meet any of the inclusion criteria for CITES Appendix II (set out in Annexes 2a and 2b of Resolution Conf. 9.24 [Rev. CoP16)].

b) As a result, it is considered appropriate to delist *T. mauryana* from the CITES Appendices, considering that there are domestic measures in place for its conservation, including the following:

   i) The protected area *Reserva de la Biosfera Barranca de Metztitlán* (Metztitlán Canyon Biosphere Reserve), which encompasses most of the known range of the species. The updated management plan for the Biosphere Reserve will include specific actions for the protection of *T. mauryana* (*Comisión Nacional de Áreas Naturales Protegidas*, CONANP, 2016).

   ii) *T. mauryana* is going to be included in the Official Mexican Standard or Mexican list of species at risk (*Norma Oficial Mexicana* NOM-059-SEMARNAT-2010) under the category of Threatened, and therefore will be managed by the Ministry of the Environment and Natural Resources (*Secretaría de Medio Ambiente y Recursos Naturales,* SEMARNAT) in accordance with the provisions of the Mexican Wildlife Act (*Ley General de Vida Silvestre,* LGVS).

Finally, the recommendation of delisting *T. mauryana* from CITES Appendix II was endorsed by the Plants Committee at its 21st meeting (PC21, Veracruz 2014) after considering the results of the periodic review of *Tillandsia mauryana* submitted by Mexico through document PC21 Doc. 19.3.2.

3. Species characteristics

3.1 Distribution

Tillandsia mauryana is a species that is endemic to the state of Hidalgo in Mexico. In the past, it was considered to occur in the states of Hidalgo, Guerrero, Oaxaca, Zacatecas, Jalisco and Morelos, based on herbarium data (Valverde, 2013). However, its occurrence in the field has only been confirmed in Hidalgo, specifically in 31 sites in the municipalities of Metztitlán, Zimapán, El Cardonal and Atotonilco el Grande. Most of these sites are located in the Metztitlán and Tolantongo canyons in

the Metztitlán Canyon Biosphere Reserve, as shown in Figure 1. The species occurs over an area of approximately 2,260 km^2 (**Figure 1**).

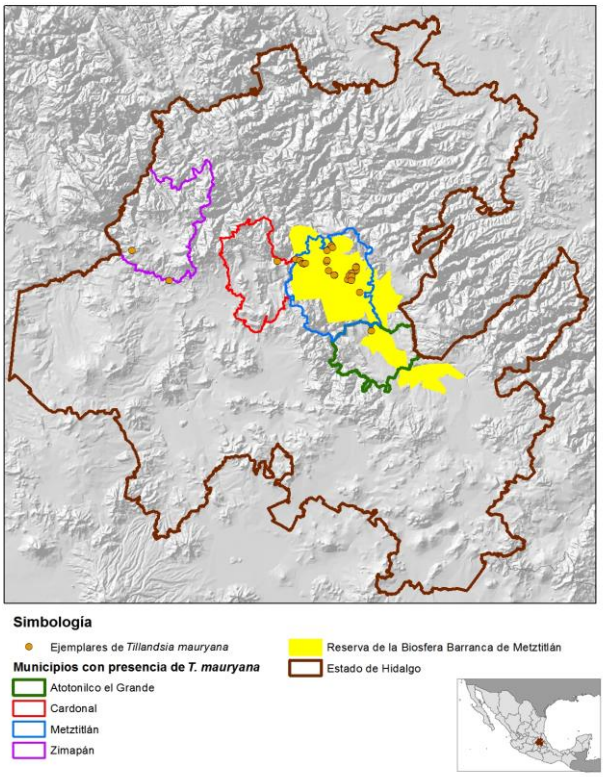

Figure 1. Located populations of *Tillandsia mauryana* (Valverde *et al.* 2013). [1]

3.2 Habitat

Considering the sites where populations of *T. mauryana* were found, it was determined that the habitats in which the species occurs are limestone cliffs with different orientations and heights in ecosystems such as mesquite-(*Prosopis* spp.)-dominated scrubland or *mezquital* (13% of sites), dry deciduous forest (65%) and sarcocaulescent scrub (22%), according to the classification made by Rzedowski (1990). The species was found at altitudes ranging from 994 and 1989 m.a.s.l., which suggests that the distribution of the species covers a broader altitudinal range than was initially reported (i.e., 1300-1800 m; Espejo-Serna 2003). The climate (according to the Köppen classification, as modified by Enriqueta García; in GEQ, 2002) in the species' known sites of occurrence is semi-arid (BS1hw) in Metztitlán; temperate-subhumid (C(wo)) in El Cardonal; temperate semi-arid (BS1kw) in Zimapán; and temperate arid (BSokw) in Atotonilco el Grande.

3.3 Biological characteristics

Tillandsia mauryana is a perennial herb that is propagated from seed; seeds are feather-like and wind dispersed. When released, *T. mauryana* seeds can stick to rock surfaces and germinate to produce seedlings. The plant seems to be very vulnerable at the seedling stage, when it has an annual growth rate of 0.89 cm^2. Growth rate changes depending on the development stage of the plant. *T. mauryana* can live for up to 35 years (Espejo-Serna, 2003).

T. mauryana plants are able to reproduce at an early age (around 2 years); the larger the plant, the greater the possibility of it reproducing. However, according to a study by Valverde *et al.* (2013), only a small proportion of the population (approximately 13%) reproduces each year, and it seems that specimens that reproduce one year will not reproduce the following year. The plant flowers from December to March (Espejo-Serna, 2003) and vegetative propagation is uncertain. It is not

[1] *Figure 1 Translation of the text: Simbología = Legend; Ejemplares de Tillandsia mauryana = Specimens of* T. mauryana*; Municipios con presencia de T*. Mauryana = *Municipalities where* T. mauryana *occurs; Reserva de la Biosfera Barranca de Metztitlán = Metztitlán Canyon Biosphere Reserve; Estado de Hidalgo = State of Hidalgo.*

uncommon to see several rosettes grouped together; however, this may be the result of several seeds germinating in the same spot, forming a cluster of rosettes.

3.4 Morphological characteristics

Tillandsia mauryana forms a dense, sphere-shaped rosette that is never more than 15 cm tall, and can reach 20 cm in diameter. It is formed by several whole-margin leaves covered with radial peltate trichomes, which give the plants a cottony appearance (Espejo-Serna, 2003). Leaves are recurved, with subulate, conduplicate blades; measured from the base, leaves can be 6-10 cm long and 3-7 mm wide. The plant has a distichous leaf arrangement (Espejo-Serna, 2003).

The inflorescence of *T. mauryana* is nidular and compound, usually with no peduncle (if any, it is normally less than 1 cm long) (**Figure 2**). Flowers are tubular-shaped; sepals are green at the base and pink at the apex, and approximately 11-17 mm long; petals are straight at the base and rounded at the apex; medial and apical parts are greenish, and basal parts are whitish; petal size is 17-21 mm long by 2.5-3 mm wide. The flower is protected by a pinkish, ovate bract (Espejo-Serna, 2003). Stamens are flat and filiform, with black oblong anthers; ovaries are ovoid-shaped and filiform, i.e., long and thin; fruits are oblong capsules, rostellate at the apex, and measure approximately 2.3 cm. Seeds are caudate, feather-like, wind-dispersed, and 15 mm long.

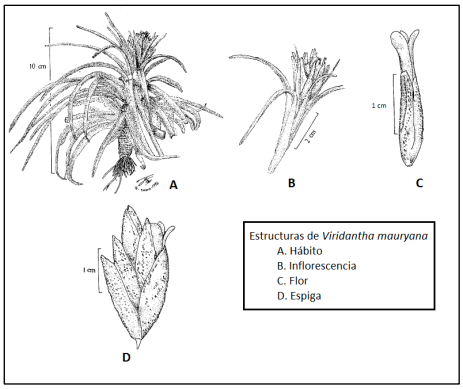

Figure 2. Structural and morphological details of *Tillandsia mauryana*. Image of rosette, inflorescence, flower, and spike (Source: Espejo-Serna, 2003, modified by Valeria Petrone).

3.5 Role of the species in its ecosystem

No data available.

4. Status and trends

4.1 Habitat trends

Of the local populations of *T. mauryana* analyzed by Valverde *et al*. (2013), 87% occur in the region of Metztitlán, within the Barranca de Metztitlán Biosphere Reserve.

As part of the study, the state of the habitat inside and outside the reserve was analyzed. This was done by estimating the level of disturbance of 30 populations of *T. mauryana* by quantifying and identifying the main factors that caused disturbances. Disturbance level was rated on a scale of 1 to 10, and the following causal factors were included: 1) rock-mining activities; 2) accessibility; 3) urban development; 4) livestock farming; and 5) agriculture. Results showed disturbance indices ranging from 0.4 to 7.7. The main causes of the higher disturbance indices were found to be rock mining and urban development, both of which had a negative impact on the populations of *T. mauryana.*

4.2 Population size

Of the 31 local populations found in the study by Valverde (2013), due to the inaccessibility of sites, it was only possible to assess the abundance and the population density of 9 of them; in one of these populations a demographic study was conducted during a one-year period. These parameters were estimated from photographs; thus, it was not possible to count smaller plants.

As a result of these estimates, abundance was found to range between 3 and 304 individuals, and density fluctuated between 0.09 and 4.14 ind./m^2. The proportion of reproductive individuals per population was 14% on average, although it had a broad variation, from 8% to 45%. No reproductive specimens were found in the population comprising 3 individuals (**Table 1**).

Table 1. List of the 9 populations of *T. mauryana* in the municipality of Meztitlán, Hidalgo, where density and abundance were assessed (Valverde *et al*., 2013).

Population No.	Abundance (reproductive individuals)	Density (ind./m^2)	Vegetation type
1	22 (10)	0.35	Dry deciduous forest
2	304 (45)	0.64	Dry deciduous forest
3	3 (0)	0.09	Sarcocaulescent scrub
4	106 (17)	1.61	Dry deciduous forest
5	206 (18)	3.27	Dry deciduous forest
6	160 (21)	2.86	Dry deciduous forest
7	130 (13)	2.2	Dry deciduous forest
8	232 (26)	3.68	Sarcocaulescent scrub
9	256 (20)	4.14	Sarcocaulescent scrub

4.3 Population structure

As part of a demographic study of a population of 307 individuals of *T. mauryana* located in Metztitlán Canyon, Hidalgo (Valverde, 2013), and for the purpose of determining the population structure, the population was subdivided into six size categories according to rosette size (calculated as an ellipse in which the area: A = $\pi \times$ [(largest diameter/2) x (smallest diameter/2)]. The most abundant categories were category 3 (individuals with an area between 10 and 50 cm^2) and category 5 (individuals with a rosette area between 100 and 300 cm^2) (**Figure 3**). Individuals in category 1 (seedlings and small individuals) represented scarcely 6% of the total. The proportion of reproductive individuals per category varied (between 5% and 41%), increasing with larger-sized individuals. Category 6 had the highest proportion of reproductive individuals (over 40%). The number of reproductive structures per individual was also very variable, ranging from individuals with only one flower to one individual that produced 20 flowers.

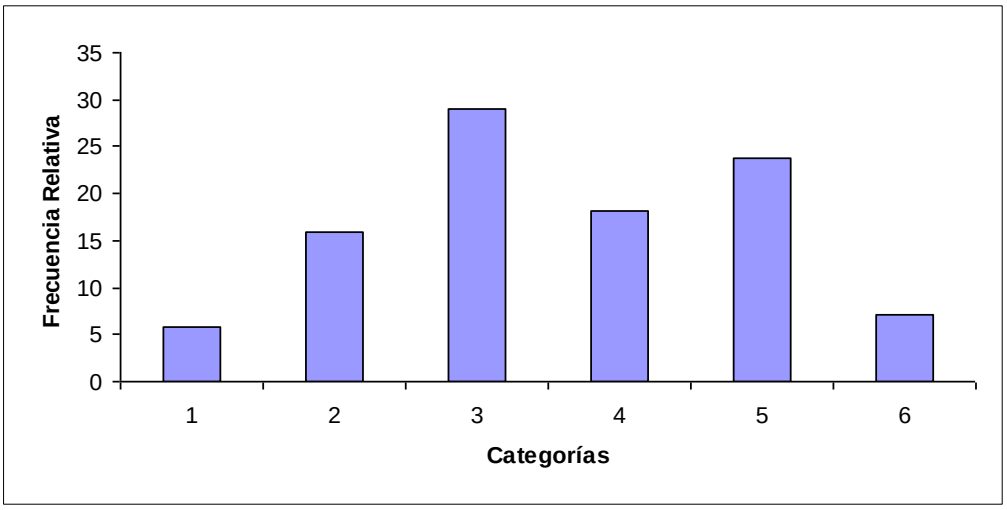

Figure 3. Description of size structure in the study population of *Tillandsia mauryana* in the Metztitlán region[2]. Size intervals: category 1: 0.1 to 1.9 cm^2; category 2: 2 to 9.9 cm^2; category 3: 10 to 49.9 cm^2; category 4: 50 to 99.9 cm^2; category 5: 100 to 299.9 cm^2; category 6: over 300 cm^2

[2] *Figure 3 Translation of the text: Frecuencia relativa = Relative frequency; Categorías = Categories*.

4.4 Population trends

As mentioned in section 4.2, a demographic study was carried out in a population of Metztitlán Canyon from May 2012 to May 2013 (Valverde, 2013). The study population is located on a cliff wall that is relatively easy to access. Researchers were able to access plants to measure the length and width of rosettes and count the number of fruits.

In the study, plants were individually monitored over a one-year period in order to estimate the probability of mortality, permanence, growth, or retrogression for each category. In addition, reproductive contribution was estimated, based on the number of seedlings produced by an average individual (**Tables 2** and **3**). These values were estimated using an empirical method (Menges, 1990), taking into account the number of seedlings observed in 2013, which were assigned to a category based on the number of individuals and reproductive effort (in terms of the number of reproductive structures produced).

Table 2. Number and proportion of reproductive individuals observed in different size categories of the population of *Tillandsia mauryana* during the study period (May 2012-May 2013; Valverde, 2013).

Category	No. of reproductive individuals/ No. of individuals in category	Proportion of reproductive individuals
1	1 / 18	0.056
2	2 / 49	0.041
3	2 / 89	0.022
4	8 / 56	0.143
5	17 / 73	0.233
6	9 / 22	0.409
Total	39 / 307	0.127

Table 3. Number of plants that died and mortality rate observed in each size category of the study population of *T. mauryana* between May 2012 and May 2013 (Valverde, 2013).

Category	No. of individuals that died/ No. of individuals in category	Mortality rate
1	6 / 18	0.333
2	4 / 49	0.082
3	6 / 89	0.067
4	5 / 56	0.089
5	5 / 73	0.069
6	0 / 22	0
Total	26 / 307	0.085

Based on the demographic parameters obtained, a Leftkovitch matrix was constructed and analyzed using the power method to obtain the asymptotic growth rate of the population (λ), the stable structure of size categories (vector *w*), and reproductive values for each category (vector *v*). Subsequently, an elasticity analysis was performed, and population viability was determined. The results of this analysis were used to estimate the finite rate of population growth: 0.981, which suggests that the population is decreasing in number.

In addition, the elasticity matrix showed that permanence of plants in category 5 was the factor that contributed the most to the value of λ. Thus, plants of sizes 100 to 299.9 cm^2 should be most closely monitored: if their survival were affected, it would have a significant impact on the population growth rate. Reproduction of category 5 plants also contributed most to the value of λ, compared to reproduction of individuals in the remaining categories.

Results of the population viability analysis show that the most negative effects would occur if mortality were to increase by 20%, in which case the population would become extinct within 80 years; the most positive effects, which would guarantee permanence of the population, would be achieved if there were a 20% decrease in current mortality rates.

4.5 Geographic trends

No accurate data are available on the current geographic trends of *Tillandsia mauryana*.

5. Threats

The main factor that is threatening wild populations of *T. mauryana* is rock mining, which is a serious, immediate threat to the survival of existing populations of *T. mauryana*. Another factor that is also a major threat is urban development, as pressure to change land use is increasingly intense, particularly in areas near the town of Metztitlán (Valverde, 2013).

6. Utilization and trade

6.1 National utilization

The genus *Tillandsia* (commonly known as airplants) is one of the groups of the family Bromeliaceae that is most sought by enthusiasts and collectors (Negrelle *et al*., 2011). More than one hundred rare and attractive species of the genus *Tillandsia* are sold as ornamental plants. These airplants include *Tillandsia mauryana*, which is sold exclusively as an ornamental plant or to collectors; there is no record of any other type of use. However, the local population is unaware that *Tillandsia mauryana* is more valuable, in commercial terms, when sold for ornamental (or other) purposes.

According to data from the Mexican General Directorate for Forests and Land Management (*Dirección General de Gestión Forestal y de Suelos*, DGGFS), up to 2016 there are no records of applications for authorization to use *T. mauryana*.

6.2 Legal trade

Until March 2016, the Mexican CITES Management and Enforcement Authorities (DGVS and PROFEPA, respectively) did not have any records of exports of *Tillandsia mauryana*; similarly, there is no evidence of harvests, seizures or domestic trade in the species.

In addition, during the period 1992-2015, data on international trade in *T. mauryana* recorded in the UNEP-WCMC database (consulted in April 2016) showed the export of 234 plants and 10 seeds, both artificially propagated; the plants exported originated mainly from Switzerland (29%) and Hungary (66%), while the seeds originated mainly from the United States; the last export recorded was in 2012. Mexico was not included in the list of exporters.

In order to obtain further data relating to the trade of *T. mauryana*, an Internet search was conducted of websites offering plants of this species for sale. The search identified the following: the country hosting the Internet website; the source of plants offered for sale; whether a CITES permit was required; and whether there were any restrictions on the shipment (**Annex 1**).

In order to better understand the workings of international trade, on 24 October 2013 the Mexican Scientific Authority (CONABIO) consulted the CITES Authorities in the countries where the species is traded as well as the representatives of all regions and the countries involved in Internet sales of the plants. The purpose of the consultation was to find out the size and stage of development of plants in trade, the source of any such plants, and information on approved nurseries. The following thirteen Parties were consulted: Peru, Singapore, the United States, Thailand, Germany, Switzerland, Hungary, the Netherlands, France, Spain, Brazil, the Czech Republic, and Lithuania.

The following eight Parties responded to the consultation (see the summary of responses in **Annex 2** of this document): Germany, the United States, the Netherlands, Peru, Switzerland, Brazil, the Czech Republic and Canada. Four of them —Germany, the United States, Switzerland and the Czech Republic— confirmed the existence of trade in this species. Except for the United States, they all indicated that traded plants are artificially propagated and that juvenile plants (4-8 cm in diameter) and adult plants (9-20 cm in diameter) are the main specimens in trade. The United States pointed out that the source of the plants available on Internet websites is unknown; they added that they have no record in their annual trade database of any export, re-export, or import of this species, nor have they received any requests to export the species. Four countries —Brazil, Canada, the Netherlands and Peru— reported that there is no trade in this species in their countries.

6.3 Parts and derivatives in trade

Based on the information requested as per Section 6.2, it is clear that the main specimens in trade are whole plants and seeds.

6.4 Illegal trade

PROFEPA, the CITES Enforcement Authority in Mexico, reported that it had conducted a review of recent years (2009 to 2015) and that it had not recorded any seizures of the plant so far. The UNEP-WCMC trade database does not show any records of illegal trade during the period 1992-2015.

Interestingly, several companies offer artificially propagated specimens of *T. mauryana* for sale over the Internet; yet, although *T. mauryana* is endemic to Mexico, none of these companies are Mexican. Until April 2016, 10 websites were found to offer this species for sale. The websites were hosted in the United States, Germany, Spain, France, Lithuania and the Czech Republic. Of these 10 websites, 2 mentioned that a CITES permit was required for exports and most of the other websites indicated that the plants were only traded within the European Union or the United States (**Annex 1**). Furthermore, the UNEP-WCMC database has no records of exports from Mexico; thus, the source of the parent plants or of the seeds used to produce the plants being sold by other countries is unknown.

6.5 Actual or potential trade impacts

No data

7. Legal instruments

7.1 National

Management and use of the species are regulated by the Sustainable Forest Development Act (*Ley General de Desarrollo forestal Sustentable*, LGDFS), specifically by the articles provided in Section 3 thereof: "Use of non-timber forest resources", and by Articles 53-61 of the implementing Regulation of the Act, which provides the requirements, validity of notifications and authorizations, and periods for utilization of non-timber forest resources, based on recovery and regeneration times for the species and their usable parts. Furthermore, the Official Mexican Standard NOM-005-SEMARNAT-1997 establishes the procedures, criteria, and technical and administrative specifications for sustainable use, transport, and storage of bark, stems, and whole plants from forest vegetation occurring in natural populations. The Standard includes plant groups of the families Bromeliaceae, Cactaceae, Orchidaceae, and ferns.

It is important to note that, based on the results of the study carried out by Valverde *et al.* (2013), *T. mauryana* will soon be included in the Mexican list of species at risk or Official Mexican Standard NOM-005-SEMARNAT-1997 in the category of Threatened.

7.2 International

International trade in the species is regulated by the provisions of CITES Appendix II with Annotation #4 since 1992.

8. Species management

8.1 Management measures

As *Tillandsia mauryana* is a forest species, its harvest is regulated by the provisions of the Mexican Sustainable Forest Development Act (LGDFS, 2013) and its corresponding Regulation, which are implemented by the General Directorate for Forests and Land Management (*Dirección General de Gestión Forestal y de Suelos,* DGGFS-SEMARNAT). Specifically, DGGFS-SEMARNAT deals with applications to harvest timber forest resources.

However, given that the species will soon be listed in the Official Mexican Standard NOM-005-SEMARNAT-1997 as a threatened species, its conservation and use will be regulated by the scheme of Wildlife Conservation Management Units or *UMAs* (*Unidades de Manejo para la Conservación de*

la Vida Silvestre). Once the species is listed and in line with the provisions of the General Wildlife Act (*Ley General de Vida Silvestre*, LGVS), the management, harvest and export of *Tillandsia mauryana* will be regulated by the Mexican General Directorate for Wildlife (*Dirección General de Vida Silvestre,* DGVS-SEMARNAT).

8.2 Population monitoring

According to the provisions of the aforementioned Sustainable Forest Development Act (LGDFS), the Mexican Federal Attorney's Office for Protection of the Environment (PROFEPA) is the competent institution for forest inspection and monitoring; the LGDFS also defines infringements and corresponding penalties.

There are no specific measures in place for monitoring the species unless utilization of the species involves populations that occur in the Metztitlán Canyon Biosphere Reserve (See paragraph 8.5.).

8.3 Control measures

8.3.1 International

There are no other instruments in force besides CITES that regulate the cross-border movement of specimens of *T. mauryana.*

8.3.2 Domestic

In accordance with the provisions of the Sustainable Forest Development Act (LGDFS, 2013), the National Forestry Council (*Consejo Nacional Forestal*) provides advice, oversight, surveillance, assessments and monitoring of forest species such as *Tillandsia mauryana*. Moreover, given that the species is listed in CITES, the Enforcement Authority (PROFEPA) implements yearly programmes and special operations to control illegal trade in wildlife at the main retail and distribution centres throughout the country.

8.4 Artificial propagation

Until March 2016, the DGVS had no national records of nurseries or other operations that artificially propagate *T. mauryana*. However, based on the information provided by Germany, it seems that the plant is easily propagated from seed, although it takes over 20 years to flower for the first time.

8.5 Habitat conservation

The Metztitlán Canyon Biosphere Reserve, in the state of Hidalgo, was declared a natural protected area and classified as a Biosphere Reserve on 27th November 2000. The Reserve has a management plan according to which any use of endemic species such as *T. mauryana* must be done wisely and with greater care than if the species were not endemic and/or were widespread. According to the study conducted by Valverde (2013), over 80% of the local populations of *T. mauryana* occur in the Metztitlán Canyon Biosphere Reserve; accordingly, utilization must be subject to the recommendations provided in the management plan of the reserve.

Furthermore, the Mexican National Commission for Knowledge and Use of Biodiversity (CONABIO) designated Metztitlán Canyon as a priority conservation area, given that it forms part of the biological corridor in the arid areas of the Central Mexican Plateau.

8.6 Safeguards

a) Since 2014, the Mexican National Commission for Natural Protected Areas (*Comisión Nacional de Áreas Naturales Protegidas,* CONANP) has been compiling field information about the species in order to strengthen the strategies for its conservation and redefine the sub-areas in which productive activities such as rock mining take place, as they could affect the habitat of *T. mauryana*. In parallel, work has been done with PROFEPA to close off the rocky areas where the habitat of *T. mauryana* could be affected in the reserve.

b) In addition, the Advisory Council of the Meztitlán Canyon Biosphere Reserve was created in 2015. Through its scientific sub-council, it has been analyzing the status of *T. mauryana* in order to strengthen its conservation actions.

c) Based on the risk assessment analysis conducted on the basis of the results of Valverde's study (2013), it was proposed to list *T. mauryana* in the Official Mexican Standard NOM-059-SEMARNAT-2010 under the category Threatened. This has been approved and is expected to be published in the Mexican Official Journal during 2016, so the species will be managed according to the provisions of the General Wildlife Act.

9. Information on similar species

Tillandsia mauryana does not have any problems of resemblance to other species of the genus *Tillandsia* that are listed in the CITES appendices (e.g., *T. harrisii, T. kammii, T, xerograhica*). However, given the complexity of the genus, it does have similarities with species of other groups that occur in Mexico and that it is closely related to (Espejo-Serna, 2003) (see **Annex 3**).

10. Consultations

Given that this is an endemic species, no other countries were consulted.

11. Additional remarks

None.

12. References

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Listado de establecimientos que comercian internacionalmente plantas completas y semillas de *Tillandsia mauryana.* Datos obtenidos a través de búsquedas en internet.

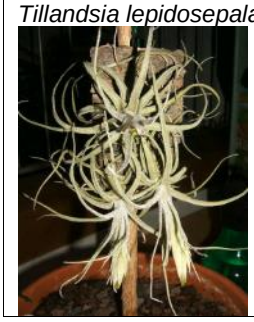
Nombre de la compañia	Pais	Dirección Web	Costo (Unidades)	Observaciones
1) Ecoterrazas	España	http://www.ecoterrazas.com/es/carrito	€ 10.95	Sólo hay envíos dentro de la Unión Europea
2) Carnivoria Eu	Desconocido	http://shop.carnivoria.eu/exotics-plants	€ 22 (US$ 20.11)	Las venden como semi-adultas o plantas adultas. Incluyen un cobro extra para solicitar el permiso CITES.
3) ctsairplants	Estados Unidos	http://www.ctsairplants.com/Tillandsia_Mauryana_p/mauryana.htm	US $24.95	Sólo la venden al interior de Estados Unidos
4) Kakteen, PH, Flora	República Checa	http://www.kakteen.cz/index.php?klic=kid1771en-tillandsia-mauryana-holm	CKZ 250.0 (US$ 12.87)	No aplica.
5) Koehres kaktus	Alemania	http://www.koehres-kaktus.de/shop/index.php/alpha/A/tpl_kaktus/img/cPath/5_748/page/8/language/en	€ 20.0 (US$ 26.47)	No aplica.
6) Orchidéjos	Lithuania	http://www.orchidejos.lt/en/tillandsia-mauryana/i821	€ 7.22 (US$ 9.55)	No aplica.
7) Pépinières Karnivores	Francia	**http://www.karnivores.com/en/tillandsia-sale/tillandsia/mauryana**	€ 13.00 (US$ 17.20)	Existe la planta a la venta pero no la tienen disponible
8) Plant Oddities	Estados Unidos	http://plantoddities.com/cgi-bin/p/awtp-product.cgi?d=plant-oddities&item=2223	US $18.95	Al requerir un certificado CITES, recomiendan ponerse en contacto con ellos, sin embargo indican que la emisión del permiso es responsabilidad del comprador.
9) PlantaBrutt	España	http://www.brutt-trading.eu/es/298-tillandsia-mauryana.html	€ 6.5	Sólo hay envíos dentro de la Unión Europea
10) **Roellke Orchideen**	Alemania	https://www.roellke-orchideen.de/index.php/en/online-shop/ornamental-plants/tillandsia/product/view/5/319	€ 6.5	Sólo hay envíos dentro de la Unión Europea

Resumen de las respuestas recibidas

País	Nombre/AA o AC	Correo electrónico	Comercio		Tamaños de la planta (cm de diámetro)	Origen	Observaciones
			SI	NO			
1. Alemania	Hajo Schmitz-Kretschmer/AC	schmitzh@bfn.de	X		9-20 cm	Reproducidas artificialmente a partir de semillas	Reportan 2 viveros. Indican que el comercio parece estar restringido a pocos coleccionistas. Es fácil de propagar a partir de semillas, pero requiere de muchos años (>20 años) para su primer floración. Algunos viveros ofrecen plantas que fueron propagadas en otros viveros en Alemania o Países Bajos, pero se desconocen sus detalles.
2. Estados Unidos	Anne St. John/AA y AC	managementauthority@fws.gov	X		4-8 cm, 9-20 cm y tamaño desconocido	Desconocido	A partir de una búsqueda en internet encontraron 4 sitios que ofrecen plantas, pero desconocen origen. U.S. CITES Annual Report trade database de 1998 a 2012 no reporta exportaciones, rexportaciones o importaciones de *T. mauryana.* La AA no ha recibido solicitudes para emitir permisos para exportar esta especie.
3. Países Bajos	Koen van Geenen/ AA	CITES@dienst-regelingen.nl		X	No aplica	No aplica	En la respuesta indican que nunca han emitido documentación CITES para la importación o exportación de *T. mauryana*.
4. Perú	Fabiola Núñez y Harol Gutierrez Peralta / AC	hgutierrez@minam.gob.pe		X	No aplica	No aplica	Mencionan que la AA tiene un vivero autorizado para la producción de este tipo de especies.
5. Suiza	Ursula Moser/AA	ursula.moser@bvet.admin.ch	X		desconocido	Reproducción artificial	Incluyen una tabla con registros de importación (2006 al 2012), todas son de Hungría y reproducidas artificialmente.
6. Brasil	Davi de Oliveira Paiva Bonavides/AC	davi.bonavides@itamaraty.gov.br		X	No aplica	No aplica	No comercializan la especie en su país.
7. República Checa	Silvie Ucová/AC	silvie.ucova@nature.cz	X		4-8 cm	Reproducción artificial	Mencionan que la mayoría de los especímenes provienen del vivero Holm en Alemania. Hay varios especímenes parentales de los cuales se colectan las semillas.
8. Canadá	Adrianne Sinclair/AC	adrianne.Sinclair@ec.gc.ca		X	No aplica	No aplica	No comercializan la especie en su país.

Especies similares

Especies con las que *Tillandsia mauryana* podría confundirse por tener características morfológicas similares y/o áreas de distribución compartidas, sin embargo ninguna de ellas se encuentra incluida en los Apéndices de la CITES.

Especie	Estados en los que se distribuye	Características distintivas
Tillandsia atroviridipetala  *(Fuente: http://www.tropicalplantbook.com)*	Guanajuato, Guerrero, Hidalgo, Jalisco, México, Michoacán, Morelos, Oaxaca, Puebla, Zacatecas.	La principal diferencia entre *T. atroviridipetala* y *T. mauryana* es el ancho de sus hojas: las de *T. atroviridipetala* son más delgadas (menores a 2 mm de ancho en la base). Además, las flores de *T. artroviridipetala* presentan anteras amarillas, en lugar de negras; su hábito es epífito.
Tillandsia ignesiae  *(Fuente: http://www.indonesiatraveling.com)*	Guerrero, Jalisco, México, Michoacán	Presenta inflorescencia escaposa, simple y aplanada, de mayor tamaño que las hojas. Sus hojas son más delgadas que las de *T. mauryana* y se trata de una planta epífita.
Tillandsia plumosa  *(Fuente: http://www.plantsystematics.org)*	Guerrero, México, Oaxaca, Puebla.	Es una planta epífita. A diferencia de la inflorescencia nidular de *T. mauryana, T. plumosa* presenta inflorescencia compuesta, escaposa y globosa, cuyo tamaño es mayor al de sus hojas; estas últimas son más delgadas desde la base en comparación con las de *T. mauryana*.
Tillandsia tortillis  *(Fuente: http://botu07.bio.uu.nl)*	Aguascalientes, Durango, Guanajuato, Hidalgo, Jalisco, Querétaro, San Luis Potosí, Zacatecas.	A diferencia de *T. mauryana*, su roseta es irregular y amorfa; sus hojas son caulescentes y la flor es escaposa, más larga que las hojas, con un pedúnculo menor a los 2 mm de diámetro. Es de hábito epífito.
Tillandsia lepidosepala 	Guanajuato, Hidalgo, Jalisco, México, Michoacán, Puebla, Querétaro.	Ésta es una roseta irregular y amorfa, cuyas hojas son caulescentes. La flor es del mismo tipo que la de *T. mauryana* (nidular y más corta que las hojas) pero su pedúnculo es de menor tamaño (hasta 2.5 mm de diámetro). Es de hábito epífito.

Especie	Estados en los que se distribuye	Características distintivas
(Fuente: http://www.tropi-qualite.fr) *Tillandsia schiedeana*  *(Fuente: http://www.associazioneclaramaffei.org)*	Morelos, Veracruz.	En estado juvenil se puede confundir con *T. mauryana*. Pero a diferencia de esta última, *Tillandsia schiedeana* es epífita y su forma de crecimiento no es una roseta esférica, ni regular, pues sus hojas presentan un arreglo diferente. Posee una inflorescencia cuyo pedúnculo puede medir varios centímetros, igual que la espiga, y cuya coloración rojiza-amarillenta difiere de la de *T. mauryana*. Sus hojas miden menos de 5 mm en la base y son más largas y curvas que las de *T. mauryana*.
Tillandsia ionantha  *(Fuente: www.tropicos.org)*	De amplia distribución en México, incluyendo Morelos, Veracruz, Puebla	En estado juvenil se puede confundir con *T. mauryana*. Pero a diferencia de esta última, *Tillandsia ionantha* es epífita; El color de su flor es morado (en lugar de verde) y tiene un pedúnculo de mayor tamaño. Su espiga es naranja-rosácea, por lo que puede parecerse a *T. mauryana*.