

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

Proposals for possible consideration at CoP17

ASSESSMENT OF *BEAUCARNEA RECURVATA* BASED ON THE CRITERIA  
OF RESOLUTION CONF.9.24 (REV. COP16) FOR AMENDING APPENDICES I AND II

1. This document has been prepared by Mexico\*.

Background

1. *Beaucarnea recurvata* (known as ponytail palm or elephant's foot) is an endemic plant to Mexico, and in particular to the tropical deciduous forest in the States of Oaxaca and Veracruz. It is an endemic plant to Mexico of greatest demand on the national ornamental plant market (CONABIO, 2012), and of high demand on the international market.
2. In the context of national legislation, the species is listed in Official Mexican Standard NOM-059-SEMARNAT-2010 under the 'Threatened' (A) category and according to Osorio et al. (published), its main threats are:
  - 2.1 Habitat loss: tropical deciduous forest is recognized as one of the most threatened tropical ecosystems, mainly as a result of human activity; and
  - 2.2 Illegal harvesting of wild plants for ornamental purposes.
3. Through a study coordinated and financed by the Scientific Authority of Mexico (National Commission for the Knowledge and Use of Biodiversity (CONABIO)), entitled "Study to identify relevant Mexican species in the framework of international trade" (Mosig & Reuter, 2013), *B. recurvata* was identified among the Mexican species that could meet the criteria for inclusion in the CITES Appendices.
4. In order to respond to that finding, CONABIO organized the "Workshop to assess the appropriateness of including *Beaucarnea recurvata* in the CITES Appendices", held from 25 to 26 September 2014 (Mexico City), with the participation of more than 26 experts from 14 institutions and organizations. The main results include:

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- 4.1 Assessment of *B. recurvata* using the criteria of Resolution Conf. 9.24 (Rev. CoP16), according to which the species merits being listed in Appendix II, in accordance with criteria B of Annex 2a of the Resolution;
- 4.2 The update of the assessment of *B. recurvata* using the criteria of the Method to Assess the Risk of Extinction of the Plants of Mexico (MER) of NOM-059-SEMARNAT-2010, according to which the species qualified for a change of category to 'At risk of extinction' (P);
- 4.3 A set of recommendations to respond to the main information gaps related to the species, which highlights the need to develop studies on the genetic variability of the species, and its demography; and finally,
- 4.4 Recommendations to strengthen sustainable, legal and traceable use of the species at the national and international level, notably:
  - a) The need to document the value chain of the species; and
  - b) If *B. recurvata* were listed in Appendix II, the need to analyse the appropriateness of listing the other species of the genus based on the similarity criteria (criteria A, Annex 2b of Resolution Conf. 9.24 [Rev. CoP16]).

#### Work after the workshop of experts on *B. recurvata* held in September 2014

5. In order to supplement the assessment using the criteria for inclusion in the CITES Appendices that resulted from the workshop, on 9 July 2015, CONABIO consulted the Scientific and Management Authorities of countries to which online trade was identified (Asia, Europe, North America and Oceania), requesting detailed information on this trade. The responses received at the time this report was drafted are reflected in section 6.3 of **Annex 1**.
6. In order to respond to the recommendations arising from the workshop, in April 2015 CONABIO initiated a project entitled "Assessment of the value chain of the ponytail palm (*B. recurvata*) and the conservation status of the wild populations", which was implemented by the National Institute of Ecology (INECOL A.C.). The expected results of the project at the start of 2016 are:
  - 6.1 Phase 1: A detailed description of the value chain of the species, including the different uses of the plant in Mexico, and identification of the main actors in the chain, including for each step the applicable legislation and regulations; and
  - 6.2 Phase 2: Update of the status of wild populations of the species, including updated maps of historical, current and potential distribution.
7. Additionally, in order to assess the appropriateness of listing the ten remaining species of the genus in Appendix II based on the criteria of similarity (i.e. *Beaucarnea intermis*, *B. goldmanii*, *B. plabilis*, *B. hiriartiae*, *B. guatemalensis*, *B. gracilis*, *B. stricta*, *B. sanctomariana*, *B. purpusii* y *B. compacta*), CONABIO is developing an online forum (under construction), the aim of which is to facilitate assessment by experts using the MER and CITES criteria, similar to what was done at the aforementioned workshop. The preliminary version of the forum is available from the link: [http://dgcii.conabio.gob.mx/foro\\_beaucarnea/](http://dgcii.conabio.gob.mx/foro_beaucarnea/)

#### Recommendations to the Plants Committee

8. Issue comments and recommendations that it considers relevant to strengthen the draft proposed amendment to include *Beaucarnea recurvata* in CITES Appendix II (Annex 1).
9. Based on the above, support Mexico's submission for the consideration of the next meeting of the Conference of the Parties (South Africa, 2016) of a proposal to include *Beaucarnea recurvata* in Appendix II.

#### References in Annex 3

## Draft proposal to include *Beaucarnea recurvata* in CITES Appendix II

### A. Proposal

Include *Beaucarnea recurvata* in Appendix II in accordance with Article 2a) of the Convention and criteria B of Annex 2a of Resolution Conf. 9.24 (Rev. CoP16).

### B. Proponent

Mexico<sup>1</sup>

### C. Supporting statement

#### 1. Taxonomy

1.1 Class: Liliopsida

1.2 Order: Asparagales

1.3 Family: Asparagaceae

1.4 Genus, species or subspecies, including author and year: *Beaucarnea recurvata* (Lemaire, 1861)

1.5 Scientific synonyms: *Beaucarnea inermis*  
- *Beaucarnea tuberculata*  
*Dasyiliron recurvatum*  
*Dasyiliron inerme*  
*Dasyiliron recurvatum*  
*Nolina recurvata*  
*Pincenectitia tuberculata*

1.6 Common names: Spanish: Palma monja, pata de elefante, apachite, palma petacona, despeinada  
French: *Pied d'éléphant; Arbre bouteille*  
English: *Ponytail palm, elephant-foot tree, bottle palm*

1.7 Code numbers:

#### 2. Overview

*Beaucarnea recurvata* is an endemic plant to Mexico, specifically in the low deciduous forests of Veracruz and Oaxaca. Its wild populations are small, with a maximum recorded density of 135 individuals per hectare (Hernández-Sandoval, et al., 2012a). However, to date there is no updated and accurate estimate on the number and size of wild populations. The habitat of *B. recurvata* could be described as specialized, since it is located in the rocky substrate or steep mountains (Osorio-Rosales, et al., 2011).

The main threats to the wild populations of *B. recurvata* are: a) habitat loss; and b) illegal harvesting of wild plants for ornamental purposes, as they are subject to high demand on the international market. As such, the origin of parent material of live plants offered outside of Mexico is unknown.

Currently, Mexican legislation – Official Mexican Standard NOM-059-SEMARNAT-2010 – classifies the species as ‘threatened’ (A). However, this classification is not supported by an assessment using the Method to Assess the Risk of Extinction of the Plants of Mexico (MER) required by the Standard (Normative Annex II).

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In 2013, the CITES Scientific Authority of Mexico (National Commission for the Knowledge and Use of Biodiversity (CONABIO)) and TRAFFIC North America developed the study entitled “Study to identify relevant Mexican species within the framework of international trade” (Mosig & Reuter, 2013). Among the main results, the study concluded that the ponytail palm (*B. recurvata*) is one of the Mexican species that could meet the criteria for inclusion in Appendices I or II of CITES.

To corroborate the above, CONABIO invited experts from the government, academia, and civil and manufacturing sectors to a “Workshop to assess the appropriateness of including *Beaucarnea recurvata* in CITES” (25 and 26 September 2014; Mexico City). Among the main results was the recommendation to list the ponytail palm in Appendix II.

In summary, the proposal to include the ponytail palm (*B. recurvata*) in CITES Appendix II is based on the following:

- a) *B. recurvata* is an endemic species to Mexico and, according to the most recent assessment, is at risk of extinction.
- b) The available evidence on trade in the species indicates that there is high demand on the international market, and also suggests that the majority of specimens marketed are of wild origin (and possibly illegal). And,
- c) It is necessary to regulate international trade in the species through the provisions of the Convention to ensure that trade does not threaten the species' survival.

### 3. Species characteristics

#### 3.1 Distribution

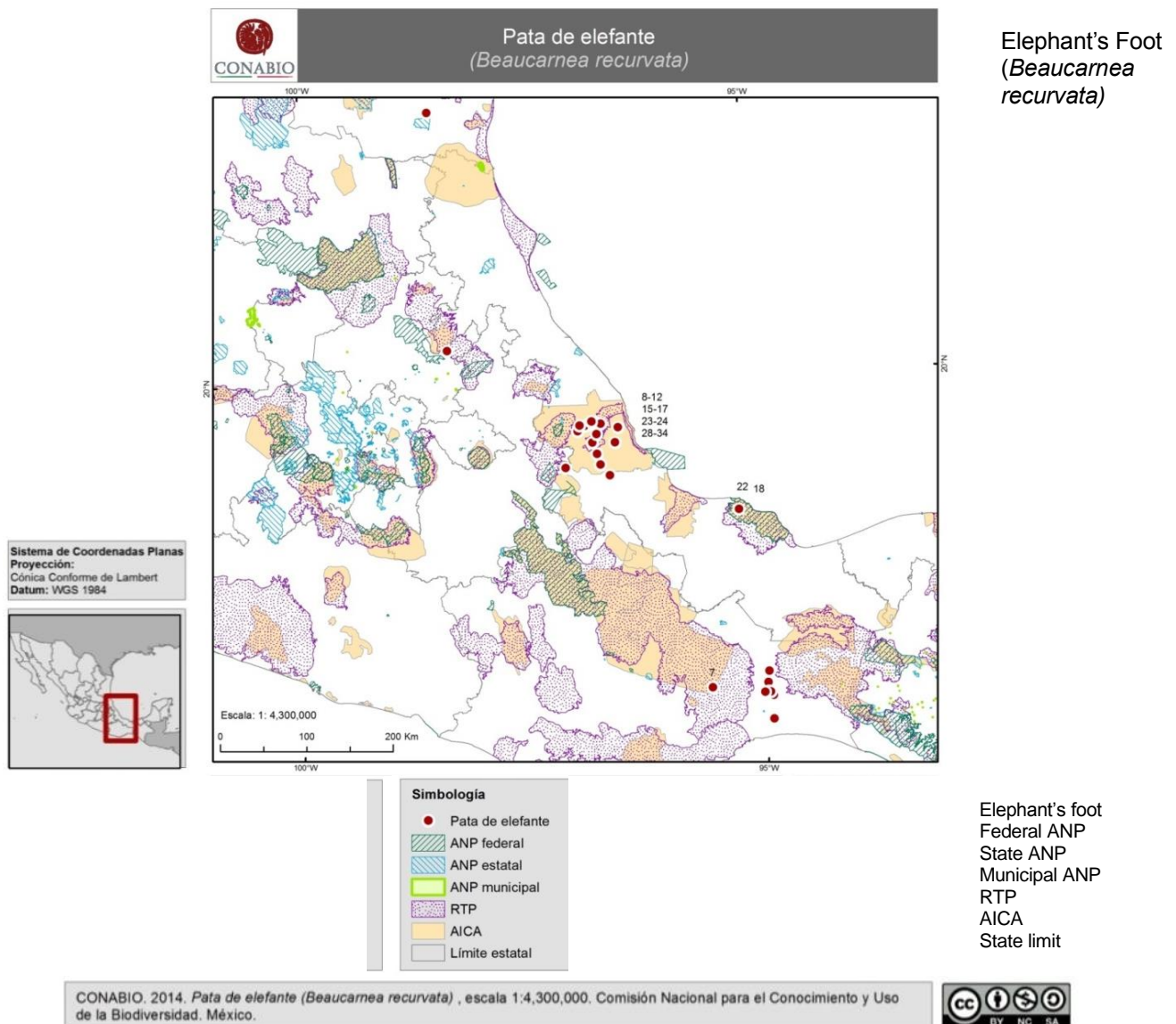
The natural range of the *Beaucarnea* genus reaches from Tamaulipas (Mexico) to Honduras, and probably the north of Nicaragua and Central America. The wild populations of the species of this genus are small, are found in ecologically sensitive areas and have extremely slow growth rates (Hernández-Sandoval, 1993). Specifically, *B. recurvata* is an endemic species to the States of Veracruz and Oaxaca (Osorio et al., published). **Table 1** includes the coordinates of recorded locations of *B. recurvata* arising from herbariums and information provided by the Elephant's Foot Network of the National Seed Inspection and Certification Service-National System for Plant Genetic Resources for Food and Agriculture (SNICS-SINAREFI).

State	Latitude	Longitude	Year	Source/Herbarium
Oaxaca	16° 22' 54"	94° 55' 17"	1990	CAS, ENCB, MEXU, NY
	16° 22' 54"	94° 55' 17"	1990	Elephant's Foot Network
	16° 37' 38"	94° 54' 57"	1989	MEXU, TEX, UAT
	16° 37' 38"	94° 54' 57"	1989	MEXU, TEX, UAT
	16° 40' 22"	94° 57' 45"	1981	ENCB, MEXU
	16° 44' 11"	95° 34' 17"	1991	MEXU, TEX
	16° 46' 00"	94° 58' 00"	-	Elephant's Foot Network
	16° 53' 00"	94° 57' 00"	-	Elephant's Foot Network
	16°39'56.7"	95°0'22.9"	2010	Field
	16°39'57.4"	95°0'21.8"	2010	Field
	16°39'59.2"	94°56'32"	2010	Field
Veracruz	18° 35' 27"	95° 11' 46"	1989	MEXU, TEX, UAT
	18° 35' 27"	95° 11' 46"	1989	MEXU, TEX, UAT
	19°06'50"	96°42'00"	-	Elephant's Foot Network
	19°13'45"	96°44'00"	-	Elephant's Foot Network
	19°26'12.99"	96°44'00"	-	Elephant's Foot Network
	19°32'39.0012"	96°41'00"	-	Elephant's Foot Network
	19°34'11.12"	96°47'00"	-	Elephant's Foot Network
	19° 00' 00"	96° 36' 07"	1990	Elephant's Foot Network
	19° 05' 27"	97° 05' 17"	1906	MO
	19° 20' 43"	96° 32' 00"	1989	XAL
	19° 21' 00"	96° 47' 00"	1998	Field

State	Latitude	Longitude	Year	Source/Herbarium
	19° 21' 00"	96° 47' 00"	1979	ENCB, MEXU, XAL
	19° 21' 00"	96° 47' 00"	1998	-
	19° 28' 22"	96° 56' 22"	1966	MO
	19° 30' 00"	96° 29' 43"	1986	XAL
	19° 31' 38"	96° 51' 49"	1981	ENCB
	19° 32' 11"	96° 49' 49"	1976	CAS, ENCB, MEXU, NY, XAL
	19° 34' 00"	96° 44' 40"	1976	ENCB, MEXU, NY, XAL
	19°34'2.9"	96°47'19.9"	2010	-
	20° 21' 16"	98° 21' 46"	-	A, GH, NY, US

**Table 1.** Georeferenced information on the presence of *B. recurvata* in Mexico.

Based on the georeference data contained in Table 1, CONABIO developed the following distribution map for *B. recurvata* in Mexico (Figure 1). Nevertheless, it is essential to update the range information for the species in future.



CONABIO, 2014. Elephant's foot (*Beaucarnea recurvata*) scale: 1:4:300,000 National Commission for the Knowledge and Use of Biodiversity

**Figure 1.** Distribution of *B. recurvata* based on currently available georeference data. ANP=Protected natural area, RTP=Priority terrestrial area, AICA=Important bird conservation area

### 3.2 Habitat

*B. recurvata* lives on steep slopes of hills in low deciduous forests, at altitudes between 350 and 420 metres above sea level, with rocky floors on cliffs or steep mountains. The temperature is generally greater than 20° C and precipitation varies between 800 and 1,200 mm, with an average dry period of 7 or 8 months (Osorio-Rosales, et al., 2011; Hernández-Sandoval, et al., 2012).

### 3.3 Biological characteristics

It is a dioecious, long-lived plant with relatively slow growth rates in the wild. Pollinization is carried out mainly by bees (hymenoptera) and diptera and seed dispersion is by wind and occurs from November to February. The number of seeds per inflorescence is more than 2000, while the number of inflorescences per specimen is (on average) seven in a range from 1 to 42. The species is synchronous in its flowering, with male and female specimens flowering simultaneously. Additionally, there is alternation in reproductive events, which means that the same specimens do not reproduce every year. In the wild, germination is immediate when there is suitable humidity; however, the number of plants that establish themselves is low, owing to a lack of water, herbivory grazing, extraction and other causes (Osorio-Rosales, et al., 2011).

### 3.4 Morphological characteristics

*B. recurvata* is an aborescent, monocotyledonous, non-wood plant and it can reach almost 15 m in height, with abundant branches and a pseudo-dichotomous branching pattern (**Figure 2**) (Hernández-Sandoval, et al., 2010).



**Figure 2.** Life form of *B. recurvata* (Hernández-Sandoval, et al., 2010).

Its base is a globose cone, becoming an ovate-ellipsoid (resembling a boot). The bark at the base and on the trunk is between grey and dark brown, with elongated quadrangular patches (Hernández-Sandoval, et al., 2010).

The leaves are green to bright green, with a ribbed and smooth surface (Osorio-Rosales, et al., 2011), and they are grouped in bunches at the end of the branches. They are reflexed and measure from 80 to 150 cm in length and 1 to 2.5 cm wide (Hernández-Sandoval, et al., 2010).

The inflorescences are extremely ovoid to extremely ellipsoid panicles, measuring between 0.7 and 1.3 m, and are yellow to reddish in colour (Hernández-Sandoval, et al., 2012b). The male flowers grow in groups of two to three per node, with pedicels measuring from 1.5 to 2 mm articulated close to the flower, with tepals measuring 2 to 2.5 mm in length. The female flowers grow in groups of 1 to 4 per node, with pedicels measuring from 2.5 to 4 mm and articulated half-way, tepals measuring from 1.5 to 2.5 mm in length and basal nectars (Hernández-Sandoval, et al., 2010).

The fruits are ellipsoid to slightly obovate, measuring 1.2 to 1.4 mm by 8 to 10 mm with three wings pale yellow in colour, an apical notch of 2 to 2.5 mm, and stems measuring 3.5 to 6 mm articulated close to the fruit (Hernández-Sandoval, et al., 2010). The seeds are ellipsoid to globose, with three

lobes and the pip is smooth to slightly coarse and dark brown to reddish in colour (Hernández-Sandoval, et al., 2010).

### 3.5 Role of the species in its ecosystem

According to Hernández-Sandoval et al. (2012a) the small plants of *B. recurvata* grow below the nurse canopy of the low deciduous forest and in some locations is the dominant species. In turn, it hosts a group of epiphytic plants, such as cacti, orchids, bromeliads and ferns, among others.

## 4. Status and trends

### 4.1 Habitat trends

According to a recent study in the dry tropical forests of the State of Veracruz (López-Barrera, et al., 2014), which analysed geographical information on deforestation for the period 1973–2000 and information on forest regeneration for the period 2007–2008, the typical habitat of *B. recurvata* is dominated by pressure from land-use change (whether by the establishment of pastures for farming or by agricultural land and irrigation). However, the annual rates of forest cover loss were moderate to low, with historical records that suggest that the majority of deforestation occurred at the start of the eighteenth century (one century before the Mexican revolution). However, these rates fluctuated considerably, with slight periods of reforestation (1.55 per cent from 1973 to 1990), followed by a marked reduction (-8.08 per cent from 1990 to 2000), and finally with notable increases in forest cover (4.92 per cent) during the period 2000–2007; the latter increases coincide with changes in public policies and migration trends among the local population. Lastly, although the number of forest patches tripled between 1973 and 2000, the average area of those patches reduced by almost 80 per cent during this period.

### 4.2 Population size

Maximum densities of 161 individuals of *Beaucarnea recurvata* in an area of 1.2 hectares have been recorded, in populations located in Veracruz, which represents an approximate density of 135 individuals per hectare (Hernández-Sandoval, et al., 2012b). However, only a few populations have been sampled and the available data are not representative of the situation of the species across its entire range area.

### 4.3 Population structure

According to a sampling exercise performed by Hernández-Sandoval et al. (2012) at a site with 161 individuals, 59 per cent of the individuals were adults, 20 per cent were juveniles and 21 per cent were seedlings. However, it is necessary to carry out a representative sampling of wild populations of the species.

### 4.4 Population trends

There is no up-to-date demographical information that enables understanding of population trends, but Osorio et al. (2011) and Hernández-Sandoval et al. (2012a) suggest that the trend is a decreasing population.

## 5. Threats

According to Osorio et al. (published), the main threats to the ponytail palm are:

- a) Habitat loss (deciduous tropical forest); and
- b) Illegal harvesting of wild plants for ornamental purposes.

Regarding the first threat, fragmentation has been identified in the ecoregions in which the species is distributed, mainly attributable to land-use change to agriculture and livestock activities (Society for the Study of Biological Resources of Oaxaca and SNICS, 2013). Specifically, the habitat of the populations of the species in Veracruz demonstrate clear fragmentation (focused on the middle zone of the basins of the Actopan and La Antigua rivers) (Osorio-Rosales, et al., 2011). This has resulted in damage to the structure (population and sex) and to the natural regeneration processes of the wild populations of the species (Hernández-Sandoval, et al., 2010). With regard to the second threat, since the 1980s, the seeds,

seedlings and adult plants of all *Beaucarnea* species have been collected for ornamental purposes (Hernández-Sandoval, 1993).

Specifically in the case of the ponytail palm (*B. recurvata*), the most valued species in the genus on the national and international ornamental plant markets, selling of the product is mainly illegal. According to Osorio-Rosales and Contreras-Hernández (2013) the modus operandi of foreign buyers is to visit sites on which the species is distributed and to request the peasants to collect as many young plants as possible in exchange for a daily payment. The wild plants collected by the peasants are taken to illegal nurseries in order to acclimatize them and they are later placed in pots and offered to legally registered nurseries. The plants are then prepared for sale abroad, the majority of illegal trade leaves Mexico in containers and freight, together with other native species of high endemic value.

In recent years, the high commercial demand has increased illegal sales, exceeding the monitoring capacities of environmental authorities (Osorio-Rosales & Contreras-Hernández, 2013).

## 6. Utilization and trade

### 6.1 National utilization

*B. recurvata* is mainly used as an ornamental plant for inside spaces (plants in pots) and open spaces, particularly public and domestic gardens, hotels and central reservations (Osorio-Rosales, et al., 2011).

### 6.2 Legal trade

a) Use of species listed in Official Mexican Standard NOM-059-SEMARNAT-2010 through the framework of Plant Conservation Management Units (UMA) falls under two categories:

b) In situ (or UMAs in the wild); and

Ex situ, such as intensive UMAs, nurseries or estates and installations that manage wildlife in a confined manner outside of its natural habitat (PIMVS).

According to an assessment of the functioning of the UMA framework during the first ten years since its establishment (CONABIO, 2012), *B. recurvata* was highlighted as one of the flora species subject to greatest demand on the ornamental market and with the highest number of records of use under the intensive UMA framework (more than 100,000 specimens approved during the period in question). However, the available information does not make it possible to identify the type of specimens of ponytail palm used (whether they are seeds, juvenile plants or adult plants or other forms).

Up to 2014, there were a total of 158 UMAs with authorized management plans for the use of *B. recurvata*. Of these, 140 were intensive UMAs and nurseries (**Annex 2, table 5**), and the remaining 18 were PIMVS (**Annex 2, table 6**). The intensive UMAs and greenhouses authorized for the use of *B. recurvata* are spread across 20 states in the country, the majority of which are located in the States of Morelos and Veracruz, followed by Yucatán, Colima and Campeche. The PIMVSs authorized to use *B. recurvata* are spread across 12 states, the majority of which are found in Campeche and Morelos, although the species is not found naturally in these states.

### 6.3 Parts and derivatives in trade

Based on an analysis of online trade of *B. recurvata* and responses received to the consultations sent by the Scientific Authority of Mexico on 9 July 2015 to the CITES Authorities of the Parties identified as marketing countries (in Asia, Europe, North America and Oceania), 81 companies or nurseries in 15 countries were identified that market (offer) the species online (**Table 2**):

Country	Company or nursery	Website
1. Germany	1) Pflazenart	<a href="http://www.pflanzenart-shop.de">http://www.pflanzenart-shop.de</a>
	2) Palmenhandel	<a href="http://www.palmenhandel.de">http://www.palmenhandel.de</a>
	3) Terrapalme (Home and Garden Design)	<a href="http://www.terrapalme.com">http://www.terrapalme.com</a>
	4) Rare Plants	<a href="http://www.rareplants.de">www.rareplants.de</a>
	5) Palmen Bolschetz	<a href="http://www.palmen-bolschetz.de/">http://www.palmen-bolschetz.de/</a>
	6) Australian seed (ebay)	<a href="http://australianseed.com/shop/item/beaucarnea-recurvata-">http://australianseed.com/shop/item/beaucarnea-recurvata-</a>
	7) Buy Sell Trees and Palms	<a href="http://www.buyselltrees.com/index">http://www.buyselltrees.com/index</a>



Country	Company or nursery	Website
	8) Gumtree	<a href="http://www.gumtree.com.au/">http://www.gumtree.com.au/</a>
2. Canada	9) Rarexoticseeds	<a href="http://www.rarexoticseeds.com/en/">http://www.rarexoticseeds.com/en/</a>
3. China	10) Alibaba.com	<a href="http://www.alibaba.com/">http://www.alibaba.com/</a>
4. Denmark	11) Gartneriet Lundager	<a href="http://www.75012.dk">www.75012.dk</a>
	12) Easy Care	<a href="http://www.feldborg.com">www.feldborg.com</a>
5. Slovakia	13) VICTOR -	<a href="http://www.kvetyvictor.sk/rastlina/beaucarnea-recurvata/">http://www.kvetyvictor.sk/rastlina/beaucarnea-recurvata/</a>
	14) HORNBACH	<a href="http://www.hornbach.sk/cms/sk/sk/projekty_pre_vas/zahradne_projekty/specialne_navody_zo_zahrady/xxl_rastliny/specialny_sortiment_hornbachu/nolina_slonia_noha/nolina-slioni-noha.html">http://www.hornbach.sk/cms/sk/sk/projekty_pre_vas/zahradne_projekty/specialne_navody_zo_zahrady/xxl_rastliny/specialny_sortiment_hornbachu/nolina_slonia_noha/nolina-slioni-noha.html</a>
	15) FLORADIES s.r.o.	<a href="http://www.floradies.sk/c/24/crepnikove-rastliny/">http://www.floradies.sk/c/24/crepnikove-rastliny/</a>
	16) HORNBACH BAUMARKT SK spol. s r.o.	<a href="http://www.hornbach.sk">http://www.hornbach.sk</a>
	17) Viktor Hrobák – VICTOR	<a href="http://www.kvetyvictor.sk/rastlina/beaucarnea-recurvata/">http://www.kvetyvictor.sk/rastlina/beaucarnea-recurvata/</a>
	18) florist's Galéria Kvetín	<a href="http://www.galeriakvetin.sk/nolina-slonia-noha">http://www.galeriakvetin.sk/nolina-slonia-noha</a>
	19) Ing. Miroslava Kráľovičová Petržalová	<a href="http://www.zpvp.sk/www-zpvp-sk/0/0/3/52/9/0/?hledatjak=2&amp;slovo=recurvata">http://www.zpvp.sk/www-zpvp-sk/0/0/3/52/9/0/?hledatjak=2&amp;slovo=recurvata</a>
6. Slovenia	20) Agrokor	<a href="http://www.agrokor.si">www.agrokor.si</a>
	21) Vrtnarstvo Revital	<a href="http://www.revital-vrtnarstvo.si">www.revital-vrtnarstvo.si</a>
	22) Vrtnarija Skocjan	<a href="http://www.komunalakoper.si">http://www.komunalakoper.si</a>
7. United States	23) Bonsai Boy of New York	<a href="http://www.bonsaiboy.com/">http://www.bonsaiboy.com/</a>
	24) Botanical Partners	<a href="http://www.botanicalpartners.com/retail/retail-home.php">http://www.botanicalpartners.com/retail/retail-home.php</a>
	25) Florida Palm Trees.com	<a href="http://www.florida-palm-trees.com/">http://www.florida-palm-trees.com/</a>
	26) Gardino Nursery	<a href="http://www.rareflora.com/">http://www.rareflora.com/</a>
	27) Green Desert Nursery	<a href="http://www.greendesertnursery.com/index.htm">http://www.greendesertnursery.com/index.htm</a>
	28) Local Harvest	<a href="http://www.localharvest.org/">http://www.localharvest.org/</a>
	29) Mass Spectrum Botanicals	<a href="http://massspectrumbotanicals.com/">http://massspectrumbotanicals.com/</a>
	30) Moon Valley Nursery	<a href="http://www.moonvalleynurseryca.com/">http://www.moonvalleynurseryca.com/</a>
	31) Real Palm Trees.com	<a href="http://realpalmtrees.com/palm-tree-store/">http://realpalmtrees.com/palm-tree-store/</a>
	32) San Marcos Growers	<a href="http://www.smgrowers.com/index.asp">http://www.smgrowers.com/index.asp</a>
	33) Stokes Tropicals	<a href="http://stokestropicals.plants.com/Default.aspx">http://stokestropicals.plants.com/Default.aspx</a>
	34) The Nursery at Ty Ty	<a href="http://www.tytyga.com/">http://www.tytyga.com/</a>
	35) Top Tropicals	<a href="http://www.toptropicals.com">www.toptropicals.com</a>
	36) Trio Nursery	<a href="http://www.trionursery.com/">http://www.trionursery.com/</a>
	37) Accents for home and garden	<a href="http://www.accentsforhomeandgarden.com/">www.accentsforhomeandgarden.com/</a>
	38) Almost Eden	<a href="http://www.almostedenplants.com/">http://www.almostedenplants.com/</a>
	39) Bunnings Warehouse	<a href="http://www.bunnings.com.au">www.bunnings.com.au</a>
	40) Buy Sell Trees and Palms	<a href="http://www.buyselltrees.com">www.buyselltrees.com</a>
	41) Tropical	<a href="http://www.365tropical.com">www.365tropical.com</a>
	42) Florida Palm Trees	<a href="http://www.florida-palm-trees.com">www.florida-palm-trees.com</a>
	43) Palm Talk	<a href="http://www.palmtalk.org">www.palmtalk.org</a>
	44) Real Palm Trees	<a href="http://www.realpalmtrees.com">www.realpalmtrees.com</a>
	45) Stokes Tropicals	<a href="http://www.stokestropicals.com">www.stokestropicals.com</a>
	46) Top Tropicals	<a href="http://www.toptropicals.com">www.toptropicals.com</a>
8. France	47) Ethnoplants Shop	<a href="http://www.ethnoplants.com">www.ethnoplants.com</a>
9. Ireland	48) plantstore.ie	<a href="http://www.plantstore.ie">www.plantstore.ie</a>
	49) E Bay	<a href="http://www.ebay.ie">www.ebay.ie</a>
	50) Adverts.ie	<a href="http://www.adverts.ie">www.adverts.ie</a>
10. Italy	51) Il Giardino Azienda Floricola	<a href="http://www.ilgiardino.it/">http://www.ilgiardino.it/</a>
	52) Florence fiori online	<a href="http://www.florencefiorionline.com">http://www.florencefiorionline.com</a>
	53) PVB Fuels SPA - Quadrifoglio	<a href="http://www.quadrifogliopianta.it">www.quadrifogliopianta.it</a>
11. New Zealand	54) Coast Palms & Cycads	<a href="http://www.coastpalms.co.nz">www.coastpalms.co.nz</a>
12. Netherlands	55) De Italiaanse Oase	<a href="http://www.italiaanse-oase.nl/contacts/index/">http://www.italiaanse-oase.nl/contacts/index/</a>
	56) Planten Voorkantoor.NL	<a href="http://www.plantenvoorkantoor.nl">http://www.plantenvoorkantoor.nl</a>
	57) Plantcomplete	<a href="http://www.plantcomplete.nl/winkel/beaucarnea-recurvata-2/">http://www.plantcomplete.nl/winkel/beaucarnea-recurvata-2/</a>
	58) Sjaloombv	<a href="http://www.sjaloombv.com/verzorging.php">http://www.sjaloombv.com/verzorging.php</a>
	59) ZadenJungle.nl	<a href="https://www.zadenjungle.nl/">https://www.zadenjungle.nl/</a>
	60) Zadengigant.nl	<a href="http://www.zadengigant.nl/">http://www.zadengigant.nl/</a>
	61) Vreeken's Zaden	<a href="https://www.vreeken.nl/621600-beaucarnea-recurvata">https://www.vreeken.nl/621600-beaucarnea-recurvata</a>
	62) Platenbakken & Planten	<a href="http://www.plantenbakkenplanten.nl">http://www.plantenbakkenplanten.nl</a>
	63) Fachjan Project Plants	<a href="http://www.fachjan.nl">www.fachjan.nl</a>
13. United	64) Ebay	<a href="http://www.ebay.co.uk">www.ebay.co.uk</a>

Country	Company or nursery	Website
Kingdom	65) Crocus	<a href="http://www.crocus.co.uk">www.crocus.co.uk</a>
	66) House of plants	<a href="http://www.houseofplants.co.uk">www.houseofplants.co.uk</a>
	67) The Palm Centre	<a href="http://www.palmcentre.co.uk">www.palmcentre.co.uk</a>
	68) House of plants	<a href="http://www.houseofplants.co.uk">www.houseofplants.co.uk</a>
14. Czech Republic	69) Hydroflora s.r.o.	<a href="http://www.hydroflora.cz/beaucarnea-recurvata-slioni-noha/">http://www.hydroflora.cz/beaucarnea-recurvata-slioni-noha/</a>
	70) Pěstík.cz	<a href="https://www.pestik.cz/beaucarnea-guatemalensis-6817.html">https://www.pestik.cz/beaucarnea-guatemalensis-6817.html</a>
	71) Semeniště.cz	<a href="http://semeniste.cz">http://semeniste.cz</a>
	72) Květináče.cz	<a href="http://www.kvetinace.cz/p/beaucarnea-recurvata-35x90cm/">http://www.kvetinace.cz/p/beaucarnea-recurvata-35x90cm/</a>
15. Sweden	73) Blomstergrossisten	<a href="http://www.blomstergrossisten.net">www.blomstergrossisten.net</a>
	74) Tibidao AB	<a href="http://www.tibidao.se/">http://www.tibidao.se/</a>
	75) Blomsterlandet	<a href="http://www.blomsterlandet.se">www.blomsterlandet.se</a>
	76) Bakker Holland AB	<a href="http://www.bakker.se">www.bakker.se</a>
	77) Plantagen	<a href="http://www.plantagen.se">www.plantagen.se</a>
	78) Impecta Fröhandel AB	<a href="http://www.impecta.se">www.impecta.se</a>
	79) Succseed	<a href="http://www.succseed.com/">http://www.succseed.com/</a>
	80) Wermland desertplants	<a href="http://www.wermlanddesertplants.se/sortiment.html">http://www.wermlanddesertplants.se/sortiment.html</a>
	81) Jalapeno -	<a href="http://jalapeno.nu/flasklilja.html">http://jalapeno.nu/flasklilja.html</a>

**Table 2.** Companies and websites that market the ponytail palm.

The main specimens on the market are: live plants (including seedlings) and seeds. The live plants are offered at heights of 0.4 to 7.5 metres, with prices that vary as follows (**Table 3**):

Plant size	Plant height (cm)	Average price (USD) <sup>2</sup>
Small (juveniles)	Less than 200 cm	\$1,390
Medium and adults	Greater than 200 cm	\$7,276.5

**Table 3.** Dimensions and price of plants marketed online.

Seeds are offered in amounts (packets) ranging from one to 2000, reaching the following prices (**Table 4**): A

Number of seeds	Maximum price reached (USD)
1	\$3
5	\$4.60
50	\$10
500	\$15
2000	\$45

**Table 4.** Price of packets of seeds marketed online.

Of the countries that responded to the consultations, 11 confirmed that seeds and plants of *B. recurvata* are marketed there, the majority of which are of unknown origin (U) or artificial (A). These countries were: China, Croatia, Czech Republic, Denmark, Ireland, Latvia, Netherlands, Slovenia, Spain and Sweden.

With regard to the total number of plants marketed (the majority of artificial origin), Denmark reported an annual average of 200,000 specimens exported, while Slovenia reported an annual average of 5943 plants imported from China, Israel and the European Union (without specifying countries).

Moreover, Croatia, the Czech Republic and Italy confirmed that the species is very common on the ornamental plant market in the country. In addition, the majority of European Union countries

<sup>2</sup> The foreign currencies were translated into United States dollars (dUSD) using the exchange rate from 1 March 2015, which was as follows:

a) 1 Australian dollar (AUD) = \$0.76 USD;  
b) 1 New Zealand dollar (NZD) = \$0.75 USD  
c) 1 euro (€) = \$1.05 USD; y,  
d) 1 pound (£) = \$1.47 USD

consulted mentioned that the majority of imports of the species come from China. Some of the countries consulted (for example, Italy, Latvia, Sweden and United States of America) clarified that as the species is not listed in the CITES Appendices, and because there are no trade records in the UNEP-World Conservation Monitoring Centre database, the reported trade levels for the species could be underestimated.

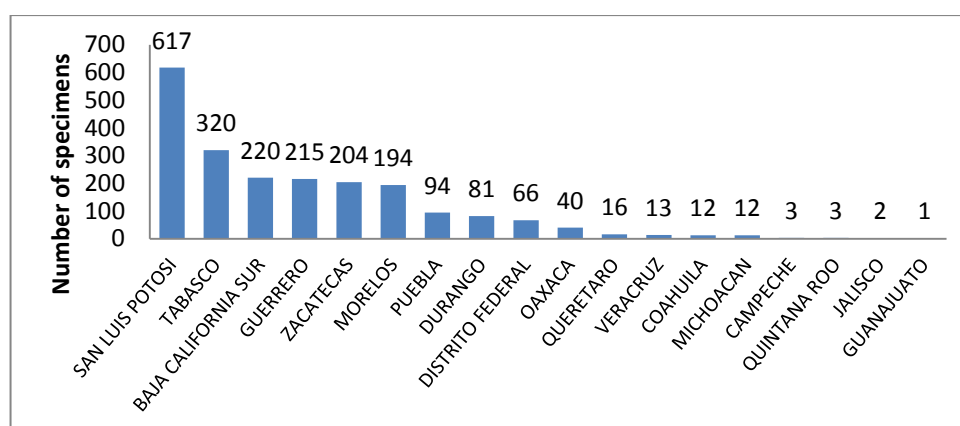
As such, it is important to know the legal origin of specimens marketed internationally, since according to the information provided by the General Wildlife Directorate of the Ministry of Environment and Natural Resources of Mexico (DGVN-SEMARNAT) during the workshop in September 2014, since 2009, no export permits have been granted for *B. recurvata*. Therefore, further investigation is required into the possibility that the ponytail palm is leaving Mexico under incorrect documentation, with phytosanitary permits issued by the Ministry of Agriculture, Livestock and Rural Development, Fisheries and Food (SAGARPA), similar to what has happened in recent years with *Yucca queretaroensis* (CITES, 2013), listed in Appendix II following a unanimous decision by the sixteenth meeting of the Conference of the Parties to the Convention (CoP16, Bangkok 2012).

#### 6.4 Illegal trade

The above trade analysis supports the findings of Golubov et al. (2007), which state that numerous websites offer plants and germplasms from diverse species of Mexican nolinaceae that are or were removed from the country.

According to the information provided by the Federal Attorney's Office for Environmental Protection (PROFEPA) on seizures and confiscations of *B. recurvata* in the period 2004–2014, 171 inspections were performed that resulted in the seizure of specimens of *B. recurvata* in 25 states across the countries. In total, the seizures collected 446,520 specimens (individuals) of *B. recurvata*, of which 73.4 per cent came from inspections in the State of Morelos; 12.4 per cent in Colima; and 7.4 per cent in Veracruz. The remaining percentage of specimens seized (6.8 per cent) were found across the 22 remaining states through inspections carried out by PROFEPA. During the period in question (2004–2014), the years with the highest number of seizures of *B. recurvata* were 2010 and 2011, which were significantly higher than the other years.

With regard to confiscations during the period 2004–2014, these amounted to 2113 specimens, mainly coming from the States of: San Luis Potosí (29 per cent); Tabasco (15 per cent); and Baja California Sur, Guerrero and Zacatecas (10 per cent each) (**Figure 3**).



**Figure 3.** Confiscations of *B. recurvata* during the period 2004–2014.

Additionally, based on an analysis of confiscations in ports, airports and borders recorded by PROFEPA and records of illegal exports of Mexican species in the Law Enforcement Management Information System (LEMIS) database of the United States of America during the period 1994–2004, combined with considerations on the conservation status (according to Official Mexican Standard NOM-059-SEMARNAT-2010) and endemism, the ponytail palm (*B. recurvata*) was identified by the “Study to identify relevant Mexican species within the framework of international trade” (Mosig & Reuter, 2013) as an at risk species with significant international trade that could meet the criteria for listing in CITES Appendix II.

Although there are nurseries in Mexico that produce (legally) the ponytail palm, the number of available specimens does not satisfy the demand on the national and international ornamental plant markets. This has apparently been the driver behind the illegal harvesting of seeds, and wild juvenile and adult plants, which could ultimately lead to the extinction of wild species, since there is a risk that this will further reduce the minimum size of the viable population (Osorio-Rosales & Mata-Rosas, 2005).

#### 6.5 Actual or potential trade impacts

As indicated in the above section (on threats), overharvesting of wild specimens for ornamental purposes has detrimental effects on the viability of wild populations of *B. recurvata*.

Nevertheless the species has a high potential for sustainable use, which could be driven by improvements in traceability and value chain regulation.

### 7. Legal instruments

#### 7.1 National

The ponytail palm (*B. recurvata*) is listed as threatened (A) under Official Mexican Standard NOM-059-SEMARNAT-2010 (SEMARNAT, 2010), and in accordance with the provisions of the General Wildlife Act (SEMARNAT, 2000), its management, use and export is regulated by the General Wildlife Directorate of the Ministry of Environment and Natural Resources of Mexico.

However, according to the most recent assessment using the methodology established by NOM-059-SEMARNAT-2010 performed during the September 2014 workshop, *B. recurvata* could be classified as a species 'at risk of extinction' (P).

#### 7.2 International

It is not listed in the Appendices of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 2013); and to date it has not been assessed using the criteria of the International Union for the Conservation of Nature Red List (IUCN, 2014).

### 8. Control measures

#### 8.1 Management measures

##### 8.1.1 Conservation *in situ*

As can be seen in **Figure 1**, at present, *B. recurvata* is not present in Protected Natural Areas.

##### 8.1.2 Conservation *ex situ*

The UMA "3 de mayo" [3 May] (Veracruz; record 118 in Table 5, Annex 2) is one of the most significant and successful efforts in the conservation of *B. recurvata* (Hernández-Sandoval, et al., 2012a). This UMA comprises 14 communities in 21 locations and 10 towns in the State of Veracruz (2010). One hundred and nineteen producers participate, with 31 nurseries installed across 195 hectares of remains of deciduous tropical forest.

Moreover, the species is present in germplasm banks of the Network of Conservation Centres of the National Seed Inspection and Certification Service-National System for Plant Genetic Resources for Food and Agriculture (SNICS-SINAREFI) of the Ministry of Agriculture, Livestock and Rural Development, Fisheries and Food (SAGARPA).

With regard to its presence in Mexican botanic gardens, the species is found in eight such gardens, with the following number of specimens recorded:

- a) "Francisco Javier Clavijero" Botanic Garden (59 specimens)
- b) "Roger Orellana" Botanic Garden (1 specimen)

- c) Culiacán Botanic Garden (1 specimen)
- d) Africam Safari Botanic Garden (1 specimen)
- e) El Charco del Ingenio Botanic Garden (7 specimens)
- f) Oaxaca Ethnobotanical Garden (Undetermined number of specimens)
- g) Ethnobotanical Garden and Museum of Traditional Medicine of the Morelos National Institute of Anthropology and History (8 specimens)

## 8.2 Population monitoring

The Elephant's Foot Network (*Beaucarnea* spp.), founded in 2008, monitors the situation of a number of species from this genus. The Network is coordinated by the National System for Plant Genetic Resources for Food and Agriculture (SINAREFI) of the Ministry of Agriculture, Livestock and Rural Development, Fisheries and Food (SAGARPA) and has a Strategic Plan for the Management and Conservation of species of *Beaucarnea* (see Hernández-Sandoval et al., 2012).

## 8.3 Control measures

### 8.3.1 International

At present, the species is not listed in the CITES Appendices.

### 8.3.2 Domestic

At the national level, the following stand out: the efforts of the Elephant's Foot Network (SNICS-SINAREFI), and the activities of national institutions (General Wildlife Directorate and PROFEPA) to comply with the provisions of the General Wildlife Act.

## 8.4 Artificial propagation

In spite of the production of *B. recurvata* in intensive UMAs, nurseries and PIMVS at the national level, this does not satisfy demand on the national and international ornamental plant markets, meaning that seeds are constantly subject to illegal overharvesting. As an alternative Osorio-Rosales and Mata-Rosas (2005) propose a system of micropropagation through organogenesis that could satisfy horticultural market demand while at the same time having the potential to contribute to reintroduction programmes in the wild.

## 9. Information on similar species

The *Beaucarnea* genus comprises 11 species, which can be grouped according to their commercial relevance as follows:

- a) Group 1 (frequent trade): *B. inermis*, *B. recurvata*, *B. goldmanii*, *B. plibilis* (syn. *B. ameliae*, and *B. petenensis*), *B. hiriartiae*, *B. guatemalensis*
- b) Group 2 (not so frequent): *B. gracilis*, *B. stricta*, *B. sanctomariana* (mainly seeds)
- c) Group 3 (no trade): *B. purpusii* and *B. compacta*<sup>3</sup>

The most similar species to *B. recurvata* is *B. inermis*, and they can be distinguished through analysis of the leaf margins. In addition, the base of *B. inermis* has extensions, compared to *B. recurvata*, the base of which has buttresses (Hernández-Sandoval, et al., 2012a). Moreover, the range of *B. inermis* is limited to the north-east of San Luis Potosí and the south of Tamaulipas (Hernández-Sandoval, 1993).

The information generated by Martínez et al. (2014) may be of great use for distinguishing between the species from the genus based on foliar anatomy and other diagnostic features.

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<sup>3</sup>However, according Luis Hernández-Sandoval (personal comment), there is marketing of *B. compacta* in nurseries in San Miguel de Allende (Guanajuato, Mexico). It is advisable to review the situation of the species in national trade to see whether it merits being classified in group 2 (not so frequent trade).

However, based on expert conclusions, the seeds and seedlings of the species in the genus are undistinguishable by non-specialists. Therefore, by listing *B. recurvata* in CITES Appendix II it is possible that other species in the genus will meet the inclusion criteria based on similarity (criteria A of Annex 2b of Resolution Conf. 9.24 [Rev. CoP16]): “The specimens of the species in the form in which they are traded resemble specimens of a species included in Appendix II [...]so that enforcement officers who encounter specimens of CITES-listed species are unlikely to be able to distinguish between them.”

On the other hand, according to Emiliano Sánchez (personal comment), it is possible to distinguish between ponytail palm plants (*B. recurvata*) of wild and artificial origin, since those of artificial origin have round and perfectly formed bases. Moreover, the roots of the plants grown in pots have a typical cylindrical shape.

10. Consultations

This is a species that is endemic to Mexico, meaning that it was not necessary to consult other Parties to the Convention.

11. Additional remarks

None.

### UMAs y PIMVS con planes de manejo autorizados para aprovechamiento de *B. recurvata*

**Tabla 5.** UMAs intensivas y viveros con planes de manejo autorizados para aprovechamiento de *B. recurvata*.

Estado/State	UMA intensiva o vivero	Clave de registro/Code of registry
BAJA CALIFORNIA SUR	1. JUNGLE CACTUS S. DE R.L. DE C.V.	SEMARNAT-UMA-VIV-061-BCS/08
CAMPECHE	2. LA PERSEVERANCIA DOS	MX/VIV-CO-063-CAM.
	3. VIVERO DESPEINADAS HZILTIL	SEMARNAT-UMA-IN-0029-CAMP-2008
	4. VIVERO ESTADO DE MEXICO	SEMARNAT-UMA-IN-0047-CAMP/12
	5. VIVERO MILLONARIA	SEMARNAT-UMA-IN-0053-CAMP/12
	6. VIVERO ENRIQUES	SEMARNAT-UMA-IN-0048-CAMP/12
	7. VIVERO AGUILAS SERDAN	SEMARNAT-UMA-IN-0044-CAMP/12
	8. VIVERO CAYAL	SEMARNAT-UMA-IN-0045-CAMP/12
	9. VIVERO SANTA CRISTINA	SEMARNAT-UMA-IN-0046-CAMP/12
	10. VIVERO ADOLFO LOPEZ MATEOS	SEMARNAT-UMA-IN-0043-CAMP/12
	11. VIVERO LA RESERVA S.P.R. DE R.L.	SEMARNAT-UMA-IN-062-COL/2008
COLIMA	12. FOLLAJES TROPICALES DE COLIMA S.P.R. DE R.L. DE C.V.	MX/VIV-CO-185-COL
	13. VIVERO JARDIMAC	SEMARNAT-UMA-IN-038-COL/2006
	14. VIVERO PELAYO	SEMARNAT-UMA-IN-037-COL/2006
	15. VIVERO LA COLUMNARIA	SEMARNAT-UMA-IN-051-COL/2007
	16. VIVERO EL GUAYACAN	SEMARNAT-UMA-IN-057-COL/2007
	17. VIVEROS RANCHO CALDERON, S. DE R.L. DE C.V.	SEMARNAT-UMA-IN-054-COL/2007 (PIMVS)
	18. VIVERO LOS MEZCALES	SEMARNAT-UMA-IN-056-COL/07
	19. HORTA NURSERY S.P.R. DE R.L	SEMARNAT-UMA-IN-063-COL/2008
	20. VIVERO VALLES VERDE	SEMARNAT-UMA-IN-031-COL/2005
	21. VIVERO LOS CHORRITOS	SEMARNAT-UMA-IN-033-COL/2006
	22. VIVERO EL CAPIRO	SEMARNAT-UMA-IN-035-COL/2006
GUANAJUATO	23. VIVERO DE PLANTAS DEL DESIERTO	SEMARNAT-UMA-INT-0043-GTO
	24. VIVERO "PALMAS Y ARBOLES DEL BAJIO"	SEMARNAT-UMA-IN-0038-GTO
	25. ZOOLOGICO QUINTA LAS PALMAS	SEMARNAT-UMA-IN-0034-GTO.
	26. LA PUNTA	DGVS-CR-IN-0888-GTO/06
JALISCO	27. VIVERO EL MANGUITO	SEMARNAT-UMA-VIV-0009-COL/01
	28. RANCHO SANTA TERESA	SEMARNAT-UMA-VIV-0042-JAL
MICHOACAN	29. VIVERO JARDIN DEL CUBILETE	SEMARNAT-UMA-IN-0052-MICH/04
	30. VIVERO JARDIN DEL CUBILETE	SEMARNAT-UMA-VIV-0052-MICH/13
MORELOS	31. VIVERO FEDERICO SANCHEZ ABUNDEZ	SEMARNAT-UMA-VIV-045-MOR.2006
	32. VIVERO MARIA LUISA	SEMARNAT-UMA-VIV-046-MOR.2006
	33. VIVERO ROSAURA DOMINGUEZ PERUN	SEMARNAT-UMA-VIV-042-MOR.2006
	34. VIVERO BUGAMBILIAS	SEMARNAT-UMA-VIV-049-MOR.2006
	35. VIVERO DEL VALLE	SEMARNAT-UMA-VIV-051-MOR.2006
	36. VIVERO NEY	SEMARNAT-UMA-VIV-054-MOR.2006
	37. VIVERO ALONDRA	SEMARNAT-UMA-VIV-052-MOR.2006
	38. VIVERO LAS TORRES	SEMARNAT-UMA-VIV-048-MOR.2006
	39. HERBAFLOR VIVEROS	MX/VIV-CO-0238-MOR./07
	40. VIVERO ESTRELLA 2	SEMARNAT-UMA-VIV-047-MOR.2006
	41. VIVERO LOS LAURELES I	SEMARNAT-UMA-VIV-036-MOR.2006
	42. VIVEROS ANDREAS S. MÜLLER JUNG	MX/VIV-CO-145-MOR/98
	43. JARDÍN JONACATEPEC	SEMARNAT-UMA-VIV-017-MOR
	44. VIVERO AGROPECUARIA LAS LUPITAS	SEMARNAT-UMA-VIV-019-MOR
	45. VIVERO YAUTEPEC	SEMARNAT-UMA-VIV-018-MOR
	46. VIVERO AMBIENTAL	SEMARNAT-UMA-VIV-020-MOR
	47. VIVERO PLANTEC	SEMARNAT-UMA-IN-VIV-0025-MOR-05
	48. VIVERO EL ROSARIO	SEMARNAT-UMA-VIV-032-MOR.2006
	49. VIVERO MUNDO 2000	SEMARNAT-UMA-VIV-035-MOR.2006

Estado/State	UMA intensiva o vivero	Clave de registro/Code of registry
	50. VIVERO SAN PABLO	SEMARNAT-UMA-VIV-034-MOR.2006
	51. VIVERO ROSSY	SEMARNAT-UMA-VIV-040-MOR.2006
	52. VIVERO ARACEAS ORNAMENTALES	MX/VIV-CO-221-MOR/05
	53. VIVERO RAMON CABELLO ALCANTARA	MX/VIV-CO-224-MOR/05
	54. VIVERO DOMINGO	SEMARNAT-UMA-VIV-058-MOR.2006
	55. VIVERO EL CHINO	SEMARNAT-UMA-VIV-059-MOR.2006
	56. VIVERO SANTA MARIA	SEMARNAT-UMA-VIV-031-MOR.2006
	57. VIVERO LOS LAURELES	SEMARNAT-UMA-VIV-037-MOR.2006
	58. VIVERO JESUS	SEMARNAT-UMA-VIV-039-MOR.2006
	59. VIVERO LA ESTACION	SEMARNAT-UMA-VIV-033-MOR.2006
	60. VIVERO OAXCOYOC	MX/VIV-CO-0239-MOR./08
	61. VIVERO HORTENCIA	MX/PIMVS-VIV-CO-259-MOR./10
	62. VIVERO LA TOMA	SEMARNAT-UMA-VIV-038-MOR.2006
	63. VIVERO BORIS	SEMARNAT-UMA-VIV-INT-067-MOR
	64. VIVERO ERIK PREDIO I Y II	SEMARNAT-UMA-VIV-INT-071-MOR
	65. VIVERO LAS 6	SEMARNAT-UMA-VIV-INT-070-MOR
	66. LA CASA DE LOS ARBOLES	SEMARNAT-UMA-VIV-INT-065-MOR
	67. VIVERO FINA FLOR	SEMARNAT-UMA-VIV-INT-063-MOR
	68. VIVERO HAYDEE	SEMARNAT-UMA-VIV-041-MOR.2006
	69. VIVERO PABLO TORRES CAMACHO	SEMARNAT-UMA-VIV-044-MOR.2006
	70. FLORAPLANT, S.A. DE C.V.	SEMARNAT-UMA-VIV-055-MOR.2006
	71. VIVERO LA RANA	SEMARNAT-UMA-VIV-056-MOR.2006
NUEVO LEON	72. VIVEROS LAS ABRAS	SEMARNAT-UMA-VIV-0002-N.L.
OAXACA	73. VIVEROS SANTA ROSA DE OAXACA S. DE R.L. DE C.V.	SEMARNAT-UMA-INT-116-OAX
	74. VIVEROS DE OAXACA S.C.L.	SEMARNAT-UMA-INT-117-OAX
PUEBLA	75. VIVERO LOS ANGELES DE ATLIXCO	SEMARNAT-UMA-VIV-0001-PUE
	76. PALMEIRA VIVE VERDE	SEMARNAT-UMA-IN-VIV-0149-VER/12
QUERETARO	77. DESARROLLOS RESIDENCIALES TURÍSTICOS	SEMARNAT-UMA-IN-0024-QRO.
	78. LOS PORTICOS	SEMARNAT-UMA-IN-0052-QRO/13
QUINTANA ROO	79. VIVERO MOON PALACE	MX/VIV-CO-353-QROO/12
	80. CARIBE PARADISE	MX/VIV-CO-210-Q.ROO
	81. TANKAH	SEMARNAT/UMA-VIV-0011-06/QROO
	82. VIVERO IXORA	MX/VIV-CO-0235-Q.ROO/07
	83. IMPERATORS	DGVs-CR-IN-1587-QROO/13
	84. RANCHO SAN SALVADOR	DGVs-CR-IN-0960-Q.ROO/07
SAN LUIS POTOSI	85. MADRE NATURALEZA	MX/VIV-CO-150-S.L.P.
	86. RANCHO TURU	SEMARNAT-UMA-INT-0009-S.L.P.
TAMAULIPAS	87. VALMELEN	SEMARNAT-VIV-IN-0227-TAM
	88. VIVEROS HORTENSIA	SEMARNAT-UMA-VIV-0183-TAM/04
	89. EJIDO NUEVO SAN FRANCISCO	SEMARNAT-UMA-VIV-0151-TAM
	90. LOS CAMALEONES	CEVS-UMA-VIV-IN-337-TAM
	91. VIVEROS TRADICIONALES DE GONZALEZ	CEVS-UMA-VIV-325-TAM
	92. SAN GERARDO	CEVS-UMA-VIV-IN-335-TAM
	93. PARQUE ZOOLOGICO DE ALTAMIRA	CEVS-UMA-IN-ZOO-0311-TAM
	94. CALQUIN S.A. DE C.V.	CEVS-UMA-IN-108-TAM
VERACRUZ	95. VIVERO NATURA	SEMARNAT-UMA-IN-VIV-0044-VER/05
	96. VIVERO CAVAZOS	SEMARNAT-UMA-IN-VIV-0041-VER/05
	97. ADVENTURE VERACRUZ EXPEDICIONES, S. A. DE C. V.	SEMARNAT-UMA-IN-VIV-0030-VER/03
	98. LA ARAUCARIA	MX/VIV-CO-159-VER
	99. VIVERO PALO ALTO	SEMARNAT-UMA-VIV-0134-VER/12
	100. XOCOTITLA	SEMARNAT-UMA-IN-VIV-0146-VER/12
	101. EL PATIO DE LAS ORQUÍDEAS	SEMARNAT-UMA-IN-VIV-0021-VER/02
	102. VIVERO MUNDO VERDE	SEMARNAT-UMA-IN-VIV-0032-VER/04
	103. VIVERO HERMANOS DURAN	SEMARNAT-UMA-IN-VIV-0154-VER/12
	104. MONTE OSCURO	DGAERN/MX/VIV-CO-015-VER/12
	105. VIVERO DE PLANTAS ORNAMENTALES LAS CICADAS	SEMARNAT-UMA-IN-VIV-0153-VER/12
	106. LA ESTANCIA	SEMARNAT-UMA-IN-VIV-0027-VER/02
	107. VIVERO LA PIEDRA	SEMARNAT-UMA-IN-VIV-047-VER/06



Estado/State	UMA intensiva o vivero	Clave de registro/Code of registry
	108. VIVERO APIAXCO	MX-VIV-CO-359-VER/12
	109. EBEN-HEZER	SEMARNAT-UMA-IN-VIV-0124-VER/11
	110. RAUL GARCIA DIAZ	SEMARNAT-UMA-VIV-0131-VER/11
	111. GRUPO PRODUCTIVO DE CACTACEAS Y SUCULENTAS	SEMARNAT-UMA-IN-VIV-0029-VER/03
	112. LA FLOR DE SANTAMARIA	SEMARNAT-UMA-VIV-0059-VER/07
	113. TEXON	SEMARNAT-UMA-IN-VIV-0063-VER/08
	114. GUARDIANES DEL BOSQUE	SEMARNAT-UMA-EX-VIV-0082-VER/08
	115. VIVERISTAS UNIDOS DE LA PERLA VERACRUZ	SEMARNAT-UMA-IN-VIV-0074-VER/09
	116. VIVERO MARIAM	MX/VIV-CO-285-VER/11
	117. CUMKU	SEMARNAT-UMA-IN-VIV-0067-VER/07
	118. 3 DE MAYO	SEMARNAT-UMA-IN-VIV-0035-VER/04
	119. VIVERO MARGARITAS	SEMARNAT-UMA-IN-VIV-0038-VER/04
	120. JARDIN SANTA MARIA	SEMARNAT-UMA-VIV-0104-VER/11
	121. MARIA CRISTINA	MX-VIV-CO-149-VER./06
	122. LUCERTAS (CRIADERO EXTENSIVO CON MODALIDAD DE INTENSIVO Y DE VIVIERO)	SEMARNAT-UMA-EX -CR-VIV-0054-VER/07
YUCATAN	123. VIVERO ARAUCARIA	SEMARNAT-UMA-VIV-0100-YUC-06
	124. VIVERO SANTA TERESA	SEMARNAT-UMA-VIV-0146-YU-08
	125. VIVERO PALMA REAL	SEMARNAT-UMA-VIV-0096-YUC-06
	126. CENTRO DE JARDINERIA HACIENDA SAN ANTONIO COCUL	SEMARNAT-UMA-VIV-0150-YUC-08
	127. YA'AX TUUNICH	SEMARNAT-UMA-VIV-0142-YUC-08
	128. SAN JOSE YAAXCHE	SEMARNAT-UMA-VIV-0033-YUC-02
	129. VIVERO MONTECRISTO	SEMARNAT-UMA-VIV-0027-YUC-02
	130. FLORES DE MANGLE	SEMARNAT-UMA-VIV-0220-YUC-11
	131. CENTRO DE JARDINERIA HACIENDA SAN ANTONIO CUCUL	SEMARNAT-UMA-VIV-0150-YUC-08
	132. BANCO DE GERMOPLASMA DE PLANTAS UTILES DE LA CULTURA MAYA	SEMARNAT-UMA-VIV-0192-YUC-10
	133. VIVERO PALMA REAL	SEMARNAT-UMA-VIV-0235-YUC/12
	134. VIVERO SAN JOSE TZAL	SEMARNAT-UMA-VIV-221-YUC-11
	135. VIVERO-ISYSA-LAS COLORADAS	SEMARNAT-UMA-VIV-0152-YUC-08
	136. GANADERÍA DIVERSIFICADA	SEMARNAT-UMA-IN-0077-YUC-05
	137. TAMANCEH	SEMARNAT-UMA-IN-0186-YUC-10
	138. VIVERO DE PLANTAS MEDICINALES, FRUTALES Y ORNAMENTALES NACHI COCOM (BAJA)	SEMARNAT-UMA-VIV-0058-YUC-04
	139. BEBELSAH (BAJA)	SEMARNAT-UMA-VIV-0060-YUC-04
	140. VIVERO DEL PUERTO	SEMARNAT-UMA-VIV-0001-QROO-02

**Tabla 6.** PIMVS con planes de manejo autorizados para aprovechamiento de *B. recurvata*.

Estado	PIMVS	Clave de registro
BAJA CALIFORNIA SUR	1. LA PAZ	MX/PIMVS-VIV-CO-0243-BCS/08
CAMPECHE	2. VIVERO JARDIN LAS PALMAS	MX/PIMVS-VIV-CO-329-CAMP/12
	3. VIVERO MARIA DOLORES	MX/PIMVS-VIV-CO-333-CAMP/12
	4. VIVERO FORESTAL LA MANCOLONA	MX/PIMVS-VIV-CO-334-CAMP/12
DISTRITO FEDERAL DISTRITO FEDERAL	5. PARQUE BICENTENARIO JARDIN NATURA	DGVS/PIMVS-JB-063-DF/10
	6. PIMVS CACTACEAS Y SUCULENTAS DE XOCHIMILCO	MX-PIMVS-VIV-CO-373-DF/13
GUANAJUATO	7. VIVERO DE CACTUS NEUTLA	MX/PIMVS-VIV-CO-260-GTO./10
JALISCO	8. VIVERO TABACHINES	MX/PIMVS-VIV-CO-354-JAL/12
MICHOACAN	9. ZITACUARO	MX/PIMVS-VIV-CO-0244-MICH/08
MICHOACAN	10. JARDINES Y CACTUS SAN ANTONIO	MX-PIMVS-VIV-CO-381-MICH/13
MORELOS	11. TEHUIXTLA	MX/PIMVS-VIV-CO-0242-MOR/08
MORELOS	12. TIKUPE S.A. DE C.V.	MX/PIMVS-VIV-CO-350-MOR/12
MORELOS	13. PALMAS EXOTICAS DEL MUNDO	MX-PIMVS-VIV-CO-357-MOR/12
NAYARIT	14. VIVERO CYCALI	MX-PIMVS-VIV-CO-317-NAY/12
PUEBLA	15. RANCHO ECOLOGICO EL ANGEL DE TU SALUD	MX/PIMVS -JB-066-PUE/12
SINALOA	16. PALMAS EXOTICAS DE ANGOSTURA	MX/PIMVS-CO-250-SIN/09
TABASCO	17. EL FORTIN	MX/PIMVS-VIV-CO-249-TAB/09
VERACRUZ	18. LAS MARAVILLAS	SEMARNAT-PIMVS-VIV-0010-VER/13

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