

# A Study of the in situ Situation of Four Species of Threatened Understory Palms of the Genus *Chamaedorea* in the Wild in the State of Veracruz, Mexico

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## ABSTRACT

This study is a continuation of WWF-US Project 3322, to elucidate the state of conservation, and economic botany of palms of Latin America and the Caribbean. The lack of field information has prevented the allocation of a CITES Appendix I status to *Chamaedorea tuerckheimii* (Dammer) Burret and *C. metallica* Cook ex Moore; both these species are considered threatened or endangered. The authors suggest that *C. tenella* Wendl. and *C. monostachys* Burret, both endemics to southern Mexico, should also be included in the study. Information such as population density of the only known populations as well as a search for new populations is presented. *Ex situ* cultivation of these species in nurseries has been searched for and also local uses of plants or leaves is recorded. It has been suggested that CITES Appendix II listing would be the most appropriate in order to encourage propagation of the species.

There exist 13 palm genera with approximately 35 species in the state of Veracruz. The genus *Chamaedorea* accounts for 15 species. This genus includes the majority of palm species that are threatened and inadequately managed.

The clear cutting of tropical rain-forest for agricultural expansion is the major factor leading to the reduction of populations of *Chamaedorea* palms. Coupled with this is the illegal extraction of plants (to a lesser extent) but still a serious threat to *C. tuerckheimii*, and leaves for the ornamental horticulture industry (to a greater extent). The latter, now being displaced by agricultural expansion, is an entrenched activity among human settlements in or adjacent to rain-forest. This can be one of the major sources of income, supporting various families and middle-men (Saldivia and Cherbonier 1982).

Habitat destruction, intense collecting, and inadequate methods of leaf harvesting coupled with a lack of institutional organization and inefficient

law-enforcement has contributed greatly to the reduction in numbers of many *Chamaedorea* species. In spite of the increasing economic importance of the species in local as well as foreign markets, there is still no adequate management of the resource at a national level (Saldivia and Cherbonier 1982). Where there is commercial management of a sort, in rain-forest, at Mr. Enrique Castro's 'farm' at El Bastonal (near Catemaco) many of the existing, but not commercially important *Chamaedorea* spp. (i.e., *C. elatior* Mart.) are destroyed, and the ones with more commercial demand such as *C. atrovirens* and *C. rojasiana* are introduced into the understory as seedlings or seed. The leaves of these species are periodically harvested using adequate techniques since Mr. E. Castro is a professional horticulturist and supervises his workers. Another commercial nursery for *Chamaedorea* spp. is in the Municipality of Juchique de Ferrer near Misantla where palms are cultivated in association with coffee or as a monoculture.

Local uses for *Chamaedorea* palms include cut foliage for decorating altars during the All Souls (Dia de los Muertos) festival in November, civic celebrations in the city of Xalapa and others, as well as the year-round decoration of commercial displays of fruit and meat (*C. tepejilote* Liebm. ex Mart.). Cut foliage as well as seed and plants are also exported, for further information see Saldivia and Cherbonier (1982).

A sustained management of the existing wild populations of *Chamaedorea* palms is urgently needed before further habitat degradation and loss occurs. Cultivation in nurseries from seed is also possible and should be encouraged.

### General Information on Plant and Foliage Collecting

Foliage collectors call *Chamaedorea* palm species 'tepejilote', 'camedor', 'guayita de rio', 'xiate (shiate)' or 'palmita'. The principal collecting areas are where tropical rain-forests and cloud-forests still exist in the states of Veracruz, Oaxaca and Chiapas. The Secretaría de Agricultura y Recursos Hidraulicos (SARH) expedites permits for the exploitation of foliage, charging a given amount per gross of cut leaves from natural habitats. There is a strong middle-man element in the export of foliage, but notwithstanding, the peasant foliage collector is assured a regular weekly income for his family whom he employs in the collection; very often whole families venture into the forests to gather 'camedor' leaves and too commonly, inexperienced children are employed and do considerable damage to the palms. Experienced collectors have a defined technique for foliage collecting and damage to the palm is minimal.

Both plants and foliage of *Chamaedorea metallica* Cook ex Moore, and *C. elegans* Mart, which are the preferred species, are collected in the state of Veracruz. To a lesser extent, largely because of their rarity, plants of *C. tuerckheimii* (Dammer) Burret and *Reinhardtia gracilis* (Wendl.) Burret are also collected among others in the Catemaco region of Veracruz. The former species is now critically endangered largely through habitat destruction.

In the regions of Córdoba, Fortín, Misantla and Naolinco it is common to see in the market places plants and foliage of *C. schiedeana* Mart. *C. oblongata* Mart., *C. klotzschiana* Wendl., *C. oreophila* Mart., *C. sartori* Liebm. and *C. tepejilote* Liebm. in Mart. originating from local forests.

In summary *Chamaedorea* palm foliage generates a market value exceeding 30 million dollars per year, and provides a source of employment for over 10,000 persons in Mexico. It is estimated that one million leaves are cut and 205 kilograms of seed are collected daily (*sic*) and the market is controlled by two North American monopolies (Toledo et al. 1989).

### Past Work

Saldivia and Charbonier (1982) carried out an investigation on the exploitation of the 'camedor' or 'xiate' palm including an analysis on collecting

sites and nurseries of the palm. The study is somewhat incomplete as regards to taxonomy of the species. The majority of the species commercialized for foliage are the more common ones. In contrast a few are rare species or not of commercial interest as regards seeds or foliage.

### Methods Used for Census

Using the descriptive and useful work of Aguilar (1986) on the genus *Chamaedorea* in the state of Veracruz, and a map indicating collecting sites made from existing information gathered from the herbarium (XAL), the classical sites were visited. Other possible sites where the species may exist were also noted and visits to the adjacent states of Oaxaca and Chiapas were also carried out.

Whenever possible three 10 × 10 m quadrats were laid out at random in each *Chamaedorea* population and all palms (seedlings, adults and immature) were counted. The population area was estimated by eye and an approximate palm density/m<sup>2</sup> was calculated. Specimens from each site were deposited at XAL, plants and seeds were also collected for the Botanic Garden at XAL.

Visits were made to local nurseries dealing with *Chamaedorea* palms on a commercial scale as well as visits to local markets where palm foliage is regularly sold.

### Results

*Chamaedorea monostachys* Burret.

*Common Name:* Tepejilote.

*Habitat:* Cloud-forest between 1,200 and 1,400 meters elevation.

*Approximate Area of Population:* 5 ha.

*Threat to Population:* Subsistence farming (maize) and fire-wood cutting.

*Land Ownership:* Private.

*Plant Density/m<sup>2</sup>:* 0.18 including adults, seedlings and young plants.

*Total No. of Plants Estimated in Habitat:* 9,000.

*Comments:* This species is found in the herbaceous strata of cloud-forest associated with *Carpinus caroliniana*, *Quercus germana*, *Ulmus mexicana*, *Clethra mexicana*, *Oreopanax* spp., *C. tepejilote* and *C. oreophila*, the last species being similar to *C. monostachys*.

The surrounding areas to this piece of relictual cloud-forest are either private or Ejido lands gazetted for agriculture. It is estimated that within the next five years or so agricultural expansion and

fire-wood cutting will destroy this remaining small and relictual site of *C. monostachys*, even though natural regeneration of the palm is occurring.

It is important, however, as a conservation measure, to organize rescue of this species and propagate it *ex situ* since seeds readily germinate.

Because of their similarity in vegetative habit, *C. monostachys* and *C. oreophila* are considered by some authorities to be the same. Differences only in size of the inflorescences have been noted during this survey.

#### *Chamaedorea tenella*

*Common Name:* Palma cimarrona.

*Habitat:* Evergreen tropical rain-forest at between 490 and 800 meters elevation.

*Approximate Area of Population:* Two populations of approx. 10 m<sup>2</sup> each on biological reserve and very widely dispersed in the fragmented rain-forest (400–500 ha), with 450–800 plants/ha.

*Threat to Population:* None envisaged at biological reserve but logging, agricultural expansion, and illegal collecting elsewhere.

*Land Ownership:* Universidad Veracruzana and State.

*Plant Density/m<sup>2</sup>:* 0.07–0.9. Individuals very widely scattered.

*Total No. of Plants Estimated in Habitat:* 17 on reserve; average of 680 plants/ha at other areas 490 and 730 meters elevation.

*Comments:* This species is a very rare rain-forest understory palm. Two populations have been detected with individuals scattered over a very wide area. Being in this primary rain-forest reserve the species is not threatened and is apparently in a state of equilibrium and conservation along with other species that are protected. In spite of this, the number of individuals existing is extremely low. Searches in neighboring relicts of forests and even in slightly disturbed habitats outside the Reserve has yielded no other populations nor isolated individuals, except on a large area of fragmented rain-forest on volcán San Martín Pajapan. This species apparently has a very low reproduction rate; on fertile individuals, no more than three fruits per raceme has been observed. There appears to be a pollinator problem giving rise to a very slow population growth rate (assuming this population has not been disturbed in any way previous to the study). Very high seed set has been achieved with hand pollination of this species (Hodel, personal communication).

Although this species does not appear to have

any general commercial demand since no use or management by palm foliage collectors has been reported, there is a great demand by collectors and hobbyists. The species inhabits sites with difficult access in the rain-forest. The two populations may well be stable but the species should be considered both rare and endangered until more of its biology is known.

#### *Chamaedorea tuerckheimii*

*Common Name:* No local name, Potato chip palm (U.S.A.).

*Habitat:* Evergreen tropical rain-forest at 700 meters elevation.

*Localities Where Encountered:* Only at one locality.

*Approximate Area of Population:* Approx. 10 × 10 m<sup>2</sup>.

*Threat to Population:* Imminent destruction of remaining habitat.

*Land Ownership:* Private.

*Plant Density/m<sup>2</sup>:* 0.1.

*Total No. of Plants Estimated in Habitat:* 10 adult plants with very few (5) seedlings.

*Comments:* A small understory palm that is in great demand by palm collectors and enthusiasts. Though the type locality is at Verapaz, Guatemala, we believed this may also be found in the Lacandona rain-forest in Chiapas. It was more widespread in the Los Tuxtlas region of Veracruz in the past but has since been decimated by commercial collectors and logging.

It grows in heavy shade with understory plants in evergreen rain-forest. The only locality of this rare palm now lies between four sweet-corn fields that are under slash-and-burn agriculture on clay soils and is also under threat by expanding cattle grazing pastures at the Rancho La Chingada locality. The habitat is already disturbed and the penetrating sun rays are causing dehydration of the site thus preventing adequate germination of the few seeds produced per plant.

It is imperative that these plants be rescued and placed under the safe custody of a botanic garden or reserve. Three live plants have been collected for the Botanic Garden.

Some local commercial nurseries have a few habitat collected individuals for sale and it is said that this palm has become very scarce over the last few years but at least one nursery is propagating the palm.

Plants and seeds that originated from larger

populations in Guatemala and Veracruz have been available at commercial nurseries in the USA.

### *Chamaedorea metallica*

*Common Name:* Metalica, palma brillante.

*Habitat:* Evergreen tropical rain-forest at 150 meters elevation.

*Approximate Area of Population:* 200–300 hectares.

*Threat to Population:* Coffee plantations and wood-cutting.

*Land Ownership:* Federal and Ejido lands.

*Plant Density/m<sup>2</sup>:* 0.24.

*Total No. of Plants Estimated in Habitat:* 2,400 per ha.

*Comments:* Locally very abundant in rain-forest on calcareous mountains. In the 10 × 10 m quadrats there were typically 4 to 5 adult plants with approximately 20 seedling and juvenile plants showing healthy regeneration. The habitat appears relatively undisturbed due to very difficult access and steep slopes. The karst topography makes the habitat unsuitable for agriculture but coffee plantations are slowly creeping up on the lower slopes. Similar hills are quarried for limestone, or cleared for grazing, thus a growing threat exists. We estimate over 300,000 individuals including seedlings in these hills which may merit considering this species as vulnerable and not immediately endangered (sensu IUCN categories).

This species seems to be endemic to these hills since exploration of similar hills on the Oaxaca side of the border revealed no other populations of the species. This small mountain range should be recommended as a reserve and management projects financed for the palm before habitat deterioration sets in. This species has also allegedly been seen in rain-forest near the Oaxaca border.

We include a list of palm species reported from the habitats visited in southern Veracruz as a part of the results of this study:

*Acoelorrhapha wrightii* Wendl., *Acrocomia mexicana* Karw. ex Mart., *Astrocaryum mexicanum* Liebm., *Bactris trichophila* Wendl., *Bactris balanoidea* Wendl., *Chamaedorea concolor* Mart., *C. ernesti-augusti* Wendl., *C. lepidota* Wendl. = *C. liebmanni* Mart., *C. tepejilote* Liebm., *C. oblongata* Mart., *C. schiedeana* Mart., *C. elatior* Mart., *Desmoncus quasilaris* Liebm., *D. chinantlensis* Liebm. ex Mart., *Genoma interrupta* (Ruiz & Pavón) Mart., *Reinhardtia gracilis* (Wendl.) Wendl., *Sabal morrisiana* Bartlett, *Scheelea liebmannii* Becc.

## Discussion

We recommend that the endangered taxa studied here be annexed to the CITES Appendix II category. Seeds germinate readily and Appendix II listing will encourage propagation and conservation oriented 'Cottage Industries' that might lead to the conservation of the few viable habitats left. Rescue operations and perhaps tissue culture are strongly advised for critically endangered species such as *Chamaedorea tuerckheimii*. Appendix I listing for *C. tuerckheimii* is felt to be redundant since the threat at the present is not commercial collecting but total habitat destruction. In the case of *C. metallica* which is apparently locally abundant, a cottage industry nursery should be encouraged in order to halt the coffee plantations from creeping in and eventually destroying the population. An 'on site' nursery will help to discourage illegal collecting and would be an incentive for the long term conservation of the habitat.

This project has not only thrown some light on the present situation of the four endangered *Chamaedorea* spp., but also has enabled new material to be collected for the herbaria, in many cases where only one report is known from the habitats. Unfortunately further explorations have not uncovered new populations, probably due to the limited time and resources devoted to the project. Perhaps further intensive botanical explorations may uncover other populations in states bordering Veracruz.

A second stage of this project should be contemplated as a continuation of the present study to include other palm species that are little known and have certain potential as useful and ornamental plants. The creation of cottage industry nurseries should be included in such a follow-up project as an immediate contribution to conservation-through-propagation of the species. Proposals to the Mexican environment protection agency (SEDSO) will be made to include sites such as the *C. metallica* population as protected areas. SEDES (Secretaría de Desarrollo Social) is also encouraging small cottage industries as a contribution towards the conservation of species that have a high commercial demand, and as an alternative to slash and burn farming practices and extraction. *Ex situ* studies in propagation techniques should be included where regional botanic gardens could be involved in the rescue and propagation of the critically endangered species. Experience in the Jardín Botánico Clavijero has shown

that *Chamaedorea* palms are readily propagated from seed with good germination rates. Mass propagation and re-introduction into protected areas would be instrumental in preventing the extinction of the rarest of these palms.

Where the more commercial species are managed or introduced i.e., *Chamaedorea atrovirens* and *C. rojasiana* as in the case of the camedora farm of Mr. Enrique Castro at El Bastonal, Los Tuxtlas, many of the naturally occurring and little known species are cut and destroyed. Education and a more conservationist-horticultural approach is needed here to orientate these nurseries that ultimately may be the only means of effective conservation of these palms in the state of Veracruz.

### Note

*Commercial collectors and overzealous enthusiasts have, in the past, decimated whole populations of palms, cycads, cacti and orchids. For these reasons we have omitted precise localities in this article and we feel it is appropriate to remind collectors and enthusiasts that remov-*

*ing palms and other plants from their habitats in Mexico without a collecting permit from SEDESOL and signed by Dra de la Garza is a most serious federal crime which can lead to fines and imprisonment.*

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### LITERATURE CITED

- AGUILAR, R. I. 1986. El género *Chamaedorea* Willd. (Palmae) en el estado de Veracruz. Thesis, Fac. de Ciencias Biológicas, Universidad Veracruzana, Xalapa, Ver, 138 p.
- SALDIVIA, T. AND C. CHERBONIER. 1982. De la recolección silvestre al cultivo de la palma camedor, Perspectiva de su aprovechamiento. SFF-SARH, Instituto Nacional de Inv. Forestales, Mexico.
- TOLEDO, V. M., J. CARABIAS, C. TOLEDO, AND C. GONZÁLEZ-PACHECO. 1989. La producción rural en México: alternativas ecológicas. Fundación Universo Veinituno, Mexico City.