



NDF WORKSHOP CASE STUDIES
WG 2 – Perennials
CASE STUDY 7
Tillandsia xerographica
Country – **GUATEMALA**
Original language – Spanish

CASE STUDY: TILLANDSIA XEROGRAPHICA

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I. BACKGROUND INFORMATION ON THE TAXA

1. BIOLOGICAL INFORMATION ON THE SPECIES

1.1. Scientific and common names.¹

Kingdom: Plantae
Division: Magnoliophyta
Class: Liliopsida
Order: Poales
Family: Bromeliaceae
Genus: *Tillandsia*
Species: *T. xerographica* Rohw
Common names: Gallito, Clavel del Aire

Scientific synonyms: *Tillandsia kruseana* Matuda
Tillandsia tomasellii DeLuca, Sabato & Balduzzi
Tillandsia xerographica Rohw form *variegata* Moffler is found from Mexico to El Salvador. It is characterized by its non-chlorophyllous longitudinal sections on the leaves. It is commonly known as *Tillandsia marítima*.²

Similar species: *Tillandsia fasciculata*

¹ CITES, Manual de Identificación de Especies, Especies de Flora, *Tillandsia xerographica*.

² Flora Mesoamericana, www.mobot.org

1.2 Distribution^{3, 4, 5}

Species endemic to the Mesoamerican Region, restricted to the semiarid area, mainly in the subtropical dry forest, very dry forest, and subtropical thorn scrub ecosystems, in southern Mexico, Guatemala, El Salvador and Honduras. It spreads at altitudes between 140 and 600 masl, with average temperatures that fluctuate from 22 to 28 degrees Centigrade, annual precipitation ranging from 550 to 800mm, relative humidity from 60 to 72 %, and evapotranspiration within a range from 600 to 800 mm per year.

In Guatemala, such region comprises the departments of El Progreso, Zacapa and Chiquimula, in the center and northeast of the Country, particularly within the semiarid region of the valley of the Río Motagua, which has an approximate surface of 928 Km² (200,000 ha). It is located at the base of the Sierra de las Minas, which acts as a natural barrier to moisture originating in the Atlantic causing the extreme dry condition that makes it one of the driest regions in Central America. Due to these conditions, its xerophytic vegetation is unique in the region and, therefore, it is considered to be an area of high endemism.⁶

At the present time, these ecosystems are extremely fragile and fragmented as a result of the expansion of the agricultural frontier to produce export crops (melon, tomato, egg plant, cucumber, peanut, okra, and citrus fruits), extensive cattle raising and urban and peri-urban sprawl in the region.

1.3 Biological characteristics of the species

Species Description⁷

Vegetative State: Epiphytic or lithophytic, acaulescent plant, from 20 – 60 cm in height. Blooming plants can reach up to 100 cm. Several leaves arranged in spiral forming a 60 – 90-cm-dense rosette, with a pseudobulbous base. Leaf blades are 15 – 75 cm long and 6 cm wide at the base, narrowly triangular, sharp to tapered, decurved, undulate and grooved with smooth margins and sometimes pink tinted. It is distinguished by being one of the gray Tillandsias of bigger size. The gray coloration of its foliage is produced by the scales that densely cover it,

³ CITES, Manual de Identificación de Especies, Especies de Flora, *Tillandsia xerographica*.

⁴ Pérez, S., *Tillandsia xerographica* en el Valle del Motagua.

⁵ Schürman, Gouda & Hromadnik, Report of a short Study of *Tillandsia xerographica* in Guatemala.

⁶ Nájera, A. La conservación del monte espinoso y bosque seco del Valle del Motagua, Guatemala: promoviendo la protección de una ecorregión única.

⁷ CITES, Manual de Identificación de Especies, Especies de Flora, *Tillandsia xerographica*.

which enable it to absorb moisture from the air. Scales are round with diameter of 0.3 -0.5 mm.

Inflorescence: Scape erect, 20 – 40 cm in height. Scape bracts imbricated, leaf shaped. Blades are up to 30 cm high and 1 cm wide and densely covered by scales. Inflorescence 30 cm long, formed by 9 – 30 spikes of 5-15 cm long and 1-2 cm wide, arranged in spiral, with 5-15 applanate flowers. Primary bracts are red and densely covered by scales, shorter than those of the spikes. Floral bracts are 2 – 5 cm long, green or yellowish red and densely imbricated. Flowers are 6 – 8 cm long, pale lilac and narrow tube-shaped. Stamen and style yellow, exerted. Superior ovary turns into dry dehiscent capsule. The plumose seeds are dispersed by the wind. The plants bloom only once in their life, but the flowers last several months.

1.3.1 *Life history of the species*⁸

It is a xerophytic species of a very slow growth in nature. It takes between 12 to 18 years to develop from seed to flower, although the asexual sprout can reach maturity in fewer years. Through its management by controlled methods or assisted reproduction in nurseries through the application of fertilizer, hormone and bloom booster the period can be significantly shortened to obtain extra large plants in about 6 to 8 years, and with the use of bloom boosters they can bloom at any age.

Reproduction

Its reproduction may be sexual or asexual.

Sexual reproduction: To succeed in its ovule fecundation *T. xerographica* requires cross pollination. It begins as from the age of 12 years and it is mainly carried out by birds and insects, hummingbirds, butterflies, moths and some species of bees and bumblebees. That is why it is important that plants are located at a short distance from each other.⁹

Natural asexual reproduction: In the wilderness it occurs after the flower falls and the seeds mature. It consists in the production of sprouts (asexual sprouts, shoots) from buds that develop in the axil of some leaves. The development period of sprouts in the wild is at least one year before the plant produces another sprout. An adult plant can

⁸ CITES, Manual de Identificación de Especies, Especies de Flora, *Tillandsia xerographica*.

⁹ Gouda, E & Feldhoff, H., Personal comments.

naturally produce a maximum of three sprouts or shoots before deteriorating and dying. It means that after blooming a mother plant deteriorates and dies in approximately four years.

Asexual reproduction with controlled methods (assisted reproduction): The production of axillary buds in nurseries may be induced or enhanced through Biotechnology, including the application of hormonal products, nutrients, and by cutting the scape. The development of a new shoot can be boosted by removing the first bud, sprout or shoot, when it reaches certain size. In Guatemalan nurseries, up to 6-8 sprouts have been obtained from one mother plant before it dies.

This way, the mother plant or maternity can produce a greater number of sprouts during the survival years. This process can even increase the lifespan of the mother plant up to six years after flowering.

Germination rate in the wild is unknown, though it is estimated to be very low mainly because of the loss of host species; therefore, the survival and recruitment rate is very low. However, in the long term, the plants that manage to germinate assure their survival through the production of sprouts, although genetic variability is not guaranteed.

The loss is smaller in nurseries. The rate of assisted germination of seeds in nurseries is estimated to be about 50 – 60 %, whereas the survival and recruitment rate is as much as 95%. As for assisted reproduction or reproduction through controlled methods, the number of sprouts produced per mother plant may even double and their harvest presents higher survival than in the nature.¹⁰

T. xerographica is a highly adaptable plant to management in nurseries, which has resulted in the increase of its commercial production; as it can be observed below through the voluntary annual quotas accepted by CITES.

1.3.2 *Habitat types*^{11, 12}

Because *Tillandsia xerographica* is an epiphyte, it directly depends on the existence of an arboreal substrate. Host species are usually trees or mature shrubs, older than 20 years, with wrinkled bark and DAP greater than 05 cm.

The host tree species with a larger quantity of *T. xerographica* ranked in order of importance are the following:

¹⁰ Chacon, O. & Cruz Corzo, J. Personal comments.

¹¹ Pérez, S., *Tillandsia xerographica* en el Valle del Motagua.

¹² Schürman, Gouda & Hromadnik. Report of a short Study of *Tillandsia xerographica* in Guatemala.

Caraño (*Juliana adstringens* Schl.)
Guayacán (*Guaiacum sanctum* L.)
Manzanote (*Pereskia autumnalis* (Eichlam) Rose and *Pereskia lychnidiflora* DC.)
Roble (*Bucida machrostachya* Stadl.)
Cruz de mayo (*Apocinaceae*),
Morro (*Crescentia alata* HBK)
Tamarind *Tamarindus indica* L.

According to the assessment reports on the manzanote (*Pereskia spp*), it has been confirmed that *T. xerographica* settles on the middle parts of the branches, where accumulation of thorns or crotches occur. The species tendency to solitary growing has also been reported; when there is an aggregate it comprises no more than 2 or 3 individuals which usually come from a single mother plant. In spite of its solitary tendency, *T. xerographica* tolerates surviving or developing next to other *Tillandsia* species; it has been observed that it grows next to *T. ionantha* and *T. scheidiana*.

One of the major problems for the survival of *T. xerographica* in the wild is deforestation. Guatemala has an annual deforestation rate of 73,148 ha /year, which is equivalent to 1.43% of the national territory, Zacapa and Chiquimula are among the top five departments with greater loss of forest cover in the Country.¹³ In addition, there are other threatening factors such as habitat degradation and introduction of exotic forest species. Not only do these agents cause a lack of substrate but also pollination problems, because if trees containing this species of plants are located very far from each other, pollination is not achieved since pollinators have very short flying ranges.

Unfortunately, substrate species for *Tillandsia xerographica* are not considered priority species; hence, they are not included in reforestation programs.

1.3.3 Role of the species in its ecosystem

In the nature, *Tillandsia xerographica* feeds from the decay of organic matter heaped up on the axils of its leaves, said process is important for obtaining proteins and nitrogen. The species also accumulates water in the axils, which is used by several animals, such as birds, tree frogs, insect larvae, aquatic insects, and small beetles. Insects commonly found in the species are: Formicidae - ants 92.2%, Blattidae – cockroaches, 3%, Reduviidae – bugs, 2.5%, Blaberidae – giant cockroaches.

¹³ IARNA. Perfil Ambiental de Guatemala.

aches, 2.2 %, Gryllidae – crickets, 0.1% and Acrididae – grasshoppers, 0.1%.¹⁴ The plant roots are covered by a special tissue that condenses environmental moisture. The flowers produce nectar to feed several nectariferous species that in turn pollinate the plants.

Due to its high photosynthetic capacity through the C-4 cycle, *Tillandsia xerographica* is regarded as capable of absorbing larger amounts of CO₂, mainly considering that the cycle is produced under water stress and high rates of light intensity. This cycle has developed principally in tropical plants occurring in dry habitats with high environmental temperatures such as *T. xerographica*.¹⁵

1.4 Population

1.4.1 Global population size.^{16, 17, 18}

The estimated size of a normal and sound population of *Tillandsia xerographica* according to different experts is the following:

> 2,000 plants / Km² (Véliz)

> 5,000 plants / Km² (Gouda)

> 30,000 plants / Km² (Feldhoff)

In the “Report of a Short Study of *Tillandsia xerographica* in Guatemala”, performed by Chris Schürmann, Eric Gouda and Lieselote Hromadnik, in January 2004, a population of 125 plants per Km² was recorded, leading the authors to the conclusion that the species may be considered biologically extinct.

In the paper CARACTERIZACIÓN ECOLÓGICA DE *Tillandsia xerographica* EN EL VALLE SEMIÁRIDO DEL MOTAGUA, prepared by Selvin Pérez from Fundación Defensores de la Naturaleza in 2004, the figure of 140 plants /ha in little disturbed natural areas was reported.

Meanwhile, at October 2008, the five nurseries that propagate the species report a total inventory of 11298,020 plants with a production of 2 to 4 shoots per mother plant a year, depending on their management. Only two of the five nurseries have a commercial quota for the species. Together, the two nurseries report a 11288,02- plant-inventory for the same date.

¹⁴ Monroy, et All. *Triatoma ryckmani* (Hemiptera: Reduviidae) in the epiphyte *Tillandsia xerographica* (Bromeliaceae) in the semiarid region of Guatemala.

¹⁵ R.G.S Bidwell, *Fisiología Vegetal*.

¹⁶ Schürman, Gouda & Hromadnik. Report of a short Study of *Tillandsia xerographica* in Guatemala.

¹⁷ Pérez, S., *Tillandsia xerographica* en el Valle del Motagua

¹⁸ CONAP. Inventarios 2008.

1.4.2 Current global population trends

increasing decreasing stable unknown

a. The trend of the *Tillandsia xerographica* population spread throughout the natural forests is to decrease as a result of the above mentioned factors.

b. The trend of the nursery population propagated through asexual reproduction systems with controlled methods is to increase.

1.5 Conservation status

1.5.1 Global conservation status. (IUCN Criteria)

Critically endangered Near Threatened
 Endangered Least concern
 Vulnerable Data deficient

Was classified as Threatened by UICN (1997).¹⁹

Currently not listed in the IUCN Red List (www.redlist.com)

1.5.2 Conservation status in Guatemala²⁰

The species is listed on Criterion 1 of the List of Threatened Species from Guatemala (LEA, Spanish acronym). It means that free export and trade of specimens collected from the wild are banned, even if used for scientific or reproductive purposes. *Only specimens that are part of or are derived from plants reproduced through proven methods may be commercialized.*

1.5.3 Major threats in Guatemala

No Threats
 Habitat Loss/Degradation (human induced)
 Invasive alien species (directly affecting the species)
 Harvesting [hunting/gathering]
 Accidental mortality (e.g. Bycatch)
 Persecution (e.g. Pest control)
 Pollution (affecting habitat and/or species)
 Other: *road expansion, forest fires, wind effects, natural disasters.*
 Unknown (pests or diseases)

¹⁹ Schürman, Gouda & Hromadnik. Report of a short Study of *Tillandsia xerographica* in Guatemala.

²⁰ Lista de Especies Amenazadas de Guatemala –LEA–.

2. MANAGEMENT OF THE SPECIES WITHIN THE COUNTRY FOR WHICH THE CASE STUDY IS PRESENTED

2.1 Management measures

2.1.1 *Management history*

In Guatemala, Tillandsias or gallitos have been traditionally used, especially in local festivals; though Christmas season is when its commercial exploitation for national consumption is the greatest. Commercial exploitation of plants of the genus *Tillandsia* for export purposes began in the 1960s, when CITES did not even exist.²¹ Then, the relevant authority was the National Forestry Institute (INAFOR Spanish acronym). For its exploitation, said agency had a register of collectors and would issue collecting permits without any kind of evaluation of the population. Some years later, the INAFOR disappeared, and the General Forestry Directorate (DIGEBOS, Spanish acronym) was created instead. The new institution followed the guidelines of its predecessor.²²

In 1980, when CITES came into effect, the DIGEBOS initiated a register of the companies dedicated to reproduction and commercialization of this genus plants as well as other species which were directly exploited from the wild. Sustainable management procedures were then incipient.

It was not until 1989, with the approval of Decree 4-89, Law on Protected Areas, and the creation of the National Council of Protected Areas (CONAP, Spanish acronym), that the current exploitation system received attention and the reproduction and management of CITES-regulated species was stressed. The process started by making the DIGEBOS registers official and by legalizing the nurseries which propagated Tillandsias and which had not been registered so far. However, their exploitation had not been regulated yet, monitoring systems had not been implemented, and statistical information on the exploited species had not been provided either.²³

In 1994, after assessing the exploitation conditions of these species, the Department of Wildlife of CONAP, *made the decision of totally banning their exploitation when removed from the wild*. The official list of collectors was cancelled as well as the issuing of collecting per-

²¹ García, M. Informe sobre *Tillandsia xerographica* para la Decimocuarta Reunión del Comité de Flora.

²² Ponciano, I. Interview , 2005.

²³ García, M. Personal experience.

mits. A Resolution adjusted to current legislation was passed, which stated that nurseries that wished to be registered for reproducing and commercializing *Tillandsias*, had to acquire the breeding stock from authorized nurseries. Besides, registered nurseries and those to be registered were requested to submit a management plan for the species of concern, as well as being assisted by a professional technician foreman, recognized and registered by CONAP.²⁴

Between 1994 and 2001, the technicians from the CONAP's Department of Wildlife supported by the Service for the Protection of Nature of the National Civil Police of Guatemala (SEPRONA, Spanish acronym) (now Division for the Protection of Nature, DIPRONA) failed in their attempt to stop the illegal removal of *Tillandsias*. Checks along the roadways were implemented so as to look for collectors and to monitor the nurseries in order to prevent the purchase of illegal products. The first concrete results of this struggle were not achieved until 2001.

In November 2001, CITES authorities from The Netherlands informed the management authorities of Guatemala that from 1999 to 2001 several shipments of *Tillandsia xerographica* were intercepted with specimens that did not comply with the requirements established for plants cultivated under controlled methods as specified in Resol. Conf. 11.11. Their characteristics suggested their wild origin: they were very large, dirty, accompanied by dead organic matter, with evidence of insect damage on the leaves, bark pieces, spider webs, and dead insects on the roots. However, all the shipments were supported by their corresponding CITES Export Permits and were properly approved (signed and sealed) by the CITES Management Authority in Guatemala who had certified the reproduction method. Due to the lack of reply from Guatemalan authorities to their claims, Dutch authorities started the cancellation of authorizations for *Tillandsia xerographica* import shipments and urged the authorities of other countries to do the same.

In 2002, the CITES Management Authorities from Guatemala were substituted. The position was taken by a civil servant with large experience in the subject. By the end of that year, the 12th Meeting of the Conference of the Parties to CITES (November 3-15, Chile) was held, and Guatemalan officers used it to start conversations with representatives from The Netherlands who provided the necessary guidelines to start the corresponding negotiations.

In early 2003, rapprochement with Dutch authorities began. As part of the process, said authorities sent an e-mail with pictures of the

²⁴ CONAP. Acuerdo Gubernativo 759-90.

plants from the shipments of concern. Definitely, those were wild plants. Meanwhile, during the 13th meeting of the Plants Committee of CITES held on August 12-15 in Geneva, Switzerland, and in the Meeting of the Plants Committee of the European Union on October 9, 2003 in Brussels,²⁵ Holland made official the banning of exports of this species from Guatemala.

As negotiations progressed, authorities from Holland realized the good intentions of the new Guatemalan authorities. Therefore, a visit of a group of scientific experts from the European Union was agreed for assessing the management of the species. The visit was sanctioned by CITES Plants Committee Chair Dr. Margarita Clemente, who personally provided follow-up on the case. The visit was scheduled for January 2004.²⁶

While the experts were on their way from Europe, the CONAP began to approach the producing companies through the Non-Traditional Product Exporters Association– AGEXPRONT– (currently AGEXPORT). Several meetings were held with the companies' legal representatives who, on their own initiative, started the arrangements before the Plants Committee in order to prevent the European Union from canceling all imports of the species. With this aim, they prepared and sent the Committee a paper explaining the production system used in the Country. In addition, the companies created the Organization for the Investigation, Protection and Conservation of Phytogenetic Resources (CONREFI, Spanish acronym), which played an important role in the reopening of the *Tillandsia xerographica* European market.²⁷

After the experts' visit, and upon request of the Committee Chair, the *Tillandsia xerographica* case was presented at the 14th Meeting of the Plants Committee, held from February 16 to 20, 2004 in Windhoek, Namibia. During the event Guatemala was congratulated by the Chair because it was the first time that both parties of a member country, the regulatory party and its private counterpart, attended the forum so as to work together for the conservation, protection, and sustainable use of a species.²⁸

The report of the expert group that visited Guatemala with the aim of observing the species management (Report of a short study of

²⁵ Jacobs, R. Informe de Participación en la PC14.

²⁶ Schürman, Gouda & Hromadnik. Report of a short Study of *Tillandsia xerographica* in Guatemala.

²⁷ Jacobs, R. Informe de Participación en la PC14.

²⁸ Jacobs, R. Informe de Participación en la PC14.

Tillandsia xerographica in Guatemala.)²⁹ was also presented and approved during the event. Later, recommendations made in the paper became the basis for the preparation of “*Proceso de control para el cumplimiento de las regulaciones CITES en relación al cultivo, propagación y exportación sostenible de Tillandsia xerographica*” (Control Process for the compliance with CITES regulations regarding sustainable cultivation, spread and export of *Tillandsia xerographica*), by CONREFI. The latter was subsequently sanctioned by the Plants Committee and made official through Resolution 05-06-2004 of the Honorable Board of CONAP.³⁰

The document includes official procedures for the exploitation and sustainable management of *Tillandsia xerographica*, which are still being applied up to date with minor modification.

2.1.2 Purpose of the management plan

The main purposes of the management plan for *Tillandsia xerographica* are its conservation, protection and sustainable management through the regulation of its commercial exploitation.

2.1.3 General elements of the management plan for *Tillandsia xerographica* are

*To set up Plant Reproducing Companies:*³¹

- General information on the company and its legal representative
- Reproduction aims
- Basic knowledge on the species biology
- Available area
- Environment conditions
- Nursery infrastructure (preferably a plan)
- Breeding stock acquisition way (purchase in a nursery, import or collection from the wild)
- Production and reproduction process
- Scheduling of management stages
- Technical information on the registered Professional Technician Foreman
- EIA

²⁹ Schürman, Gouda & Hromadnik. Report of a short Study of *Tillandsia xerographica* in Guatemala.

³⁰ Resolución No.05/06/2004 del Consejo del CONAP.

³¹ CONAP. Formato de Solicitud para Registro de Personas Individuales o Jurídicas que se dedican a la Reproducción de Especies Silvestres.

To set up a Plant Trading Company:³²

- General information on the company and its legal representative
- Species suppliers (must be authorized and registered companies)
- Plant management for exportation
- Type of Packing

Observation: The CONAP has forms that only require to be filled in and relevant papers to be attached.

2.1.4 Breeding stock or parental breeding stock acquisition way

- Breeding stock purchase
It is performed when purchased from CONAP authorized and registered nurseries.
- Breeding stock import
In the case of *Tillandsia xerographica* it is not customary, though it is known that some nurseries might be bringing illegal plants from neighboring countries.
- Collection from the wild
This breeding stock acquisition way comprises two different possibilities:

Case No.1. When the breeding stock is directly obtained from the wild

In this case, what is stated in Article 48 of the Regulation of the Law on Protected Areas, Governmental Accord No. 759-90³³ is implemented. The requirements of the application are the following:

- To prove through certification from the Registro de la Propiedad Inmueble (Registry of Real Property), the right of property, possession, and usufruct on the piece of Real Estate where exploitation is intended to be performed. Should it not have registration, evidence given by the relevant authority must be presented to the satisfaction of CONAP.*
- To prove expressed consent of all individual or legal persons who for any reason should have registered on their behalf any right on the piece of Real Estate.*

³² CONAP. Formato de Solicitud para Registro de Personas Individuales o Jurídicas que se dedican al Comercio de Especies Silvestres.

³³ CONAP. Acuerdo Gubernativo 759-90.

- c. *To attach the inventory of the species subject of the request, whose content could be proven by CONAP's Executive Secretariat.*
- d. *To present the management plan to which the plant and animal species intended to be exploited will be subject to. Both the inventory and the management plan should be prepared by a related professional or by a specialist qualified technician approved by CONAP Secretariat.*
- e. *A Professional Technician Foreman, registered in CONAP, who will be in charge of implementing the management plan, will be suggested.*

Case No. 2. When the breeding stock is directly obtained from the wild through the special harvesting system:

Art. 36 of Decree 4-89, Law on Protected Areas³⁴ states:

In forest harvestings legally authorized by the INAB, plants and animals may be collected upon prior permit from CONAP. INAB and CONAP shall keep close and permanent coordination regarding these activities. (Examples: housing urban development, road urban development, energy development, extended agriculture and/or land use change).

At the present time, collection of wild plants to be exported is not allowed in Guatemala. The Law specifies that only plants reproduced by controlled methods as from the second generation may be exported. This assures conservation, protection, and sustainable use of the species as well as the quality of the exported specimen, thus, preventing wild plant exportation.

2.1.4 Restoration or mitigation measures

As it is explained below, depending on the breeding stock acquisition way, mitigation measures will or will not have to be implemented.

- Breeding stock purchase → no mitigation measures are required.
- Breeding stock importation → no mitigation measures are required.
- Obtained from the wild (only for special harvestings) → EIA and mitigation measures are required.

³⁴ CONAP. Acuerdo Gubernativo 759-90.

Suggested mitigation measures:

- Reforestation projects,
- Management of collected species, seed included,
- Reintroduction programs,
- Population enhancement projects,
- Environmental education programs for social awareness on the value of the species and its ecosystem

2.2 Monitoring system

2.2.1 *Methods used to monitor harvest*

When removal of the wild is authorized, visits are carried out prior to the project, during the removal and after the removal. Subsequent visits to the nurseries are performed periodically so that the management can be monitored, the scheduling of activities can be followed up, and the production can be verified. In fact, these monitoring visits are performed in all the nurseries, regardless of the breeding stock acquisition way.³⁵

2.2.2 *Confidence in the monitoring*

There is confidence in the monitoring because the procedures legally established are performed.

2.3 Legal framework and law enforcement

To provide details of national and international legislation relating to the conservation of the species

- Legislative Decree 4-89, Law on Protected Areas and its Reforms, Decrees No. 18-89, 110-96 and 117-97 of the Congress of the Republic
- Governmental Agreement 759-90 and its Reform, Government Agreement No. 263-92
- Legislative Decree 63-79, CITES Ratification
- Guatemala List of Threatened Species– LEA-
- Resolutions of CONAP's Honorable Board

³⁵ Chacon, O. & Cruz Corzo, J. Personal comments.

3. UTILIZATION AND TRADE WITHIN THE COUNTRY IN WHICH THE CASE STUDY IS PRESENTED

3.1 Type of use (origin) and destination (purposes)

As per the Sub-commission for Ornamental Plants, Foliages and Flowers of the Guatemalan Exporters Association (AGEXPORT, Spanish acronym) *Tillandsia xerographica* is mainly exported for ornamental purposes. In importing countries it is used as an indoor and outdoor ornamental plant.

Nowadays, 100% of the plants authorized for export are obtained from asexual reproduction by controlled methods (assisted) in CONAP authorized and registered nurseries. However, the existence of clandestine nurseries has been reported to CONAP's Wildlife Department. Such nurseries exploit several species of the same genus; therefore, some shoots of wild plants recovered in the nurseries are likely to be within the shipments. Unfortunately, there is no methodology for recognizing the difference between the latter and those reproduced through assisted reproduction.

3.2 Harvest³⁶

3.2.1 Harvesting regime

(Extractive or non-extractive,, demographic segment harvested, harvesting effort, harvesting method, harvest season)

The harvesting regime for *Tillandsia xerographica* is non-extractive. In general, the sprouts produced by the mother plants (maternity) are harvested after flowering. Depending on the type of management, from 3 to 4 sprouts per mother plant per year can be produced. They are harvested twice a year, but only the larger spout is separated. The rest, one or more, of smaller size are left on the mother plant until reaching a proper size for being cut. Exported sizes are small, medium and large. In order to avoid the introduction of wild plants in shipments, exportation of extra-large-size specimens has been prohibited. Such plants are set apart for maternity.

As for *Tillandsia xerographica* management, four cultivation systems (asexual reproduction) through controlled methods (assisted) are known.

³⁶ CONREFI. "Proceso de control para el cumplimiento de las regulaciones CITES en relación al cultivo, propagación y exportación sostenible de *Tillandsia xerographica*."

- A. Natural system, without the use of chemicals nor treatments for increasing asexual production. Usually, upon reaching a medium or large size sprout are cut.
- B1. It is similar to the above-mentioned system, but in this one the sprouts are cut at a small or even shorter size. These nurseries must have a larger area in comparison to the nurseries of the previously explained system because they have to cultivate the small plants, which takes one or two years.
- B2. It has the same components of the prior two systems, but this one uses chemicals and another process for the cultivation of small plants. It also uses products to induce flowering so that mother plants can produce sprouts soon. It requires a larger area and greater infrastructure than the previous system.
- B3. It is very similar to the others, but this system uses chemicals and processes or treatments to increase the number of asexually-produced sprouts. The infrastructure required is similar to infrastructure of system B2.

3.2.2 *Harvest management or control (quotas, season, permits, etc.)*³⁷

According to what is stated in the paper *“Proceso de control para el cumplimiento de las regulaciones CITES en relación al cultivo, propagación y exportación sostenible de Tillandsia xerographica”* (Control Process for the compliance with CITES regulations regarding sustainable cultivation, spread and export of *Tillandsia xerographica*), the steps to control management and harvest of *Tillandsia xerographica* are the following:

1. In the first step, every nursery must present a report including information on infrastructure, number of benches and enclosures available, plant inventory, and cultivation process. This will allow verification of the reproduction process, as well as the later physical confirmation of the inventory. In addition, it will confirm the number of mother plants and, based on this and on their reproduction process, the production capacity of each nursery will be determined.
2. The second step consists in a document and plant inventory review for each nursery (including breeding stock) aiming to corroborate that they are legally authorized and registered. It will be performed by CONAP.
3. The third step consists in an annual visit to each nursery on behalf of the technical inspectors of the Agricultural and Environmental

³⁷ CONREFI. “Proceso de control para el cumplimiento de las regulaciones CITES en relación al cultivo, propagación y exportación sostenible de *Tillandsia xerographica*.”

Integral Protection Program – PIPAA- which has been accredited by the Guatemalan Ministry of Agriculture, Livestock, and Food, with the purpose of corroborating truthfulness of inventory-related information given to CONAP (this visit is independent from the visit performed by technicians from CONAP’s Wildlife Department.)

4. The fourth step involves the calculation of the annual quota for each nursery. It is carried out by implementing the program developed by CONREFI and authorized by CONAP and CITES. The procedure is carried out by technicians from PIPAA, an unbiased entity, in order to guarantee the data will not be manipulated. Results of the calculation are reported to CONAP, who will authorize and notify each nursery.

Through implementation of this program it is also established the minimum obligatory retention of plants that every nursery must have according to its own particular cultivation method in order to keep its breeding stock over time, which will determine whether the nursery will have an exportation quota or not in the future.³⁸

This process is completed with the shipment inspection, a procedure through which the quantity and quality of exported plants are verified. It is performed by CONAP’s shipment inspectors prior to export authorization.³⁹

Table. 1 Schedule of the calculation process for the commercialization quota of *Tillandsia xerographica*.

STEPS	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Presentation of information on the nurseries								X				
Document review									X			
Information verification										X		
Quota calculation and report to CONAP											X	
Officialization of quota and information to CITES												X
Information for the nurseries												X
Quota execution	X	X	X	X	X	X	X	X	X	X	X	X

Seed management

When the plants set apart for maternity produce fertile seed it can be managed in two different ways:

³⁸ CONREFI. “Proceso de control para el cumplimiento de las regulaciones CITES en relación al cultivo, propagación y exportación sostenible de *Tillandsia xerographica*.”

³⁹ CONAP. Manual de Procedimientos del Departamento de Vida Silvestre.

- a. It is left in the mother plant scape until germination. Later, it is taken to a wire mesh frame so it can continue developing.
- b. Or the seed is removed from the mother plant being dampened and placed in a plastic fabric frame for germination and later growth.

Regardless of the germination system used, development of the newly germinated plant is extremely slow, just like in the wild. But as it grows it will be set apart and/or classified according to the size it has reached. When it gets the proper size, it will be earmarked for exportation; though most experts consider it would be better to use it as a mother plant.

*National support and authorization*⁴⁰

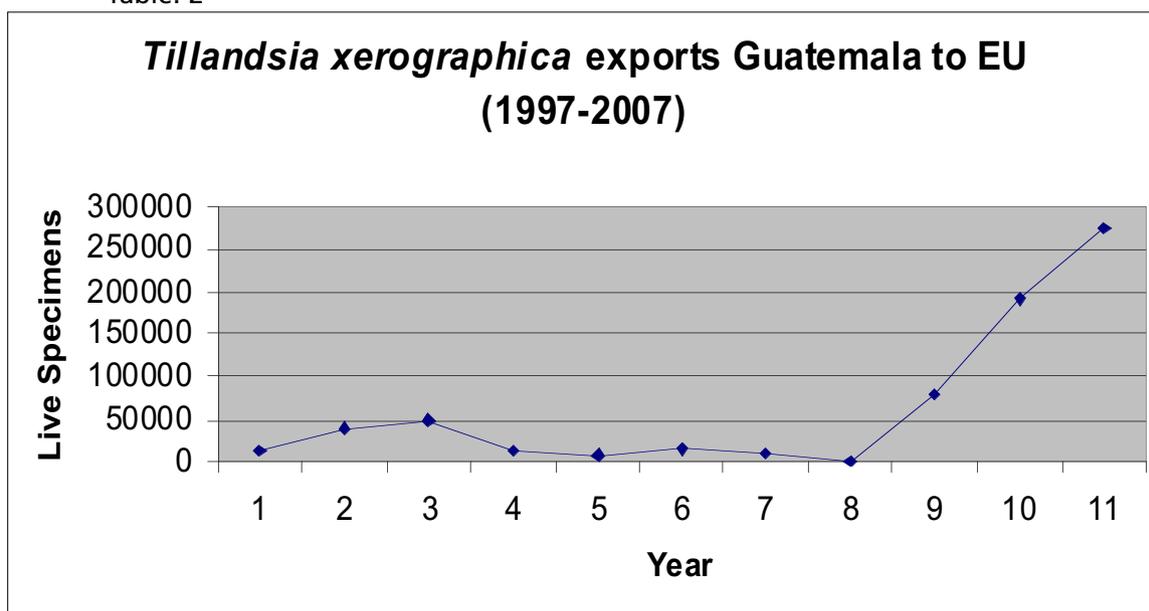
The papers which must accompany legal shipments for authorizing exports are the following:

- a. Permit / CITES Certificate, issued by CONAP, CITES Management Authority of Guatemala
- b. Certificate of Origin for export issued by the Professional Technician Foreman
- c. Phytosanitary Certificate granted by the Ministry of Agriculture, Livestock and Food (MAGA)
- d. Export License issued by the Export Authorization Office (VUPE, Spanish acronym) of the Ministry of Economy.
- e. Export Policy issued by the Tax Administration Office (SAT).

3.3 Legal and illegal trade levels

Next, information on *Tillandsia xerographica* legal export in the last 10 years is presented. It shows the years of sanction from the European Community.

⁴⁰ CONAP, Ventanilla Única.

Table. 2⁴¹Table. 3. Authorized export quotas for *Tillandsia* xerographica* 2005 - 2008:⁴²

Year	Country of Origin	Quota	Notes
2008	Guatemala	1011152	artificially propagated live plants, www.cites.org, Updated: 01/04/2008
2007	Guatemala	828560	artificially propagated live plants, www.cites.org, Updated: 30/03/2007
2006	Guatemala	829397	artificially propagated live plants, www.cites.org, Updated: 20/03/2006
2005	Guatemala	699983	artificially propagated live plants, www.cites.org, Updated: 21/03/2005

⁴¹ Ordóñez, H. Informe sobre *Tillandsia xerographica*.

⁴² Ordóñez, H. Informe sobre *Tillandsia xerographica*.

II. NON-DETRIMENT FINDING PROCEDURE (NDFs)

Provide detailed information on the process used to make the non-detrimental finding for the species evaluated.

1. IS THE METHODOLOGY USED BASED ON THE UICN CHECKLIST?

Yes No

For the case of *Tillandsia xerographica*, no NDF has been performed, just as it is explained throughout the paper.

2. CRITERIA, PARAMETERS AND/OR INDICATORS USED

The parameters used for establishing the ban were the following:

- Inventories
- Number of maternity plants versus amount of exported plants
- Management system
- Number of plants found in detained trucks
- Amount of wild plants found among nursery wastes and in nurseries as maternity
- Quality of exported plant (with wild characteristics)

3. MAIN DATA SOURCES, INCLUDING FIELD EVALUATION, SAMPLING METHODOLOGIES AND ANALYSIS

- Reports of technicians from the Department of Wildlife
- Results of field monitoring in reproduction nurseries
- Accusations
- Retentions made by Police
- Shipment inspections
- Refused collection request

4. EVALUATION OF DATA QUALITY AND QUANTITY FOR THE EVALUATION

Most of the information was provided by trustworthy personnel. Besides, during some visits of the technicians to the nurseries trucks containing wild plants were observed. Likewise, workers of some nurseries could be observed cleaning and placing the plants in the enclosures.

5. MAIN PROBLEMS, DIFFICULTIES AND CHALLENGES FOUND ON THE IMPLEMENTATION OF THE BANNING

Problems or difficulties with the nurseries

There was a great deal of opposition from the nursery staff. Sometimes they did not allow personnel from the Wildlife Department to enter the premises. In some nurseries it was necessary to inform long time in advance about the technicians' arrival, and moreover, they were received by armed guards. In one occasion the technicians were retained for more than six hours by the nursery employees.

Problems or difficulties with the police

When a truck transporting a plant was retained, an officer with the order of liberating the shipment would arrive. The officers were never identified. These events discouraged the police from doing their job.

Problems of the technical staff

The authority of the technical staff was not recognized by officers from other agencies such as the District Attorney (Ministerio Público), the Ministry of Agriculture, the SAT, and the Police; therefore, many difficulties arose when looking for support. Besides, (and so far) the judges are not familiar with specific laws, they do not accept technical assessments, and hence obtaining a search warrant is proved to be very difficult. Even CONAP's legal department, which accompanied the technicians in the cases they were following up, showed little support. For these reasons, few cases reached a legal process.

6. RECOMMENDATIONS

- To perform a study on the species in order to determine the actual status of the population in Guatemala and make the NDF
- To promote certification of *Tillandsia xerographica* cultivation
- To prioritize areas for the conservation of the species
- To train the technical staff from the management authority in recognition and identification of *T. xerographica* in all phases

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