Why are Guarumo Buds not Listed as "Edible" within Lists of Edible Plants of the Maya?

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FLAAR (USA) and FLAAR Mesoamerica (Guatemala)

Cecropia peltata
Parque Nacional Yaxha, Nakum y Naranjo
Reserva de la Biosfera Maya (RBM)
Petén, Guatemala

December 2021

Appreciation

For Cooperation, Hospitality, and Assitance at Parque Nacional Yaxha, Nakum and Naranjo Proyect (August 2018 through July 2019)

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For Cooperation, Hospitality, and Assitance at Parque Nacional Yaxha, we thank

All the helpful and knowledgeable guides of IDAEH CONAP at PNYNN who accompanied us each day. It is essential to have either an IDAEH and/or CONAP guardabosque or comparable when doing flora and fauna research in a national park.

Assistance for Knowledge of Plants and Animals of PNYNN

Teco, Moisés Daniel Pérez Díaz, park ranger, PNYNN

We also appreciate the assistance of park ranger Ricardo Herrera and every park ranger that accompanied us on other field trips.

COVER PHOTOGRAPH:
Photo by: David Arrivillaga, FLAAR Mesoamerica, Jun. 22, 2019. Yaxha behind South Acropolis, Petén, Guatemala.

Camera: Canon T3i. Lens: Canon EF 300mm IS II USM. Settings: 1/125 sec; f/6.3; ISO 400.

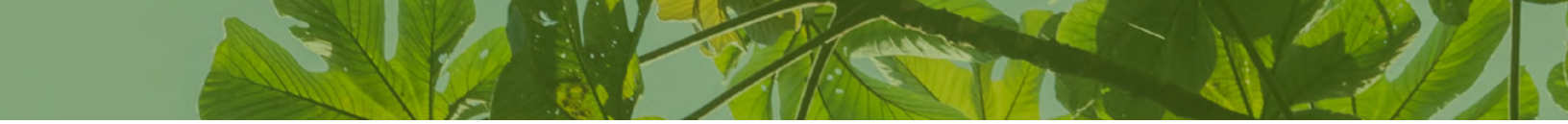
FLAAR MESOAMÉRICA

FLAAR

We appreciate a donation during November 2021 to help cover the costs of FLAAR research projects specifically to assist and support the current FLAAR project of flora and fauna in the Reserva de la Biosfera Maya (RBM). This donation is also assisting the FLAAR (USA) and FLAAR Mesoamerica (Guatemala) research project in the Municipio de Livingston area of the departamento of Izabal, Guatemala.

This donation is from a family in Chicago in honor and memory of botanist Dr John D. Dwyer, who worked in many areas of Mesoamerica, including in the Yaxha area in the 1970's while the site was being mapped by FLAAR.

This donation is also in recognition of the urgency and need for conservation of both wildlife and rare plants in the bio-diverse ecosystems of the Reserva de la Biosfera Maya (RBM) of Guatemala. Parque Nacional Yaxha, Nakum and Naranjo (PNYNN) is one part of the over 5 million acres of the RBM.



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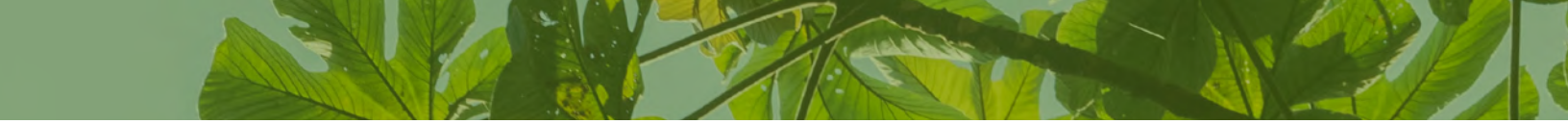
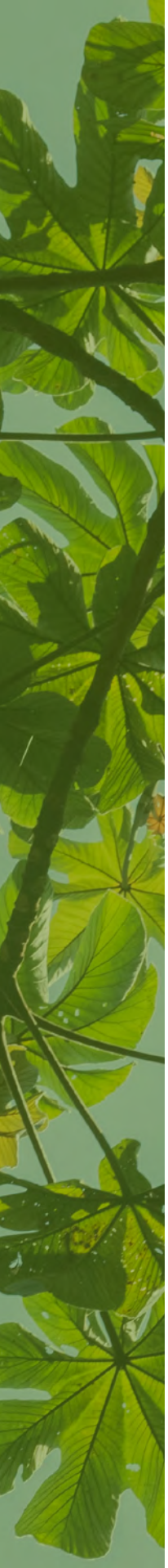




What if *Cecropia* Fruits or Seeds are Edible?

Introduction to *Cecropia peltata* of Guatemala

There are millions of trees from two *Cecropia* species in Guatemala. I especially see them all over Alta Verapaz, Izabal, and Petén. I had assumed they were *Cecropia peltata* but as I accomplish more library research I have learned that there are two species in the Maya Lowlands (Chiapas, Tabasco, Campeche, Quintana Roo, Belize and much of Guatemala). The other species is *Cecropia obtusifolia.*

These trees grow fast, commonly in slash-and-burn milpa fields after the maize, beans, and squash has been harvested. As these same fields allow the forest to start growing again, the fastest growing of these plants is edible so the farmers don't even have to plant the *Cecropia*, it grows by itself. This is possible because monkeys, bats and birds eat the parts with seeds and as the creatures wander through (or fly over) the former milpas, the animals spread the seeds through their poop (with fresh fertilizer wrapped around the seeds).

Even if slash-and-burn milpa agriculture was not the exclusive manner of agriculture 2000 years ago, there were still plenty of *Cecropia* trees with their abundant inflorescences available to eat. *Cecropia* trees were also available to the first inhabitants of Guatemala, long before slash and burn agriculture developed.

1. However, ethnobotanist Cyrus Lundell's 1938 article listing edible wild plants of the Maya does not include either species of *Cecropia*.

2. The premier botanical monograph, Flora of Guatemala, states clearly: "So far as known, no use is made of it in Central America." (Standley and Steyermark 1946: 23).

3. The most comprehensive monograph on edible and useful plants of Mesoamérica makes not one single hint that either of the two species of *Cecropia* is edible whatsoever (Williams 1981).

As a result, most books on the Classic Maya ignore, omit, or simply do not realize the potential importance of *Cecropia* trees, in providing a wide array of medicinal edible uses.

The three landmark botanical resources to learn if a plant is eaten by the local Maya are: Lundell, 1938, and the thousands of pages by Standley, Steyermark, Williams (1930's-1960's), and other colleagues and the summary on edible species by Williams (FOODS FOR EARLY MAN, 1981). However, one by one they fail to mention anything edible whatsoever. But the botanists at the New York Botanical Garden clearly state that BOTH species of *Cecropia* have edible parts in addition to the known utilitarian parts! (Balick, Nee and Atha 2000: 58).

Photo by: David Arrivillaga, FLAAR Mesoamerica, Jun. 29, 2021.
Yaxha lake south shore, Petén, Guatemala.

Camera: Sony Alpha A9 II. Lens: Sony FE 200-600mm G OSS.
Settings: 1/1,600 sec; f/6.3; ISO 400.

My Personal Experience with *Cecropia peltata*

In 1965, most of the local Peteneros that I worked with, while a student intern for the University of Pennsyvania Tikal Project, were chicleros. They told me that when they ran out of tobacco they smoked the leaves of guarumo trees (most likely *Cecropia peltata*). This is frequently mentioned on various sources (albeit not by Standley and Steyermark back in the 1940's, since they evidently did not live in a remote part of Petén for 12 straight months as I did over half a century ago), however, since I do not smoke, I never tried it.

I have been curious about how to figure out which *Cecropia* tree is masculine and which is feminine, so I have been photographing *Cecropia* trees in many areas of Guatemala long before our flora and fauna research project for PNYNN (initiated in August 2018 through July 2019). Now we have a 5-year cooperation and coordination project with CONAP to cover the entire Reserva de la Biosfera Maya. This project will initiate with a focus on the bloque of parks and nature reserves (Tikal, PNYNN, Bio Itzá, Biotopo San Miguel la Palotada and Cerro Cahuí) which share the objectives to protect, preserve, document flora and fauna. The specific objectives are to protect and preserve the bio-diverse ecosystems and also to encourage eco-tourism and avi-tourism to provide jobs for local people. It is crucial that local people around the parks earn income for their families working as guides, bus drivers, hotel and restaurant workers, park rangers, research assistants etc.). When local people achieve improved livelihoods it is more realistic that they understand the need (and benefits) to preserve the flora and fauna inside the parks and nature reserves.

Photo by: Melanny Quiñónez. FLAAR Mesoamerica, Apr. 18, 2018. Río Ixtinto Yaxha, Petén, Guatemala.

Camera: Canon 60D.
Lens: Canon EF 24-105mm IS USM.
Settings: 1/1,600 sec; f/5.6; ISO 400.

Full Botanical Name

Cecropia obtusifolia Bertol. and *Cecropia peltata* L. are the accepted names.

Family name URTICACEAE in most botanical sources
https://sura.ots.ac.cr/florula4/find_sp2.php?customer=Cecropia+obtusifolia&busca=Buscar

But Balick, Nee and Atha (2000: 58) use CECROPIACEAE as does CONABIO of México.

A botanist's list of trees of an area in Guatemala lists *Cecropia* twice, once under Cecropiaceae and a second time under Urticaceae. As a courtesy I do not cite them here, but it means we have to totally renumber all the other trees that come after this double listing.

Photo by: Erick Flores, FLAAR Mesoamerica, Aug. 15, 2018. Yaxha lake west half, Petén, Guatemala.

Camera: Canon 1D X Mark II. Lens: Canon EF 100MM Macro USM.
Settings: 1/125 sec; f/11; ISO 100.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Jun. 29, 2021.
Yaxha lake south shore, Petén, Guatemala.

Camera: Sony Alpha A9 II. Lens: Sony FE 200-600mm G OSS.
Settings: 1/1,600 sec; f/6.3; ISO 400.

Here are the synonyms for each species of *Cecropia*

CECROPIA PELTATA	CECROPIA OBTUSIFOLIA
Ambaiba humboldtiana (Klotzsch) Kuntz *Ambaiba peltata* (L.) Kuntze *Ambaiba propinqua* (Miq.) Kuntze *Ambaiba schiedeana* (Klotzsch) Kuntze *Ambaiba surinamensis* (Miq.) Kuntze *Cecropia arachnoidea* Pittier *Cecropia argentea* Vis. *Cecropia asperrima* Pittier *Cecropia dielsiana* Snethl. *Cecropia digitata* var. *grisea* Ten. ex Miq. *Cecropia goodspeedii* Cuatrec. *Cecropia hondurensis* Standl. *Cecropia humboldtiana* Klotzsch *Cecropia propinqua* Miq. *Cecropia scabrifolia* Aladar Richt. *Cecropia schiedeana* Klotzsch *Cecropia surinamensis* Miq. *Coilotapalus peltata* Britton *Coilotapalus peltata* Hitchc.	*Ambaiba commutata* (Schott ex Miq.) Kuntze *Ambaiba costaricensis* Kuntze *Ambaiba hemsleyana* Kuntze *Ambaiba mexicana* (Hemsl.) Kuntze *Ambaiba obtusifolia* (Bertol.) Kuntze *Ambaiba panamensis* (Hemsl.) Kuntze *Cecropia alvarezii* Cuatrec. *Cecropia amphichlora* Standl. & L.O.Williams *Cecropia burriada* Cuatrec. *Cecropia commutata* Schott ex Miq. *Cecropia concolor* Miq. *Cecropia dabeibana* Cuatrec. *Cecropia levyana* Aladar Richt. *Cecropia maxonii* Pittier *Cecropia mexicana* Hemsl. *Cecropia mexicana f. glabrescens* Donn.Sm. *Cecropia mexicana var. macrostachya* Donn.Sm. *Cecropia obtusifolia* subsp. *burriada* (Cuatrec.) C.C.Berg & P.Franco *Cecropia panamensis* Hemsl.
www.theplantlist.org/tpl/record/kew-2707099	www.theplantlist.org/tpl1.1/record/kew-2707088

Local names for *Cecropia peltata*

CECROPIA PELTATA	CECROPIA OBTUSIFOLIA
Trumpet tree	Guarumo Palo de violin Trompeta, Trompetilla
Everywhere so no need to cite	www.CONABIO.gob.mx

There is another local native tree in the Maya Lowlands also called Trumpet Tree: accepted name *Pourouma bicolor* Trécul, synonym *Pourouma aspera*, family Urticaceae (https://enciclovida.mx). However I have not yet found any of these species with branches large enough to really make a trumpet. *Pourouma bicolor* subsp. *scobina* (Benoist) C.C. Berg & Heusden is listed twice for Izabal in the Neotropical Plant Portal (https://serv.biokic.asu.edu/neotrop/plantae/collections/list.php).

Mayan names for *Cecropia peltata*

CECROPIA PELTATA	CECROPIA OBTUSIFOLIA
Ix-coch should be Ix-coche For a linguist it would be best to check whether Ix-cochle is gringo misspelling.	**Pad, Choop** (Q'eqchi' Mayan, Coban, Alta Verapaz) **Xobin** (Baja Verapaz, fide Tejada) (Standley and Steyermark 1946) **Kooche** (with accent on e)
	www.CONABIO.gob.mx

Kolok is a word in Chol Maya for "Guarumbo" (Becerra 1937: 21 and footnote 77)

Habit of *Cecropia peltata*

Both species are trees, they can grow quite tall, especially if other trees around them provide too much shade; the *Cecropia* shoots upwards to get their large leaves up into the canopy. After a year, there are almost never any "branches" or limbs anywhere on the lower trunk, they all fall off and only grow up at the top.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Jan. 21, 2019. Yaxha to Nakum Road, Petén, Guatemala.

Camera: Nikon D810. Lens: Nikon AF-S NIKKOR 400mm FL ED VR.
Settings: 1/160 sec; f/14; ISO 1,000.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Jun. 29, 2021. Yaxha lake south shore, Petén, Guatemala.

Camera: Sony Alpha A9 II. Lens: Sony FE 200-600mm G OSS.
Settings: 1/1,600 sec; f/6.3; ISO 400.

In what Ecosystem(s) can you find native *Cecropia peltata?*

Cecropia are best known for populating abandoned milpa fields or any area that has recently been cut down. The Plan Maestro for PNYNN has good research cited:

> Entre las especies vegetales asociadas a cuerpos de agua, es decir, no estrictamente acuaticas, registradas en Yaxha por Reyes et al., 2009 destacan: *Acacia* Mill., *Allophylus cominia* (L.) Sw, *Bursera simarouba*, guarumo (*Cecropia peltata* L.), sian (*Chromolaena odorata* (L.) R.M.King & H. Rob.), curarina, guaco o tamagas (*Cissampelos pareira* L.), chople o palo de agua (*Critonia morifolia* (Mill.) R.M. King & H. Rob), frijolillo (*Galactia striata* (Jacq.) Urb.), *Ipomoea alba* L., *Ipomoea indica* (Burm.) Merr., *Lysiloma acapulcense* (Kunth) Benth., *Matelea* Aubl., *Metopium brownei* (Jacq.) Urb., *Mimosa bahamensis* Benth., *Piper aduncum* L., *Piper jacquemontianum* Kunth., *Piper amalago* L., *Piscidia piscipula* (L.) Sarg., *Psychotria pubescens* Sw., *Rhynchosia longeracemosa* M. Martens & Galeotti., *Vitis tiliifolia* Humb. & Bompl. Ex Schult., *Sphagneticola trilobata* (L.) Pruski. (Reyes et al., 2009).
>
> **(CONAP- DGPCN/MICUDE 2015: 43)**

Since *Cecropia* are visable along any road, along the edge of cattle fields or in other disturbed areas, I myself have not listed them as a wetland plant. Therefore, in our Municipio de Livingston wetland series I do not include *Cecropia* in the 25+ plants of the wetlands that are edible. However, Reyes et al. puts *Cecropia* in their Anexo 2: "Listado de especies acuaticas y riparias" (2009).

I estimate that *Cecropia* can grow on the edges of wetlands because there is no shade in some sides of marshes, rivers, lakes and lagoons. However, I do not consider *Cecropia* as a "water plant", at best I would consider them as "water tolerant." Since 90% of the *Cecropia* I see is nowhere near a wetland (note that I estimate a 10% of this species being be along edge of some wetlands).

What other Trees or Plants are often found in the same Habitat?

One good place to identify what other trees that are in same habitat is in Lundell's (1937) botanical monograph on plants of Petén in Guatemala. Also look for the word guamil which means an area where guarumo is one of the most noticeable plants. Since *Cecropia* trees are adaptive to diverse ecosystems, the other trees that grow nearby varies.

Stilt Roots when the ground is limestone outcrops

If there is almost no soil and the "ground" is fractured limestone, the *Cecropia* species sends out stilt roots to keep itself from falling over in a windstorm. You see this on moist karst hillsides in Municipio de Livingston, Izabal.

Sometimes the Guarumo tree develops its roots at the base of the trunk so it gives more stability to grow.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Dec. 18, 2020. Vuelve Mujer, Livingston, Guatemala.

Camera: iPhone 12 Pro Max

Where has *Cecropia peltata* been found in PNYNN?

You see a fair number of *Cecropia* trees where sun is available. There may be a few together but not often en masse and rarely even in groves. That said, there are areas where lots are within the same field: this kind of area is called a "guamil".

Where has *Cecropia peltata* been found in Petén?

Cecropia is so common that most people don't bother to study it much less to collect it (also, the leaves are so large they are not easy to press or store fully unfolded). Since these trees can be found while driving along any road in Petén, it is of little help to make a list from herbaria databases.

https://serv.biokic.asu.edu/neotrop/plantae/collections/harvestparams.php

Are *Cecropia peltata* trees registered for Parque Nacional Tikal?

Cecropia peltata is so common throughout Petén that it is obviously in the list of trees by Schulze and Whitacre (1999).

Photo by: María Alejandra Gutiérrez, FLAAR Mesoamerica, Dec. 19, 2018. Yaxha lake, Petén, Guatemala.

Camera: Canon 1D X Mark II. Lens: Canon 50mm f/2.5 Macro.
Settings: 1/100 sec; f/9; ISO 200.

For Yaxha, Nakum and Naranjo, is *Cecropia peltata* present or missing from earlier lists

Cecropia peltata, Cecropiaceae, Guarumo is in the CONAP- DGPCN/MICUDE report (page 233) from 2015 and certainly was in earlier lists as well.

What species of *Cecropia* trees did Cyrus Lundell find in Petén?

Catalog #: 1029979
Occurrence ID: a71f7406-9115-4f38-ab73-471de50e9508
Taxon: *Cecropia obtusifolia* Bertol.
Family: Urticaceae
Collector: C. L. Lundell
Number: 16355
Date: 1959-06-11
Verbatim Date: 11 Jun 1959
Locality: Guatemala, PetÃ©n, Dep Peten, San Luis (sic)

Most databases can't handle Spanish accents

https://serv.biokic.asu.edu/neotrop/plantae/collections/list.php for Cecropia peltata

Both species of Crecropia trees need more documentation, and with high-resolution digital photographs (not just shriveled, dried, colorless, specimens). Their really large and curled leaves are one reason why not many botanists collect them. Plus these trees are filled with attack-ants so no intelligent botanist wants to get bitten all over his arms.

What is notable about Lundell's 1937 monograph on The Vegetation of Petén is that neither he nor his experienced team are able to identify which species of *Cecropia* they are seeing. Only rarely does he say *Cecropia mexicana* (today a synonym for the accepted name of *Cecropia obtusifolia*). Considering Lundell´s botanical training, decades of field work and capable botanical associates, I don't feel totally brain-dead because I too can't automatically tell the different between the two species of *Cecropia*.

Even the eminent botanist and ethnobotanist Paul C. Standley noted: "All the species are much alike in general appearance, and they are not easily separated upon examination of herbarium material."

(Standley 1922: 219).

Photo by: María Alejandra Gutiérrez, FLAAR Mesoamerica, Dec. 19, 2018. Yaxha lake, Petén, Guatemala.

Camera: Canon 1D X Mark II. Lens: Canon 50mm f/2.5 Macro.
Settings: 1/80 sec; f/9; ISO 200.

Photo by: María Alejandra Gutiérrez, FLAAR Mesoamerica, Dec. 19, 2018. Yaxha lake, Petén, Guatemala.

Camera: Canon 1D X Mark II. Lens: Canon 50mm f/2.5 Macro. Settings: 1/100 sec; f/9; ISO 200.

Brief list of *Cecropia peltata* trees for Belize by Standley and Record (1936)

Cecropia L.

Small or medium-sized trees with hollow, whitish, smooth trunks; stipules large, deciduous; leaves long-stalked, very large, peltate, deeply lobed, usually whitish beneath and tomentose; flowers dioecious, in dense spikes, these clustered at the ends of short or long peduncles. The hollow branches invariably are infested by small ants that inflict severe bites when the tree is molested. The name Trumpet sometimes given to the trees alludes to a tradition that the stems were employed for making trumpets by the aborigines of tropical America. After palms, the Cecropias probably constitute the most conspicuous and characteristic element of the vegetation of the Central American lowlands, for their appearance is quite unlike that of any northern tree. The light, soft, coarse-textured, perishable wood is not utilized. (For description see T. of T. A., pp. 144-147.)

Cecropia mexicana Hemsl. Trumpet. Guarumo. A frequent small tree of the lowlands, springing up abundantly in abandoned land; southern Mexico to Panama.

(Standley and Record 1936: 110-111)

Standley was not doing much ethnobotany research when working together with commercial tree timber wood professor Record. However, when Standley was by himself or working together with Steyermark, their descriptions included helpful cultural information on the uses of many plants.

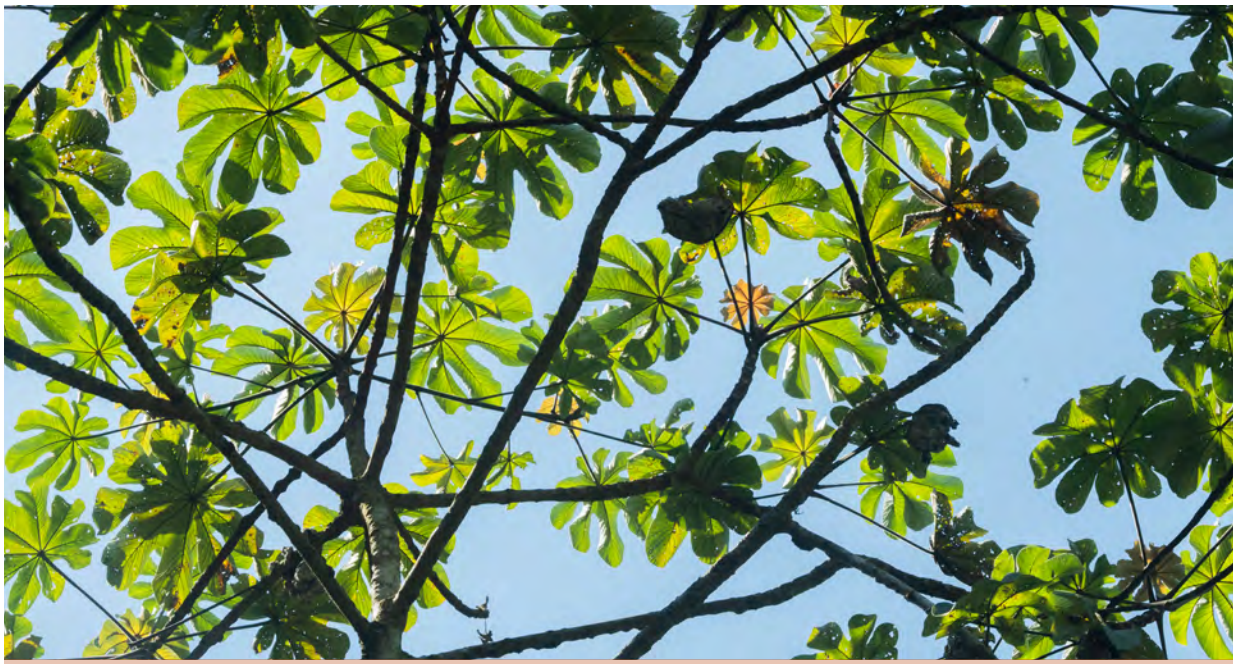


Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Feb. 20, 2019. Parque Yaxha, Nakum y Naranjo, Petén, Guatemala.

Camera: Nikon D5. Lens: Nikon AF-Micro NIKKOR 200mm IF-ED Macro.
Settings: 1/250 sec; f/14; ISO 1,600.

Botanical Description of *Cecropia peltata* by Standley and Steyermark (1949)

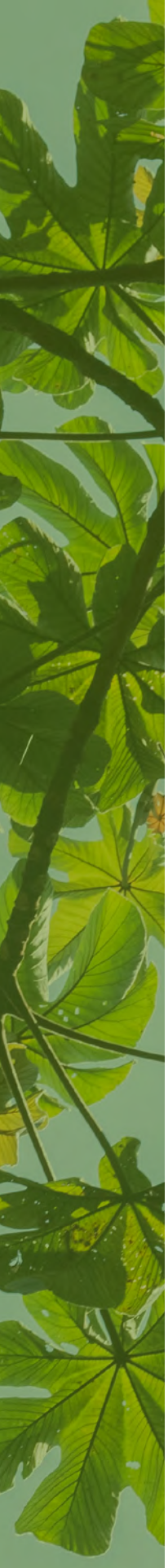
The branches are said to have been used by some of the American aborigines for making trumpets, hence the English name "trumpet tree" often applied to the genus. The split trunks sometimes are employed as troughs or conduits for conducting water. The bark contains a tough fiber utilized in some regions (not in Central America, so far as known) for making cordage, mats, and a kind of coarse cloth.

The stems have been used in Brazil for making paper. The sap contains a kind of rubber but in too small quantities for commercial purposes. It is reported that some South American Indians ate the pith of the branches. The trees have been much used in domestic medicine but no definite properties seem to be ascribed to them.

(Standley and Steyermark 1946: 21)

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Oct. 27, 2018. Parque Yaxha, Nakum y Naranjo, Petén, Guatemala.

Camera: Nikon D5. Lens: Nikon AF-Micro-NIKKOR 200mm IF-ED Macro. Settings: 1/250 sec; f/10; ISO 640.



Cecropia obtusifolia Bertoloni, Fl. Guat. 439. 1840. *C. mexicana* Hemsl. Biol. Centr. Amer. Bot. 3: 151. pi. 80. 1883. *C. mexicana* var. *macrostachya* Donn. Smith, Bot. Gaz. 27: 442. 1899 (type from Costa Rica). Guarumo (often modified, especially about Coban, to Guarumbo); Pad, Choop (Coban, Quecchi); Xobin (Baja Verapaz, fide Tejada).

Common through most of the lowlands, usually in wet or moist thickets, sometimes in wet forest, even in Manicaria swamps, frequent along borders of pastures or forest, ascending from sea level to (in the Occidente) about 1,300 meters; Peten(?); Alta Verapaz; Baja Verapaz; Izabal; Santa Rosa; Escuintla (type from Escuintla, Velasquez); Suchitepequez; Retalhuleu; Sacatepequez; Chimaltenango; Huehuetenango; Quezaltenango; San Marcos. Southern Mexico and British Honduras throughout the lowlands of Central America to Panama.

A small to large tree, sometimes 22 meters tall but usually much lower, the trunk seldom more than 30 cm. in diameter, the branchlets very stout and thick; stipules large, whitish-pubescent or glabrate; leaves on very long, terete petioles, suborbicular in outline, 30-50 cm. wide or larger, cleft about halfway to the base into usually 10-13 lobes, green and scaberulous above, densely white-tomentulose beneath or sometimes glabrate, the lobes entire, broad or narrow, rounded or abruptly short-acuminate at the apex; spathe at the base of the inflorescence white-tomentose or rarely glabrate, closed and pointed before anthesis; staminate peduncles elongate, the spikes few, 3-4 mm. thick, long and slender; pistillate spikes usually 2-4 or sometimes more, sessile or nearly so, mostly 20-40 cm. long and 6-7 mm. thick, in fruit very fleshy.

This is an abundant and characteristic tree almost throughout the Pacific plains, and almost equally so in the North Coast. It is easily distinguished from *C. peltata* by the very long and pendent flower spikes. The leaves, especially young ones, often are tinged beneath with red or purple but this coloring is not very conspicuous. Trees brought from the Pacific coast have been planted in Guatemala City, where they seem to grow well. This species sometimes flowers when only a shrub of 4 meters. The leaves are eaten by stock, and in Salvador the leaves are salted, after which cows are said to eat them in quantity. The wool separated from the stems and leaves is said to be sometimes smoked by the Indians of Alta Verapaz, like tobacco. Velasquez, in notes accompanying the original specimens of *C. obtusifolia*, remarks that it is on this tree that the bird called "ciacia" (chacha or chachalaca) builds its nests. The local name, "guarumo," gives its name to a caserio of San Marcos, called El Guarumo. In British Honduras the tree is called "trumpet." The name "guarumo" is probably of West Indian origin. Oviedo cites it as "yaruma," which probably is closest to the original form of the word.

(Standley and Steyermark 1946: 21-22)

Cecropia peltata L. Syst. ed. 10. 1286. 1759. *C. asperrima* Pittier, Contr. U. S. Nat. Herb. 19: 227. 1917. Guarumo; Igarata, Ix-coch (Maya); Trumpet (British Honduras); Ixcochle (Peten).

Chiefly in pastures or second-growth, often in thickets or modified forest, at 900 meters or less; Peten; Izabal; Santa Rosa. Yucatan and British Honduras; Honduras; Nicaragua; Costa Rica; West Indies; northern South America.

A small or medium-sized tree, attaining sometimes a height of 20 meters; petioles often longer than the leaf blades, these suborbicular in outline, 30-50 cm. wide or larger, mostly 7-9-lobate, shallowly or deeply lobate, dark green and scabrous above, rough to the touch, densely covered beneath with a white, often snowy tomentum, or sometimes greenish and only sparsely tomentose; spathes about 6 cm. long, cuspidate at the apex, caducous; staminate spikes numerous, about 4 cm. long and 3 mm. Thick, short-pedicellate; pistillate spikes usually 2-6, sessile, yellowish at first, 3-6 cm. long, in fruit very thick and succulent.

The Central American tree has never, so far as we know, been referred to the common West Indian *C. peltata*, but there are no apparent characters by which two species may be distinguished in the fairly ample material at hand. Specimens from Guatemala and Yucatan have been referred in the past to *C. obtusa* Trecul and *C. Humboldtiana* Klotzsch. The wood is whitish or light-colored, very light and soft, with a specific gravity of about 0.45, with straight or fairly straight grain, coarse-textured, easy to cut, tough and strong for its weight, but perishable. So far as known, no use is made of it in Central America. The Maya name reported from Yucatan is "xco-che."

(Standley and Steyermark 1946: 22-23)

Photo by: María Alejandra Gutiérrez, FLAAR Mesoamerica, Dec. 19, 2018. Yaxha lake, Petén, Guatemala.

Camera: Canon 1D X Mark II. Lens: Canon 50mm f/2.5 Macro. Settings: 1/80 sec; f/9; ISO 200.

Photo by: Ericka García, FLAAR Mesoamerica, 2019. Yaxha, Petén, Guatemala.

Camera: Canon 1D X Mark II. Lens: Canon 50mm f/2.5 Macro. Settings: 1/80 sec; f/9; ISO 200.

Botanical Description of *Cecropia* in Trees and Shrubs of Mexico

The trees grow very rapidly. Their hollow trunks are generally inhabited by pugnacious ants. The trunks are often cut in two and used as troughs to conduct water. Many of the native inhabitants of tropical America used them also for making a kind of trumpet, and the soft spongy wood was employed as tinder. In Brazil the wood has been used for making paper. The bark contains a tough, coarse fiber used for cordage and for mats and for a kind of coarse cloth by the Indians of Central and South America. The sap yields rubber, but the quantity obtained by tapping is too small to be of commercial importance. It is said that the Indians sometimes ate the pith and that cattle eat the leaves and fruit. The fruit is eaten also by birds.

Various medicinal properties are ascribed to the plants. In Mexico the juice is used as a caustic for the treatment of ulcers and the removal of warts. In South America and the West Indies it is used for dysentery and venereal diseases, and a decoction of the young leaves for dropsy, liver affections, and asthma. The ashes, according to Barbara, were employed as a remedy for dropsy. It is said, in addition, that the plant possesses the properties of digitalis, although its toxicity is relatively low.

(Standley 1922: 217)

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Feb. 20, 2019. Parque Yaxha Nakum y Naranjo, Petén, Guatemala.

Camera: Nikon D5. Lens: Nikon AF-Micro NIKKOR 200mm IF-ED Macro.
Settings: 1/250 sec; f/14; ISO 1,600.

In which States of Mexico is *Cecropia peltata* listed by Villaseñor?

CECROPIA PELTATA		CECROPIA OBTUSIFOLIA	
CECROPIA OBTUSIFOLIA	CECROPIA PELTATA	CECROPIA OBTUSIFOLIA	CECROPIA PELTATA
CAM	CAM	Alta Verapaz	Petén
CHIS	CHIS	Baja Verapaz	Izabal
CHIH		Chimaltenango	Santa Rosa
COL		Huehuetenango	
DGO		Izabal	Belize
GRO	GRO	Escuintla	
HGO	HGO	Petén (?)	
MEX		Quetzaltenango	
MICH	MICH	Retalhuleu	
MOR		Sacatepéquez;	
NAY	NAY	San Marcos	
OAX	OAX	Santa Rosa	
PUE	PUE	Suchitepequez	
QRO	QRO		
QROO		Belize	
SLP	SLP		
SIN			
TAB	TAB		
TAMS	TAMS		
VER	VER		
(Villaseñor 2016: 895)		**(Standley and Steyermark 1946)**	

So, on all neighboring areas of Petén: Chiapas, Tabasco, Campeche, Quintana Roo, both species are found. Therefore, both species would be expected to be present in Petén.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Dec. 16, 2020. Livingston, Plan Grande Tatín, Guatemala.

Camera: Nikon D810. Lens: Nikon AF-Micro NIKKOR 200mm IF-ED Macro.
Settings: 1/250 sec; f/9; ISO 400.

Cecropia peltata and/or *Cecropia obtusifolia* in Izabal, Guatemala

Very incomplete record for this tree in the Neotropical plant portal:

Catalog #: 1029978
Occurrence ID: d7b5e95b-852e-498f-942b-42d778038e69
Taxon: *Cecropia obtusifolia* Bertol.
Family: Urticaceae
Collector: G. C. Jones
Number: 3034
Date: 1966-04-23
Verbatim Date: 23 Apr 1966
Locality: Guatemala, Izabal, Dep Izabal, village of Izabal 15.58 -89.42
Elevation: 600-600 meters Verbatim Elevation: 1969 ft

(https://serv.biokic.asu.edu/neotrop/plantae/collections/individual/index.php?occid=3268092&clid=0)

Are any parts of *Cecropia peltata* edible?

> Comestible [flor]. La infrutescencia es comestible, con un sabor similar al del higo. Los frutos presentan un valor nutritivo relativamente alto; tienen una proporción mayor de proteínas que los de otras moráceas y lauráceas.
>
> www.conabio.gob.mx/conocimiento/info_especies/arboles/doctos/49-morac3m.pdf
> pp 189-193

Botanist MacVean lists *Cecropia peltata* as being edible for Petén, in additional to being medicinal (2003:48).

The comprehensive book on Arboles of the Tuxtla area of Veracruz, *Cecropia obtusifolia* states: "los frutos pueden ser comestibles." (Vazquez et al. 2010: 108)

Photo by: Erick Flores, FLAAR Mesoamerica, Aug. 15, 2018. Yaxha lake west half, Petén, Guatemala.

Camera: Nikon D810. Lens: Nikon AF-S Micro 60mm G. Settings: 1/30 sec; f/5; ISO 400.

Photo by: Erick Flores, FLAAR Mesoamerica, Aug. 15, 2018. Yaxha lake west half, Petén, Guatemala.

Camera: Nikon D810. Lens: Nikon AF-S Micro 60mm G. Settings: 1/30 sec; f/5; ISO 400.

Smoking *Cecropia*? Is this an hallucinogen?

Just like some parts of *Nymphaea ampla* are considered hallucinogenic, I had always assumed that the leaves of *Cecropia* were also a mild hallucinogenic.

However, it's more than the leaves that are smoked and it is smoked by more people than just chicleros in Petén. For *Cecropia obtusifolia*, "The wool separated from the stems and leaves is said to be sometimes smoked by the Indians of Alta Verapaz, like tobacco." (Standley and Steyermark 1946: 21-22). These would most likely be the Q'eqchi' Mayan-speaking people. This is partially collaborated by Wilson (1972: 37 and 358): Moraceae: *Cecropia* spp. *peltata* L., & others) BBR; leaf formerly used as tobacco.

The leaves of *Cecropia* are routinely smoked by chicleros when they are out in the rain forests for months and there are no stores anywhere to buy cigarettes. Thus, they smoke *Cecropia peltata* leave as a cigar or in a pipe (Balick and Arvigo 2015: 497).

Ratsch (1998: 141) lists *Cecropia* leaves as "a substitute for marijuana" citing Ott 1993 and Schultes and Hofmann 1995 (these are in Ratsch's biblio; not mine). In my experience, if you want to hear someone telling you how hallucinogenic smoking *Cecropia* is, they will want to make you happy. I am trying to be polite nut for the average person (who is not already deep into drugs), smoking *Cecropia* leaves is not going to send you into outer space (unless you get high on whatever you want).

If *Cecropia* is an additive for coca (p. 247), looks like it requires coca to produce the desired effect. Also, it is the ashes that are added, not the leaf itself. Evidently, smoking or burning *Cecropia* alters its chemicals, however, no chemical analysis substantiates that *Cecropia* leaves are hallucinogenic. Besides, it's the buds that are eaten, not smoked leaves or the ashes. I have learned from Maya people collaborating at my own office that their mother wraps tamales in guarumo leaves and no one in their family jets off to outer space.

Experienced ethnobotanist Suzanne Cook discusses *Cecropia* utilization by the Lacandón and although she lists a lot of uses there is nothing hallucinogenic (2016: 189).

I am not a prude; I was a student at Harvard in the 1960's, however, I don't need drugs to feel happy (a few beers or sharing a bottle of wine with company are more than enough). I realize that the Aztec, Zapotec and about everyone else south down to Brazil used every drug they could. Nonetheless, I would not feature *Cecropia* in a list of naughty hallucinogenic drugs. It surely gives you a pop, but so does chocolate, Coca Cola, a cup of coffee with excess sugar, etc.

Cecropia is edible and is eaten by many pre-Hispanic people as a regular food, with no focus or interest in having a delirious journey into Xibalba.

Leaves of *Cecropia* as wraps for tamales

I was pleasantly surprised to learn from Sofia Monzón that her Mayan cook in Panajachel uses guarumo leaves to wrap tamales. Thus, I asked the Mayan individuals who work for FLAAR Mesoamerica whether their parents also use guarumo leaves to wrap tamales. Several said yes.

I am not sure that hallucinogen specialist Ratsch is aware of this cooking use for *Cecropia* leaves. None of the people making tamales wrapped with these leaves have any interest whatsoever in a mind-altering delusional hallucination. Learning of this regular Maya use of *Cecropia* leaves lends even more documentation for not dumping guarumo into the world of drugs. Keep in mind that the leaves on a tamale are not eaten: they keep the ingredients moist and gives them a slight flavor. On the other hand, if you set fire to the leaves and inhale the smoke + whatever chemicals are in any leaf, you may feel "happy", but the Classic Maya had plants a lot more awe inspiring than *Cecropia* leaves!

Is there potential medicinal use for *Cecropia peltata* by local people?

Considering that much of the indigenous population suffers from Diabetes 2 (due to ingestion of too much PepsiCola, CocaCola, Big Cola and sugar in general), it is frankly amazing the potential benefits of tea from *Guarumo obtusifolia* leaves (www.rxlist.com/guarumo/supplements.htm)

Even the prestigious WebMD site lists *Cecropia obtusifolia* as medicinal (www.webmd.com/vitamins/ai/ingredientmono-1480/guarumo)

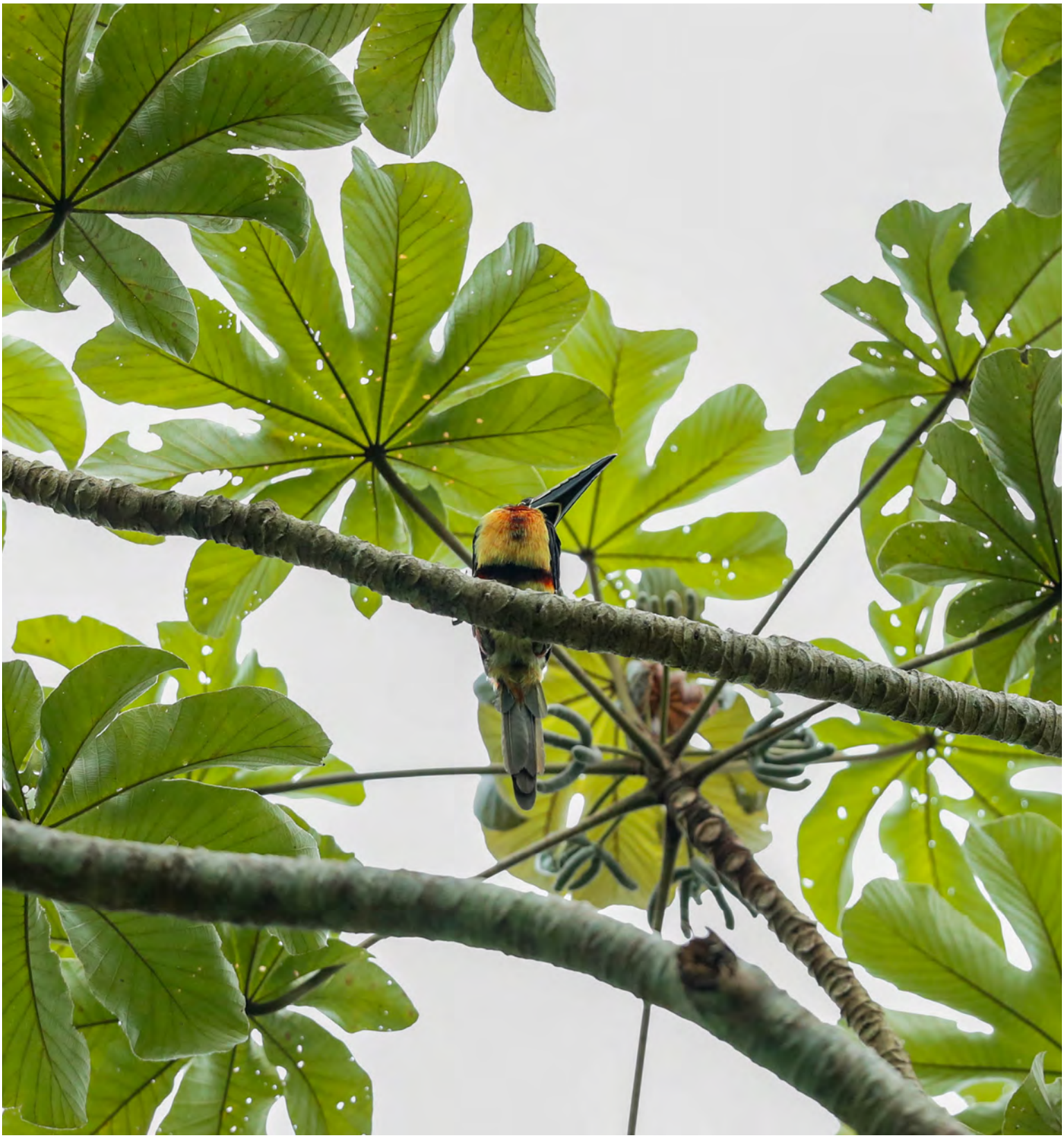
Cecropia obtusifolia is even sold packaged (for medicinal uses):
https://hervarfam.com/producto/chancarro-cecropia-obtusifolia-puro-seco-molido-1-kg/

There are dozens of professional Ethnopharmacological studies, just Google the appropriate keywords and you will get all these reports on the medical potential of *Cecropia obtusifolia*. Entire theses in pharmaceutical chemistry have been written on both species together (Gil 2005).

Cecropia species are a common medicinal plant of the Lacandón Maya (Cook 2018: 189). In the book on medicinal plants of Belize the list of medicinal uses of *Cecropia* leaves is over 3 pages long (Balick and Arvigo 2015: 495-497).

How do the Seeds Spread?

In the Lacandón area *Philander opossum* and *Didelphis marsupialis* deposit seeds of *Cecropia obtusifolia* in their poop (Medellin 1994). Monkeys, other arboreal mammals, and birds also spread the seeds of both species of *Cecropia*. Would be valid research to check how many local bat species eat and then poop out seeds of *Cecropia*. Bat specialist Cajas already lists finding *Cecropia* seeds in deposits left by the bat *Glossophaga soricina* (2005: 42). Additional mention of frugivorous bats spreading *Cecropia* seeds is in a comprehensive thesis by Lumbreras (2012).



Erick Flores and Melanny Celeste Quiñónez were a photography team who assisted FLAAR field trips for many years. The two following photos are examples.

Lots of birds and lots of mammals (and bats) love to gobble down *Cecropia* buds, seed pods, or leaves. Here Erick was able to find and capture an image of Collared Aracari, *Pteroglossus torquatus*.

Photo by: Erick Flores, FLAAR Mesoamerica, Aug. 13, 2018. Yaxha, Petén, Guatemala.

Camera: Canon 1D X Mark II. Lens: Canon EF 300mm IS II USM.
Settings: 1/1,600 sec; f/2.8; ISO 2,500.

In this view the Collared Aracari has its beak on the seed pods of the guarumo since the bird is parallel to the branch it is hard to see it at first sight.

Photo by: Erick Flores, FLAAR Mesoamerica, Aug. 13, 2018. Yaxha, Petén, Guatemala.

Camera: Canon 1D X Mark II. Lens: Canon EF 300mm IS II USM.
Settings: 1/1,600 sec; f/2.8; ISO 2,500.

Are any parts of *Cecropia peltata* trees eaten by mammals?

Spider monkeys eat both seed pods and also leaves (www.youtube.com/watch?v=0nGE_TVplfQ)
Cecropia tree & pioneer plants / El Guarumo y las plantas pioneras
3:49 minutes

Lots of bats also like to eat *Cecropia* fruits.

Learn more about *Cecropia peltata*, and check out adorable spider monkeys eating!

What are the primary pollinators of *Cecropia peltata* flowers?

Potentially insectivorous bats.

Concluding Discussion and Summary on *Cecropia peltata*

The present report is to remind us that *Cecropia* is edible and was available to the Mayan people for thousands of years. Therefore, the ants that live inside *Cecropia* trees should be covered in an entirely additional report in the future.

Additionally, I am not convinced that smoking *Cecropia* leaves is "the equivalent or substitute for smoking cannabis" (putting together statements by halluncinogenic biologist Ratsch). He also lists avocados (and probably a dozen other normal fruits) as aphrodisiac in his other book; and probably tomatoes too (It is not useful for me to put this two ton giant book off the book shelf next to my desk). However, I eat avocados every day, together with tomatoes, and surely most of us could agree that it does not have such effect.)

About half of the herbaria specimens of *Cecropia* have the leaves either broken or incomplete, meaning they are rather insufficient. https://swbiodiversity.org/seinet/taxa/index.php?tid=26789&taxauthid=1&clid=15

The primary benefit of these herbaria specimens are where they were found. As for their utility for other respects, I would rather stand in front of an actual live tree in the fields of Mesoamérica.

In addition to being edible, the medicinal potential of *Cecropia* trees has been documented. A report on the pharmacological and chemical traits of this plant lists 72 other reports in its bibliography (Costa et al. 2011).

Balick, Nee and Atha (2000: 58) list BOTH of the two species of *Cecropia* as FOOD:

Cecropia obtusifolia Bertol. — **Syn:** *Cecropia mexicana* Hemsl. —**Reg Use:** PRD, RITL, MED, FOOD, FORG, FUMT.

Cecropia peltata L. — **Syn:** *Cecropia asperrima* Pittier —**Loc Use:** PRD, MED, FUMT — **Reg Use:** MED, FOOD.

It never bothers me that the local use for this plant is not food, what counts is that people elsewhere eat a plant. I bet most people in Petén and Belize today would never ever even consider eating either one of the *Cecropia* species. Nonetheless, this plant is edible and 2000 years ago there were millions of these trees growing literally everywhere.

I cited and included *Cecropia peltata* in my 12th edition of edible plants of the Maya (Hellmuth 2013). I now realize I need to add the other species: *Cecropia obtusifolia*.

Cecropia trees are a main source of food also for monkeys (both spider monkey and howler monkey) and dozens of birds. I consider that other arboreal mammals also feed on either leaves, seeds, or inflorescences of *Cecropia*. This tree deserves to be preserved (not chopped or burned down) but more important, this tree is worthy of significantly more recognition and discussion in botanical monographs. Merely being in a "List of Trees of xyz Location" is not adequate.

When you visit PNYNN and surrounding areas of the Reserva de la Biosfera Maya, now you know more about one of the easiest-to-recognize trees: *Cecropia* species. During the coming 5 years we will be covering plant after plant to provide a more realistic understanding of them. Our project also includes field work on insects, reptiles, birds, mammals, mushrooms, lichen, and underwater plants. There is a lot more to come!

Photo by: Erick Flores, FLAAR Mesoamerica, Aug. 15, 2018. Yaxha lake west half, Petén, Guatemala.

Camera: Canon 1D X Mark II. Lens: Canon EF 100MM Macro USM. Settings: 1/125 sec; f/11; ISO 100.

References Cited and Suggested Reading on on *Cecropia peltata*

Most helpful monographs on this plant:
There is no monograph on *Cecropia peltata* or *Cecropia obtusifolia* that we have yet found. These trees certainly deserve more attention in Guatemala and adjacent countries. The most helpful information within a botanical monograph on plants in general is by Balick, Nee and Atha, Checklist of the Vascular Plants of Belize: With Common Names and Uses, Memoirs of the New York Botanical Garden (2000: 58).

Best video so far on *Cecropia peltata*:
www.youtube.com/watch?v=0nGE_TVpIfQ

Note: since the present edition is a work-in-progress this bibliography also is a work-in-progress

AGUIRRE de Riojas, Regina and **Elfriede de PÖLL**

2007 Trees in the Life of the Maya World. BRIT PRESS, Botanical Research Institute of Texas. 206 pages.

Regina de Riojas has dedicated much of her life to trees of the Maya and trees of Guatemala. Elfriede de Pöll has likewise dedicated her life to the biology of Guatemala, at Universidad del Valle de Guatemala.

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2003 Nomenclatura, forma de vida, uso, manejo y distribución de las especies vegetales de la Península de Yucatán. Etnoflora Yucatanense Fascículo 20. Universidad Autónoma de Yucatán, UADY. 815 pages.

A challenge to find as a download.

ATRAN, Scott, LOIS, Mimena and **Edilberto UCAN Ek'**

2004 Plants of the Peten Itza' Maya. Museum of Anthropology, Memoirs, Number 38, University of Michigan. 248 pages.

Very helpful and nice collaboration with local Itza' Maya people. But would help in the future to have a single index that has all Latin, Spanish, and English plant names so that you can find plants more easily. Suzanne Cook's Lacandon ethnobotany index is significantly easier to use.

Not available as a download.

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Download here:
https://repository.si.edu/bitstream/handle/10088/27024/usnh_0024.04.pdf

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2005 Biodiversidad del Estado de Tabasco. CONABIO, UNAM, México. 370 pages.

CAJAS Castillo, Jose Octavio
2005 Polen transportado en el pelo de murcielagos nectarivoros en cuatro bosques secos de Guatemala. Thesis, USAC.

CHIZMAR, Carla
2009 Plantas Comestibles de Centroamérica. Instituto Nacional de Biodiversidad (INBio). Santo Domingo de Heredia. Costa Rica. 360 pages.

Download:
www.museocostarica.go.cr/descargas/PlantasComestiblesCA-VE.pdf

CONABIO

n.d. Listado de algas y plantas presentes en Ría Lagartos (Las Coloradas), Yucatán. (CONABIO, anexo 3).

This is just Anexo 3; the rest of the report is splattered in a dozen other PDFs. But this Anexo 3 had six species of Crotón listed.

Download:
www.conabio.gob.mx/conocimiento/manglares/doctos/anexos/PY71_Anexo_3.pdf

CONAP- DGPCN/MICUDE-

2015 Plan Maestro del Parque Nacional Yaxha, Nakum, Naranjo (PNYNN). Primera actualizacion. Consejo Nacional de Areas Protegidas (CONAP), Direccion General de Patrimonio Cultural y Natural (DGPCN)/Ministerio de Cultura y Deportes (MICUDE), Centro Agronomico Tropical de Investigacion y Ensenanza (CATIE)-GITEC Consult GmbH. (Editado y revisado por Carlos Rodriguez Olivet, Julio Rafael Morales, Oscar Quintana, Jenniffer Ortiz, Julio Lopez Payes). Programa para el Desarrollo de Petén para la Conservacion de la Reserva de la Biosfera Maya (PDPCRBM/MARN). Guatemala. 323 pages.

Easy download.

COOK, Suzanne

2016 The forest of the Lacandón Maya: an ethnobotanical guide. Springer. 334 pages.

Sold online: www.springer.com/la/book/9781461491101

COSTA, Geison M., SCHENKEL, Eloir P. and Flávio H. REGINATTO

2011 Chemical and Pharmacological Aspects of the Genus *Cecropia*. NPC, Natural Product Communications, 2011 Vol. 6 No. 6, 913 – 920.

Easy download: https://journals.sagepub.com/doi/pdf/10.1177/1934578X1100600637

DIX, Margareth and Juan F. FERNANDEZ (editors)

2001 Inventario Nacional de los Humedales de Guatemala. UICN-Mesoamérica, CONAP: USAC. 176 pages.

Ironic that zilch plants are listed for Laguna Yaxha. Adjacent Laguna Sacnab is "Sin información" (p. 53); Laguneta Champoxte "Sin información" (p. 53); and the other two lagunas within PNYNN are not even in the lst. Río Ixtinto is also missing.

ESTRADA Loreto, Feliciana

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HELLMUTH, Nicholas

2013 Maya Ethnobotany Complete Inventory Fruits, nuts, root crops, grains, construction materials, utilitarian uses, sacred plants, sacred flowers. FLAAR (USA) and FLAAR Mesoamerica (Guatemala). 106 pages.

There are multiple editions of this opus.

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Download here: www.researchgate.net/publication/306128522_Riqueza_de_especies_y_endemismo_del_componente_arboreo_de_la_Peninsula_de_Yucatan_Mexico

INE

2013 Nomination of Ancient Maya City and Protected Tropical Forests of Calakmul, Campeche. 55 pages.

There is no author on the fragment that is the most available as a download, so we put INE.

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2005 The *Cecropia*-Azteca association in Costa Rica. The Evergreen State College.

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2014 Estructura y composición florística de la vegetación secundaria en tres regiones de la Sierra Norte de Chiapas, México. Polibotánica, No. 37, pp 1-23

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MALDONADO-Polo, J. Luis

1995 Los recuerdos naturales de Centroamérica. El origen de la expedición botánica al reino de Guatemala. Consejo Superior de Investigaciones Científicas Licencia Creative Commons 3.0 España

Download here: http://asclepio.revistas.csic.es/index.php/asclepio/article/view/434/431

MARTÍNEZ, Esteban and **Carlos GALINDO-Leal**

2002 La Vegetación de Calakmul, Campeche, México: Clasificación, descripción y distribución. Bol. Soc. Bot. México 71: 7-32.

Download here: www.botanicalsciences.com.mx/index.php/botanicalSciences/article/download/1660/1309/

Medellin, Rodrigo A.

1994 Seed Dispersal of Cecropia obtusifolia by Two Species of Opossums in the Selva Lacandona, Chiapas, México. Biotropica Vol. 26, No. 4 (Dec., 1994), pp. 400-407.

OCHOA-Gaona, Susana

1996 La Vegetación de La Reserva El Ocote a lo largo Del Cañón del Río La Venta. Ecosur, CONABIO.

Downloadable:

OCHOA-Gaona, Susana, RUÍZ González, Hugo, ÁLVAREZ Montejo, Demetrio, CHAN Coba, Gabriel and **Bernardus H. J. DE JONG**

2018 Árboles de Calakmul. ECCOSUR, Chiapas. 245 pages.

It is amazing that there is no such book for Parque Nacional Tikal, nor El Mirador. Even though it includes only half the estimated number of "trees," it has more tree species than Schulze and Whitacre for Tikal (they estimated about 200 but list only about 156 (their lists of species and list by plant family are not identical)).

The entire book is a totally free download, however it is locked so you can't copy and paste so is difficult to add to your discussion.

In the future would be helpful to have a photographer with high-resolution equipment available and a book producer that can put these photos at a resolution that allows you to see the details. The photos of the overall tree have almost no visible detail. Nonetheless, the authors all have botanical experience and this book is a good start. A second edition would be helpful. Also would help to have more than one photo for plants with only one photo.

The page on *Cecropia peltata* fails to mention uses other than generic word medicinal (p. 220). However this page has 5 photos of which the bottom two are nice quality. But, as in most botanical monographs, no comparison of male features on one side and female features on the other side.

http://aleph.ecosur.mx:8991/exlibris/aleph/a22_1/apache_media/74R92GMRSJSEPFDEE5NJY4SJI2I8AK.pdf

ORDÓÑEZ, MARÍA de Jesús

2014 Las flores comestibles. Instituto nacional de investigación sobre medios bióticos

Download: www.academia.edu/12405169/LAS_FLORES_COMESTIBLES_MAR%C3%8DA_DE_JES%C3%9AS_ORD%C3%93%C3%91EZ

PARDO Tejada, Enrique

1979 Flores Comestibles. comunicado n° 36 sobre recursos hióticos potenciales del país.

PEÑA-Chocarro, María and Sandra KNAPP

2011 Árboles del mundo maya. Natural History Museum Publications. 263 pages.

Helpful book; contributing authors are experienced botanists. They cover 220 species of trees, more than virtually all other "Books on Trees of the Maya." Even include tasiste (which is missing from all other books on "Trees of the Maya" except for the recent book on Árboles de Calakmul).

But if all this effort is going into a book, would help if there were more photos, larger photos, and not so much blank space at the bottom of each page. Plus would help if the text could include personal first hand experience with these trees out in the Mundo Maya. But even as is, it is a helpful book.

If you are doing field work you need this, plus Árboles de Calakmul, plus Árboles tropicales de México. Parker's book you need back in your office, since out in the field it's not much help due to lack of photographs. Back in your office the books by Regina Aguirre de Riojas are also helpful.

RÄTSCH, Christian

2005 The Encyclopedia of Psychoactive Plants: Ethnopharmacology and Its Applications. Park Street Press. 944 pages.

He definitely knows hallucinogenic plants, but I am not convinced that 100% of the plants in his book are all really mind-altering.

REYES Morales, Elsa Maria de Fatima, MORALES Can, Julio, OLIVA Hernandez, Bessie Evelyn and Celia Vanessa DAVILA Perez

2009 Los Cuerpos de Agua de la Region Maya Tikal-Yaxha: Importancia de la Vegetacion Acuatica Asociada, Calidad de Agua y Conservacion. CECON, USAC.

There are two versions on the Internet. One is 72 pages and the other (that I cite here) is 12 pages.

SCHULZE, Mark D. and David F. WHITACRE

1999 A Classification and Ordination of the Tree Community of Tikal National Park, Peten, Guatemala. Bulletin of the Florida Museum of Natural History. Vol. 41, No. 3, pp. 169-297.

Even though 20 years ago, it's the best list of trees of Tikal that I have found. There is a web site with plants of Tikal but they are not separated into trees, vines, shrubs, etc., so harder to use. The new monograph on Arboles de Calakmul is better than anything available so far on Tikal (and the nice albeit short book by Felipe Lanza of decades back on trees of Tikal is neither available as a scanned PDF nor as a book on Amazon or ebay).

Download on the Internet.

SELVIN Pérez, Edgar and Miriam Lorena CASTILLO Villeda

2000 A rapid assessment of avifaunal diversity in aquatic habitats of Laguna del Tigre National Park, Petén, Guatemala. In: Bestelmeyer, B.T. and Alonso, L.E. (eds.). A Biological Assessment of Laguna del Tigre National Park, Petén, Guatemala, pp. 56-60. Conservation International.

Download on the internet.

STANDLEY, Paul C. and **Samuel J. RECORD**

1936 The Forests and Flora of British Honduras. Field Museum of Natural History. Publication 350, Botanical Series Volume XII. 432 pages plus photographs.

STANDLEY, Paul C.

1922 Trees and Shrubs of Mexico. Contributions from the United States National Herbarium, Volume 23, Part 2. Smithsonian Institution.

In this one monograph the species are not listed in alphabetical order, so it's a mental adventure finding the species you are looking for.

All monographs by Standley and co-authors can be easily found and downloaded. I would recommend finding the .pdf versions as they are easier to store, easier to copy, and easier to share with students and colleagues.

STANDLEY, Paul C. and **Julian A. STEYERMARK**

1946 Flora of Guatemala. Fieldiana: Botany, Volume 24, Part IV, Chicago Natural History Museum.

TETETLA Rangel, Ericka

2013 Diversidad vegetal de especies raras y su relación con la estructura del paisaje a múltiples escalas espaciales en las selvas de la Península de Yucatán. Dissertation, Centro de Investigación Científica de Yucatán.

This is one of the better dissertations that I have seen and is as good as most peer-reviewed articles in scientific journals. Even has location maps for most of the trees.

Download: file:///Users/new/Downloads/PCBP_BT_D_Tesis_2012_Tetetla_Erika.pdf

VAZQUEZ Torres, Mario, ARMENTA Montero, Samaria, CAMPOS Jimenez, Jaqueline and **Cesar I. CARVAJAL Hernandez**

2010 Arboles de la region de Los Tuxtlas. Veracruz, Gobierno del Estado. 424 pages.

VILLASEÑOR, José Luis

2016 Checklist of the native vascular plants of MexicoCatálogo de las plantas vasculares nativas de México. Revista Mexicana de Biodiversidad 87 (2016) 559–902.

http://revista.ib.unam.mx/index.php/bio/article/view/1638/1296

VILLAR Anléu, Luis

2005 Guatemala, Arboles Magicos Y Notables. Empresa Eléctrica de Guatemala, Editorial Artemis-Edinter. 148 pages.

I always enjoy seeing an author who is really enthusiastic about what he is writing about. I have had this book in my office reference library for 15 years (since it first came out).

VILLEGAS, Pedro. BUROGOS, Claudia, and **CRUZ, Harim**

2011 Plantas medicinales y comestibles de la Reserva Natural de Usos Multiples Monterrico-RNUMM-, Taxisco, Santa Rosa. Programa Universitario de Investigaciòn en Recursos Naturales y Ambiente-PUIRNA-. Universidad de San Carlos de Guatemala. Guatemala.

Download: http://digi.usac.edu.gt/bvirtual/informes/puirna/INF-2011-024.pdf

WILSON, Michael

1972 A Highland Maya People and their Habitat: The Natural History, Demography and Economy K´ekchi´ PhD dissertation. 475 pages.

His field work was near San Pedro Carchá, which is now a suburb of Cobán, Alta Verapaz. The climate is moist due to moist clouds during many times of the year.

East to download on the Internet.

ZAMORA-Crescencio, Pedro, GUTIÉRREZ-Báez, Celso, FOLAN, William J., DOMÍNGUEZ-Carrasco, Ma. Del Rosario, VILLEGAS, Pascale, CABRERA-Mis, Geucilio, CASTRO-Angul,o Claudeth and **Juan Carlos CARBALLO**

2012 La vegetación leñosa del sitio Arqueológico de Oxpemul, Municipio de Calakmul, Campeche, México. Polibotánica, Num 33, pp. 131-150

Download: www.scielo.org.mx/pdf/polib/n33/n33a9.pdf

Helpful web sites for any and all plants

There are several web sites that are helpful even though not of a university or botanical garden or government institute.

However most popular web sites are copy-and-paste (a polite way of saying that their authors do not work out in the field, or even in a botanical garden). Many of these web sites are click bait (they make money when you buy stuff in the advertisements that are all along the sides and in wide banners also. So we prefer to focus on web sites that have reliable information.

https://serv.biokic.asu.edu/neotrop/plantae/
Neotropical Flora data base. To start your search click on this page:
https://serv.biokic.asu.edu/neotrop/plantae/collections/harvestparams.php

http://legacy.tropicos.org/NameSearch.aspx?projectid=3
This is the main SEARCH page.

https://plantidtools.fieldmuseum.org/pt/rrc/5582
SEARCH page, but only for collection of the Field Museum herbarium, Chicago.

https://fieldguides.fieldmuseum.org/guides?category=37
These field guides are very helpful. Put in the Country (Guatemala) and you get eight photo albums.

http://enciclovida.mx
CONABIO. The video they show on their home page shows a wide range of flowers pollinators, a snake and animals. The videos of the insects are great.

www.kew.org/science/tropamerica/imagedatabase/index.html
Kew gardens in the UK is one of several botanical gardens that I have visited (also New York Botanical Gardens and Missouri Botanical Gardens (MOBOT), in St Louis. Also the botanical garden in Singapore and El Jardín Botánico, the open forest botanical garden in Guatemala City).

www.ThePlantList.org
This is the most reliable botanical web site to find synonyms. In the recent year, only one plant had more synonyms on another botanical web site.

Web pages specifically on *Cecropia obtusifolia*

www.naturalista.mx/taxa/160255-Cecropia-obtusifolia
Copy and paste from Wikipedia (a surprise for a botanical website). However, the few photos available are very helpful.

Videos on *Cecropia peltata* in general

https://www.facebook.com/GuayavaLove/videos/2362622597340267/
nice views of fruits growing straight up
4:25 minutes
The last few seconds have excellent views of the fruits.

www.youtube.com/watch?v=Bb1-y1QaCFM
moving and planting a *Cecropia* (in Florida)
5:52 minutes
Amazing that a tiny baby *Cecropia* will begin to flower at less than 1 meter height!

https://vimeo.com/39162251
Investigation of the *Cecropia peltata*
2:58 minutes

https://hablemosdeflores.com/el-guarumo/
4:15 minutes
have to scroll down the webpage to find the video

www.youtube.com/watch?v=iBNHiF_rxPc
0:15 seconds
Cecropia Seedling Timelapse
Worth watching

Videos on *Cecropia peltata* fruits

www.youtube.com/watch?v=v8qhalwUspo
RARE FRUIT REVIEW - The Old Man's Fingers fruit (*Cecropia peltata*)
5:37 minutes

www.youtube.com/watch?v=umMNA9woUwo
Cecropia-Frucht
4:38 minutes
auf Deutsch
Excellent views of the edible fruits.

Videos on *Cecropia peltata* trichilium with muellerian bodies of *Cecropia* trees

www.youtube.com/watch?v=Z_ZFzCKQMDA
Fast-growing food bodies on a *Cecropia* tree
1:53 minutes

www.youtube.com/watch?v=KiAEzfF2y0M&t=3s
Ant Plants: *Cecropia* - Azteca Symbiosis
2:26 minutes
Shows the trichilium with muellerian bodies of a *Cecropia* tree at 0:48 seconds into the video.

Videos on *Cecropia peltata* Azteca ants

www.youtube.com/watch?v=3-vexsweRLU
Azteca ants from *Cecropia peltata* tending their young
0:51 seconds
Remarkable view inside the hollow portion of a *Cecropia* trunk showing how the ants feed their young.

www.youtube.com/watch?v=fhNJJE5zZOA
Queen Azteca Ant Chewing into a *Cecropia* Tree
4:00 minutes
Well filmed, with 1:1 close-up of the queen ant chewing her way in to her new home.

This report can be cited in your preferred style. Here is the basic information:

HELLMUTH, Nicholas (2021) Why are Guarumo Buds not Listed as "Edible" in Lists of Edible Plants of the Maya?, *Cecropia peltata*. Parque Nacional Yaxha, Nakum and Naranjo, Petén, Guatemala: FLAAR Mesoamerica.

Base Camp Assistance in PNYNN

We thank Biologist Lorena Lobos and both co-administrators of PNYNN (Arq. Jose Leonel Ziesse (IDAEH) and Lic. Jorge Mario Vázquez (CONAP) for providing a place to stay for the photographers, biologists, and assistants of the FLAAR Mesoamerica team of flora and fauna during the 1-week-a-month field trips August 2018 to July 2019.

In turn FLAAR purchased and donated a cooking stove when the original one no longer functioned, plus we have photographed and documented many tree and insect species that we found around this camp.

Base Camp Assistance in Parque Nacional Tikal

While doing field work in the Tikal national park about a decade ago we appreciate the house provided to us by the park administration. We also thank the Solis family, owners of the Jaguar Inn, for providing a place to stay when park facilities had other occupants. We also thank the Solis family for food in their Jaguar Inn restaurant.

Ecolodge El Sombrero

I thank Gabriella Moretti, owner of Ecolodge El Sombrero, for providing hotel room and meals while we have been doing field work at Parque Nacional Yaxha, Nakum y Naranjo. We also appreciate the hospitality of her sons Sebastian de la Hoz and Juan Carlo de la Hoz. Every workday is exhausting because we are carrying and then using very heavy cameras, super-telephoto lenses, sturdy tripods, large gimbals or ball tripod heads. Thus it is crucial for my health to be able to rest and totally recuperate every night in order to be ready for the following day of botanical and zoological adventures in Parque Nacional Yaxha, Nakum and Naranjo.

Equally crucial is having a place to charge the batteries of the computers, or all the cameras, and of the cell phones. Solar power is great, but it lasts only an hour, or less, if you plug in multiple computers and cameras and flash batteries to charge. So a place with enough electricity to charge the entire mass of essential field work equipment is essential and thus very much appreciated.

In order to post photographs on botanical and zoological websites, you can't do this if there is either no Internet or weak Internet. Thus it is very helpful that when we are provided rooms and meals, that Internet is also provided by the Ecolodge El Sombrero.

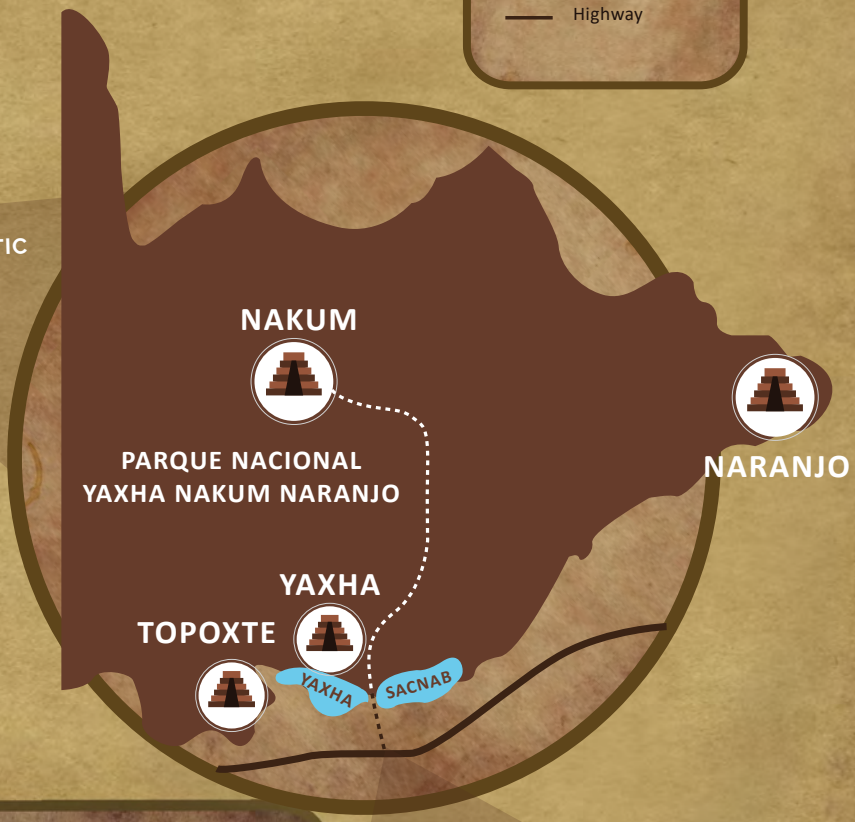
Contact Info: +502 5460 2934, VentasElSombrero@gmail.com or WhatsApp.

www.elsombreroecolodge.com/en-us

HOW TO GET TO YAXHA?

MAP LEGEND

- Archaeological sites
- Airports
- Earthworks
- Highway



PROTECTED AREA

FLAAR MESOAMÉRICA

Go to the Mundo Maya airport in Santa Elena and then you will find a services of tourist vehicles to go to the archaeological site. If you want to go by car from Guatemala City, take the following route: Río Dulce - Poptún-Flores. At the junction further on you will find on the left the route to Tikal. Go straight on to the right towards Yaxha (towards Melchor de Mencos). In km. 521 at the village La Maquina, turn left to the site.Ecolodge El Sombrero is 50 meters before the entrance to National Park Yaxha - Nakum - Naranjo.

Acknowledgements to FLAAR Mesoamérica

The reports are a joint production between the field trip team and the in-house office team.
So here we wish to cite the full team:

Flor de María Setina is the office manager, overseeing all the diverse projects around the world (including FLAAR-REPORTS research on advanced wide-format digital inkjet printers, a worldwide project for over 20 years). We also utilize the inkjet prints to produce educational banners to donate to schools.

Vivian Díaz environmental engineer, is project manager for flora, fauna projects (field work and resulting reports at a level helpful for botanists, zoologists and ecologists, and for university students). Also coordinates activities at MayanToons, division where educational material for kids is prepared.

Victor Mendoza identifies plants, mushrooms, lichen, insects, and arachnids. When his university schedule allows, he also likes to participate in field trips on flora and fauna research.

Vivian Hurtado is part of our bibliography team. In addition, she also prepares blogs and articles for our websites with helpful information about the flora and fauna we document in our field trips and other topics we interested in.

Andrea de la Paz is a designer who helps prepare the master-plan for aspects of our publications. She is our editorial art director.

Norma Estefany Cho Cu helps with preparing the camera equipment for each field trip and helps in the office (and on field trips) as cook.

Byron Pacay handles GPS mapping of where we hike or go in the lancha (boat) each field trip day. He also lists where we stop to take photos and what each one of us is photographing and then has that tabulation ready each night.

Jaqueline González is a designer who puts together the text and photographs to create the actual report (we have several designers at work since we have multiple reports to produce).

Roxana Leal is Social Media Manager for flora and fauna research and publications, and MayanToons educational book projects.

María Alejandra Gutiérrez is an experienced photographer, especially with the Canon EOS 1D X Mark II camera and 5x macro lens for photographing tiny insects, tiny flowers, and tiny mushrooms. Work during and after a field trip also includes sorting, naming, and processing. And then preparing reports in PDF format.

David Arrivillaga is an experienced photographer and is able to handle both Nikon and the newest Sony digital cameras. Work during and after a field trip also includes sorting, naming, and processing.

Juan Carlos Hernández takes the material that we write and places it into the pertinent modern Internet software to produce our web pages (total network is read by over half a million people around the world).

Paulo Núñez is a webmaster, overlooking the multitude of web sites. Internet SEO changes every year, so we work together to evolve the format of our web sites.

Valeria Avilés is an illustrator for MayanToons, the division in charge of educational materials for schools, especially the Q'eqchi' Mayan schools in Alta Verapaz, Q'eqchi' and Petén Itzá Maya in Petén, and the Q'eqchi' Mayan and Garifuna schools in the municipality of Livingston, Izabal.

Josefina Sequen is illustrator for MayanToons and also helps prepare illustrations for Social Media posts and for animated videos.

Rosa Sequen is also an illustrator for MayanToons and also helps prepare illustrations for Social Media posts and for animated videos.

Laura Morales is preparing animated videos in MayanToons style since animated videos are the best way to help school children how to protect the fragile ecosystems and endangered species.

Heidy Alejandra Galindo Setina joined our design team in August 2020. She likes photography, drawing, painting, and design.

Maria José Rabanales she is part of the team for editing photographic reports and educational material of Flora and Fauna since September 2020. She works together with others of the team to prepare the finished pdf editions of the material of the Yaxha, Nakum and Naranjo Project.

Alejandra Valenzuela, biology student is now part of Flora y Fauna's photographic report and educational material editing team since September 2020.

Alexander Gudiel designer who joined the editorial design team on December 2020. He will combine the text, pictures and maps into the FLAAR Mesoamerica editorial criteria.

Cristina Ríos designer student who join the editorial design team on December 2020. She will combine the text, pictures and maps into the FLAAR Mesoamerica editorial criteria.

Carlos Marroquín is a USAC graphic design student who volunteered to do his professional practice with the Editorial Design Team. We are very grateful with people like him who join our team and bring his knowledge and work.

Sergio Jerez prepares the bibliography for each subject and downloads pertinent research material for our e-library on flora and fauna. All of us use both these downloads plus our in-house library on flora and fauna of Mesoamerica (Mexico through Guatemala into Costa Rica).

Permissions

Any school, college, university, botanical garden, zoological garden, botanical or zoological association (or club) may post this report on their web sites, (at no cost) as long as they link back to one of our web sites: either www.maya-ethnobotany.org or www.maya-ethnozoology.org or www.maya-archaeology.org or www.digital-photography.org or www.FLAAR-Mesoamerica.org.

FLAAR (in USA) and FLAAR Mesoamerica (in Guatemala) are both non-profit research and educational institutes, so there is no fee. And you do not need to write and ask permission; but we do appreciate when you include a link back to one of our sites.

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CECON, CONAP, FUNDAECO, INGUAT, ARCAS, IDAEH, Municipio de Livingston, etc. are welcome to publish our reports, at no cost.

All national parks, nature reserves, and comparable are welcome to have and use our reports at no cost.

USAC, UVG, URL, and other Guatemalan universities and high schools, and schools, are welcome to post our reports, at no cost.

If You Wish Our Flora and/or Fauna Material as a Powerpoint Presentation

Dr Nicholas (Hellmuth) is flown all around the world to lecture. He has spoken in Holland, Belgium, Germany, Austria, Greece, Italy, Serbia, Croatia, Bosnia, Russia, UK, Dubai, Abu Dhabi, Thailand, Korea, China, Japan, Canada, USA, Mexico, Panama, Guatemala, etc. He can lecture in Spanish, German, or English (or simultaneously translated to your language). He has lectured at Harvard, Yale, Princeton, UCLA, Berkeley and dozens of other universities, colleges, museums, alumni clubs, etc.

He also writes cartoon books on plants and animals of Guatemala so gives presentations to primary school, high schools, etc. www.MayanToons.org shows our educational material for children.

In today's COVID era, we present via ZOOM, Google Meet or comparable platforms. This way there are no costs for airfare, airport shuttle, hotel, or meals. But it is appreciated when a donation can be provided before the lecture presentation to assist our decades of research.

FLAAR MESOAMÉRICA

FLAAR

If Your Club, Association, Institute, Botanical Garden, Zoo, Park, University, etc Wishes High-Resolution Photos for an Exhibit in your Facility Anywhere in the World

The Missouri Botanical Garden (MOBOT) has had two exhibits of the FLAAR Mesoamerica photos on Neotropical flowering plants of Guatemala. Photos by the FLAAR team have also been exhibited at Photokina in Germany and in Austria, Guatemala, and elsewhere. For use of these photos in a book or exhibit, naturally we need to discuss how to share the costs. We have material for entire exhibits on:

- Orchids of Guatemala (including aquatic orchids),
- Dye colorants from Mushrooms and Lichens of Guatemala,
- Bromeliads of Guatemala,
- Trees of Guatemala,
- Treetop Ecosystems of Guatemala (includes arboreal flowering cacti, bromeliads, and orchids),
- Cacao Cocoa Chocolate and their Maya and Aztec Flavorings.

We naturally appreciate a contribution to help cover the costs our office expenses for all the cataloging, processing, and organization of the photos and the field trip data.

TO PUBLISH PHOTOGRAPHS

Hellmuth's photographs have been published by National Geographic, by Hasselblad Magazine, and used as front covers on books on Mayan topics around the world. His photos of cacao (cocoa) are in books on chocolate of the Maya and Aztec both by Dr Michael Coe (all three of editions) and another book on chocolate by Japanese specialist in Mayan languages and culture, Dr Yasugi. We naturally appreciate a contribution to help cover the costs our office expenses for all the cataloging, processing, and organization of the photos and the field trip data.

FOR YOUR SOCIAL MEDIA

You can post any of the FLAAR Mesoamerica PDFs about the Municipio of Livingston on your Social Media sites; you can send any of these PDFs to your friends and colleagues and family: no cost, no permission needed.

We hope to attract the attention of professors, botanical garden clubs, orchid and bromeliad societies, students, tourists, experts, explorers, photographers and nature lovers who want to get closer, to marvel at the species of flowering plants, mushrooms and lichen that FLAAR Mesoamerica finds during each field trip each month.

BACK COVER PHOTOGRAPH:
Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Sep. 8, 2018. Yaxha, Plaza C or Lincoln Sacbe.
Camera: Nikon D810. Lens: Nikon AF-S NIKKOR 600mm FL ED VR. Settings: 1/40 sec; f/10; ISO 3,200.

Other Publications of the Fauna of Guatemala

Were domesticated insects part of Maya civilization?
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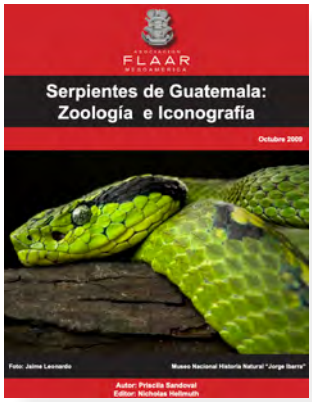

Serpientes de Guatemala: Zoología e Iconografía
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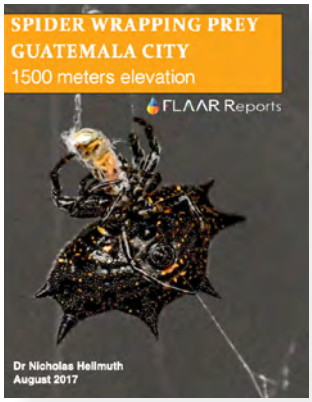

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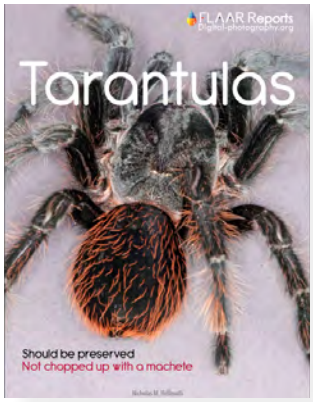

Tarantulas
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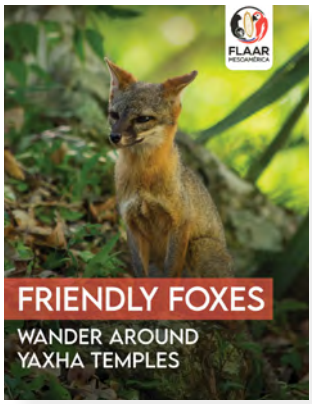

Friendly Foxes Wander Around Yaxha Temples
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Honey Bees
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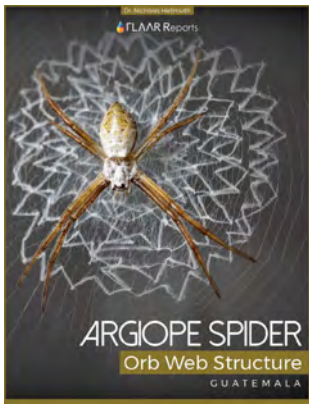

Argiope Spider Orb Web Structure
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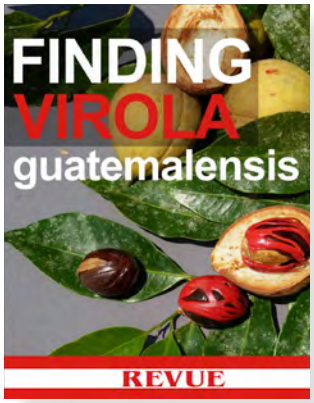

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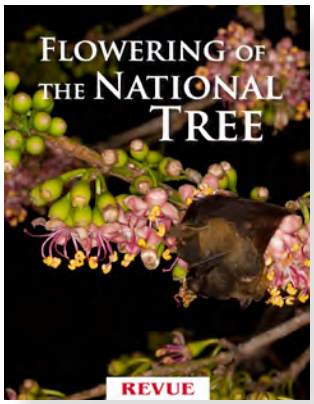

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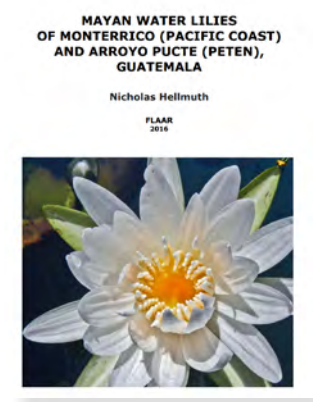

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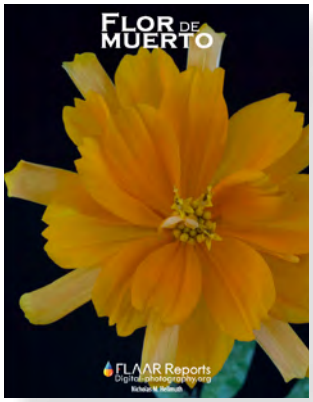

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