Bucutz
Cassia grandis

Helpful Medicinal Plant Native
to the Mayan Biosphere Reserve (RBM)

Parque Nacional Tikal
Reserva de la Biósfera Maya (RBM)
Petén, Guatemala

Nicholas Hellmuth
April. 2023

FLAAR MESOAMÉRICA

FLAAR

INITIATION AND COORDINATION OF THE CONAP PROJECT OF COOPERATION FOR 2021–2025

- **Licda. Merle Fernández** - CONAP
- **Marla Mercedes Bolvito Jerónimo** Unidad de Cooperación Nacional e Internacional de la Secretaría Ejecutiva de CONAP
- **Licda. Ana Luisa De León N.** Directora de Educación para el Desarrollo Sostenible, CONAP
- **Lic. Apolinario Córdova** - CONAP Petén
  Ing. Jorge Mario Vázquez - CONAP Santa Elena, Petén

COMMUNICATIONS WITH PANAT DURING MID-2022

- **Cristel Pineda,** Unidad de Relaciones Comunitarias, PANAT

DISCUSSION ON ASPECTS OF PANAT WHERE FLAAR CAN ASSIST THE TIKAL PARK ADMINISTRATORS

- **Ing. Dimas Pérez Rivera,** Sub-Administrador, Parque Nacional Tikal

ASSISTANCE FOR KNOWLEDGE OF PLANTS, ANIMALS AND ECOSYSTEMS OF PANAT

- Gelber Aldana
- Esdras García
- Luis Lobos

FLORA AND FAUNA IN PNYNN IDETIFIER AND EQUIPMENT PORTER

- **Teco (Moises Daniel Perez Diaz),** FLAAR Mesoamerica

FOR PROVIDING STORAGE SPACE FOR OUR CAMPING EQUIPMENT AND OTHER SUPPLIES

- **Ing. Sergio Balam** - Jefe de Manejo Forestal, CONAP PETÉN

- **FRONT COVER PHOTOGRAPH**

  Photo by: Nicholas Hellmuth, FLAAR Mesoamerica. Apr. 3, 2022. Camera: iPhone 13 Pro Max.

Hotel Tikal Inn

We thank Roxana Ortiz for offering to provide lodging for our research team at the Tikal Inn for our field trips in October 2022 and January 2023. Since we are not receiving payments for our field work, our budget appreciates complimentary lodging. 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 Tikal. 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 functional Internet is available at the Hotel Tikal Inn.

Contact info:
- **Book by Phone: (502) 7861 2444 or (502) 7861 2445**
- **Book by email: Email: tikalinn@gmail.com**
- **Website: www.TikalInn.com**

CREDITS

AUTHOR
- Nicholas Hellmuth

COMPILATION OF BASIC DATA FROM EARLIER BOTANISTS
- Nicholas Hellmuth

PLANT IDENTIFICATION (GENUS SPECIES)
- Nicholas Hellmuth

BIBLIOGRAPHY TEAM
- Nicholas Hellmuth
- Estefani Serrano (2017)
- Maria José Toralla (2022)
- Roberto Enrique Aguiar Siguil (2023)

BIBLIOGRAPHY TEAM
- Alejandra Valenzuela

PHOTOGRAPHERS
- Nicholas Hellmuth

PHOTOGRAPHY ASSISTANT
- Norma Cho Cu

GPS MAPS DURING THE MARCH 2023 FIELD TRIP
- Byron Pacay

MANAGER OF DESIGN AND LAYOUT
- Andrea Sánchez Díaz

LAYOUT OF THIS ENGLISH EDITION
- Jaqueline González

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Introduction to helpful medicinal plant *Cassia grandis* of Guatemala

While driving through Petén, especially Uaxactun, and hiking through PANAT, we saw dozens of Cassia grandis trees in full bloom the last days of March 2023. Since the long thick seed pods and other parts of this tree have well documented medicinal value, and since this tree is one of the more beautiful trees of the Maya Lowlands when in flower, we realized the Cassia grandis tree deserved a FLAAR Report.

Our 2021-2025 project with CONAP includes coordination and cooperation. So when Mario Vásquez, CONAP co-administrator of PNYNN (Parque Yaxha Nakum and Naranjo), mentioned that documentation of which plants had medicinal attributes would be helpful, we are finding and documenting medicinal plants of the RBM (Reserva de la Biosfera Maya). Therefore. the medicinal aspects of the *Cassia grandis* tree are the focus of the present FLAAR Report.

My Personal Experience with *Cassia grandis*

In past decades we noticed that *Cassia grandis* was blooming all along the Arroyo Petexbatún, from Sayaxché to the lake Petexbatún. More *Cassia grandis* trees were blooming along the highway from Sayaxché towards Santa Elena and Flores, and along the highway from there towards Poptun. This was the first day of April and the trees were in full bloom.

Our close-up photos of the flowers were taken about two years earlier, also along the Arroyo Petexbatún. We always stay at Hotel Ecológico Posada Caribe, since Julian Mariona and his family provide excellent service, healthy meals, , and his decades of knowledge about the plants, animals and archaeological sites. We first traveled with Julian and his father over 40 years ago.

Blooming times of many trees may vary year by year, and may vary by the eco-system, so you have to check every year.

On March 28, 2022 during our expedition in the Reserva de la Biósfera Maya (RBM), we found many Bucutz (*Cassia grandis)* trees blooming. Mainly on the road from the center of San Andrés to Cruce Dos Aguadas, where we begin to enter the RBM. It was an incredible surprise to find these, as we are always interested in documenting the flowering stage of useful plants like this to show the different phases of their development.

During our visits to different municipalities in Guatemala in the past decades, we have confirmed the use of this tree as a flavoring agent. A local person from Petén shared with us his experience with the edible use of the tree: "The pods are edible and when they mature they turn black, measuring between 50-60cm. These pods have several cells that contain seeds much like those of a watermelon. It gives off a bittersweet honey, whose smell is not very pleasant, but the taste is".

The flowers are pinkish in color and grow in pendant clusters of 15 or more flowers. The trees are so full of these vertical flower clusters that rarely do you see an individual flower.

Plant Family, full Accepted Botanical Name and Synonyms for *Cassia grandis*

The accepted name is *Cassia grandis* L.f. (literally, capital L and small f according to **Click here to read more**. Its synonyms are:

- *Bactyrilobium grande* Hornem.
- Bactyrilobium molle Schrad.
- *Cassia brasiliana* Lam.
- *Cassia brasiliana* var. tomentosa Miq.
- *Cassia brasiliensis* Buc'hoz
- *Cassia mollis* Vahl
- *Cassia pachycarpa* de Wit
- *Cathartocarpus brasilianus* Jacq.
- *Cathartocarpus erubescens* Ham.
- *Cathartocarpus grandis* Pers.

Plant family: FABACEAE, Subfamily: Caesalpinioideae

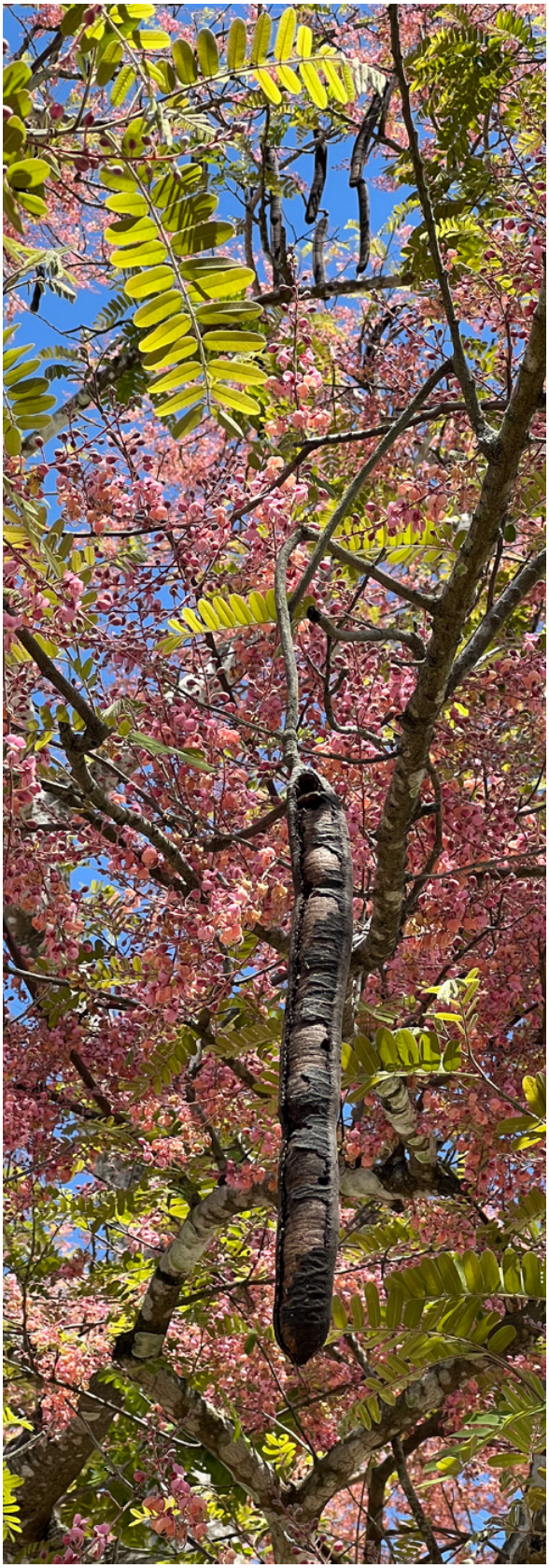

Photo by: Nicholas Hellmuth, FLAAR Messoamerica. Apr, 03. 2022

Camera: iPhone 13 Pro Max.

Habit for *Cassia grandis*

Tree. Healthy size, but not a giant. Medium sized.

Local Common Names for *Cassia grandis* in the Maya Lowlands

Guatemala: Bucut, Caragüe, Carao, Mucut (Cordero, J. and Boshier, H. 2003: 439).

Belize: bu-kèt, bookut, bu-kut, bu-kút, carao, stinking toe (Balick, Nee and Atha 2000: 86).

This tree is relatively tall, but the trunk and limbs aren't very thick. Not many epiphytes on the limbs or branches.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica. Apr. 3, 2022.
Camera: iPhone 13 Pro Max.

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Camera: iPhone 13 Pro Max.

Mayan Language Names
for *Cassia grandis*

Every important plant deserves to have an experienced linguistic accomplish library research (and in-person field work research) to learn the names in all languages from where this tree grows and/or is used. If funding becomes available, we could cover more of the linguistic aspects, but as a starter we have the basic info here.

Bucut is the most common spelling (can also be Bukut).

Baqut, Q'eqchi', (Grandia 2006:190).

Bocot (Lundell 1937:169), "La Libertad… At Chiche there is a grove of this species beside the aguada." But Lundell is himself not consistent! He also spells the tree name Bukut (1937:62).

Bokut (Balam Jungle Estate, Belize, Table 15). Spelled same way in other Belize reports.

Bukte (Kermath, Bennett, and Pulsipher 2018: 243). This would be written by a linguist or Mayanist as Buk te', or (in other Mayan languages) Buk che', tree of buk. However, the name of Cassia grandis is almost never spelled Bukte or Bukte' in any Mesoamerican report I have yet read. The Kermath et al. book is not by a Mesoamericanist. If Atran's translation of b'ukut' (given below) is correct (which I assume it is), then bukte' is not as likely the correct spelling; unless buk means penis (as the tree has no breast-like features but the seed pod could get some people excited as a phallic replacement).

Bukut, Q'eqchi' (Zarger 2002:241).

B'ukut', since Atran works with the Peten Itza people, need to check if this word is Peten Itza (a variant from Yucatec Maya) or is Q'eqchi' Mayan, or whether the same word is used in both languages. Atran says the locals call it "beast penis," because of shape and size of the legume (Atran et al. 2004:26). I can perhaps understand the seed pod being rather phallic, but I don't (yet) understand the concept of breast related to the pod or flower or tree or seed. Best would be to ask local speaks of Itza or Yucatec or Q'eqchi' Mayan languages.

The international standard seems to be Bucut, or Carao. I prefer Bucut (or spelled Bukut) since this is a Maya term.

Cassia grandis is not listed in the 1972 PhD dissertation of Michael Wilson on K'ekchi' ethnobotany, in part because his work was at a higher altitude where this tree may not be common. *Cassia* is not in the monograph by Petra Maass on Q'eqchi communities in Guatemala either.

Cassia grandis described in Trees and Shrubs of Mexico (Standley 1922)

12. ***Cassia grandis*** L. f. Suppl. Pl. 230. 1791.
Collected at Acapulco, but perhaps only cultivated; reported from Tabasco. Central America, West Indies, and South America.

Tree, 4 to 10 meters high or larger; leaflets large, oblong, 10 to 20 pairs, pubescent; flowers large and showy, racemose, white or pink ; fruit 45 to 60 cm. long, about 3.5 cm. in diameter. " cañafístula grande " (Tabasco); " cañafístula " (Guerrero); "carao" (Costa Rica, Nicaragua, El Salvador); "sandal" (Costa Rica); "carao" (El Salvador, Honduras); "cañafístula gruesa," "canandonga" (Colombia); "caramano" (Nicaragua); "cañafístula cimarrona" (Puerto Rico).

The fruit is filled with a bitter pulp, which has laxative properties and is used in the treatment of fevers.

It is probably this species which has been reported frequently from Mexicoas *C. fistula* L. The writer has seen no Mexican specimens of the latter, although it may occur in Mexico, at least in cultivation. The following Mexican names names are reported for *C. fistula*: "Cañafístula," "quauhayohuachtli," "quauhuayo." It has been reported from Oaxaca, Campeche, Morelos, and Veracruz.

(Standley 1922:405).

Cassia grandis described in Flora of Yucatan (Standley 1930)

Standley lists 18 species of the Genus Cassia (1930: 285-288) but not Cassia grandis nor any synonym. This is very unexpected since surely this tree is present in Yucatán.

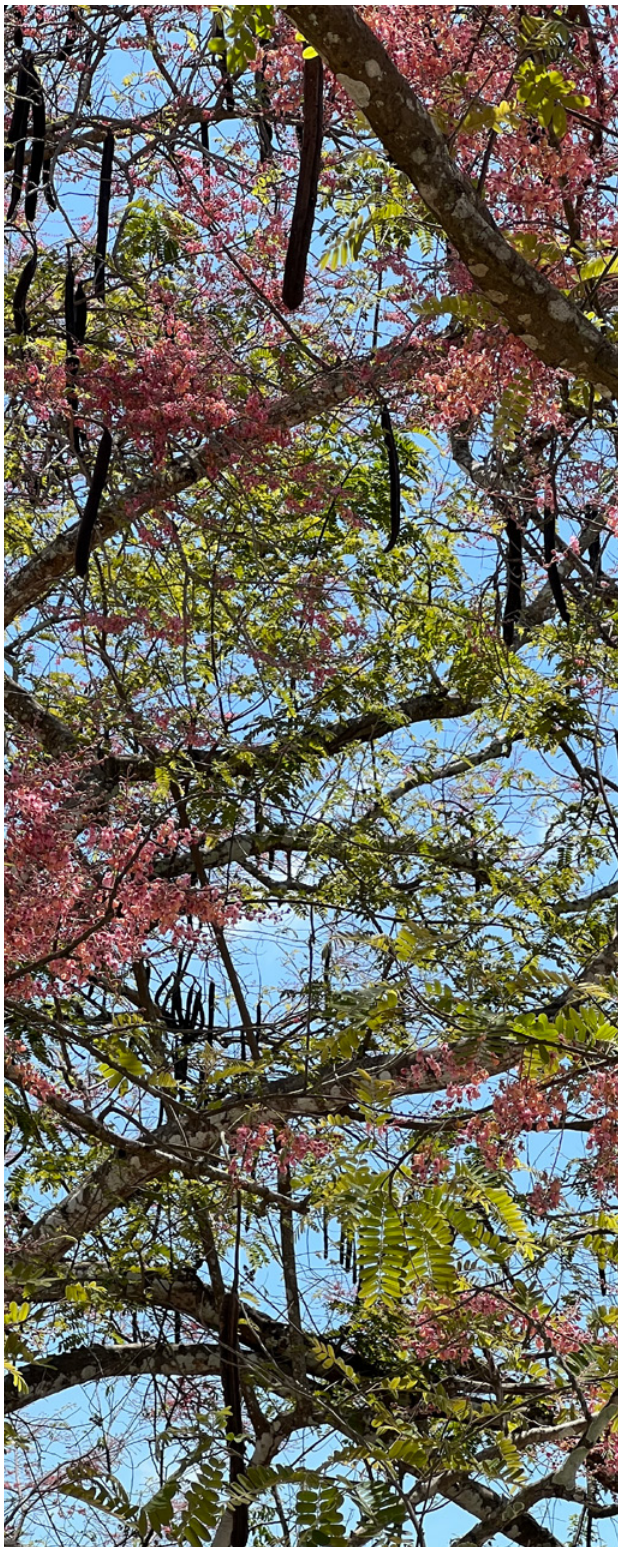

Photo by: Nicholas Hellmuth,
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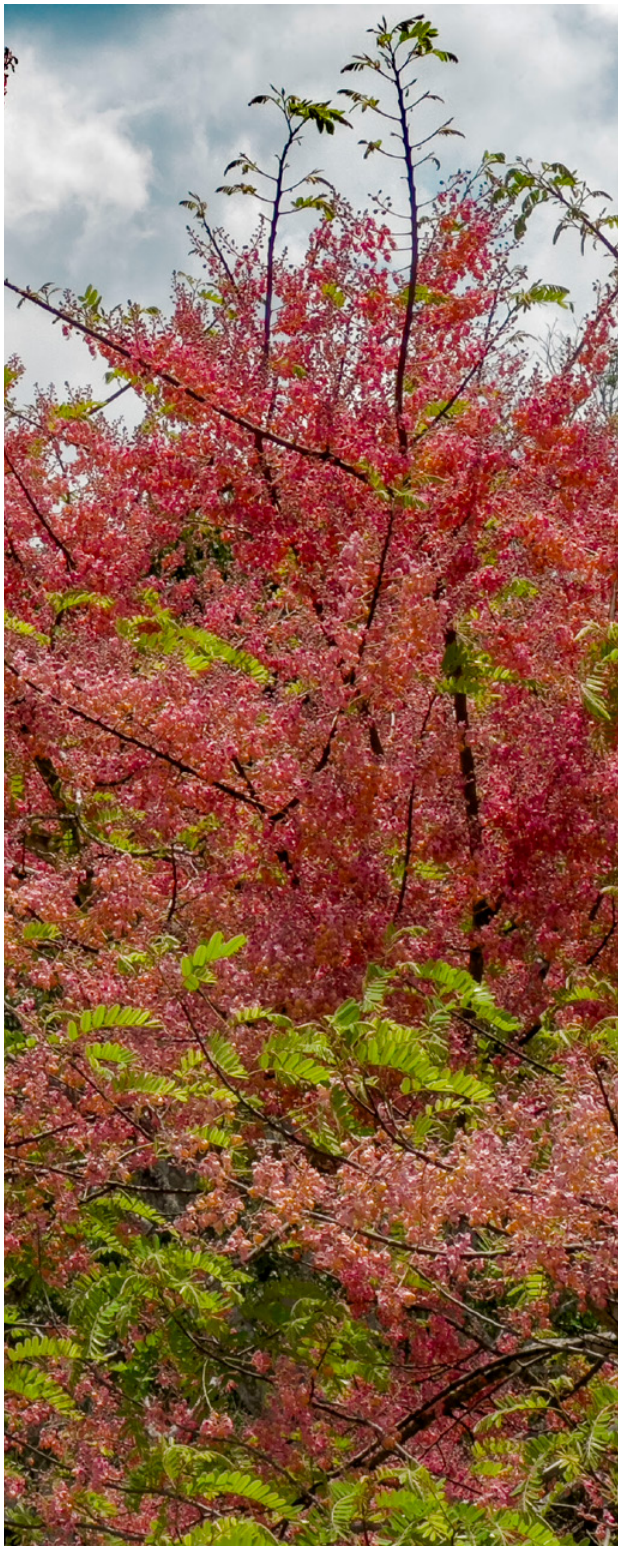
Camera: iPhone 13 Pro Max.



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FLAAR Messoamerica. Mar, 30. 2023
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Where is *Cassia grandis* found in Mexico?

Cassia grandis L. f. **CAM**, **CHIS**, COL, GRO, MEX, MICH, OAX, **QROO**, **TAB**, VER, **YUC**

(Villaseñor 2016: 738)

So *Cassia grandis* is found all the way around Peten and adjacent to northern Belize: Chiapas, Tabasco, Campeche, Quintana Roo (and Yucatan also).

***Cassia grandis* described in Forests and Flora of** British Honduras (Standley 1936)

Standley and Record list 22 species of *Cassia* genus (174-176) and finally include *Cassia grandis*:

> ***Cassia grandis*** L. Stinking Toe, Bookoot, Bookut, Beef-feed. Carao (Honduras). A large tree with spreading crown, often 12 meters high or more; leaflets numerous, oblong, 3-5 cm. long, densely hairy beneath; flowers large, in long racemes; pods 45-60 cm. long and 3.5 cm. thick, filled with dark pulp and large seeds. The pulp has laxative properties and is much used in domestic medicine. The tree is a remarkably beautiful one in flower, the color and appearance of the blossoms reminding one of apple trees. Wood brownish yellow, rather hard and heavy, coarse-textured, not durable; not utilized.

(Standley and Record 1936: 175).

Cassia grandis described in Flora of Guatemala (Standley and Steyermark 1936)

Ten years later, Standley and Steyermark list about 51 species of *Cassia* for Guatemala (1946: 109-132). Nowadays many of these are synonyms. By 1936 Standley and Steyermark have more documentation:

> ***Cassia grandis*** L. f. Suppl. PL 230. 1781. Caragua; Bucut, Bocot (Peten, Maya, fide Lundell); cañafístula (Peten); Mucut (Peten, Maya); Carao.
>
> Open, brushy or forested hillsides or on thinly forested plains, often about dwellings or along roadsides and in pastures, 900 meters or less; Peten; Jutiapa; Santa Rosa; Escuintla; Suchitepequez; Retalhuleu; probably in all the Pacific coast departments as well as elsewhere in the Oriente. Southern Mexico; British Honduras to Salvador and Panama; West Indies; northern South America.
>
> A large tree, sometimes 30 meters high or more, the crown rounded or spreading, the trunk sometimes a meter in diameter, the bark chocolate-brown, scaly, the young branchlets densely pilosulous; stipules very small, linear, deciduous; leaves short-petiolate, eglandular; leaflets 8-20 pairs, oblong, short-petiolulate, 3-5 cm. long, rounded or very obtuse at each end, lustrous above, puberulent or glabrate, paler beneath and puberulent; flowers pink or white, racemose, usually appearing when the tree is leafless or nearly so, the racemes 10-20 cm. long, the flowers slender-pedicellate; sepals broad, 6-8 mm. long, rounded at the apex, whitish-tomentulose; petals 1 cm. long, glabrous; stamens 10, the anthers of the 3 lower stamens longer than the others; legume ligneous, terete, blackish, indehiscent, 30-80 cm. long, 2-2.5 cm. thick, septate within; seeds transverse, compressed.
>
> Known in British Honduras as "stinking-toe" and "beef-feed." The wood is brownish yellow, rather hard and heavy, coarse-textured; not durable. It is utilized for fuel and minor construction purposes. When in flower, this is one of the handsome trees of Central America, especially along the Pacific lowlands, reminding one of apple trees, by both the form of the tree and the coloring of the blossoms. The ashes of the wood are employed in soap-making. The pulp of the pods is edible but has purgative properties. An ointment made from lard and the crushed leaves is employed commonly in treating cutaneous diseases, especially mange and other skin affections in dogs. It is probably this species that -has been reported from Peten as *C. moschata* HBK., a species that apparently does not extend to northern Central America.

(Standley and Steyermark 1946: 115)

That's a lotta large seed pods. And this is only one part of one *Cassia grandis* tree. During late March and early April, you can see hundreds of these trees (one or two every several kilometers) when driving through Peten and adjacent areas of the Maya Lowlands.

This tree is along the road from Flores/Santa Elena towards Sacpuy, during our field trip April 3, 2022. Photo by Nicholas Hellmuth with iPhone 13 Pro Max.

Relatives of *Cassia grandis*

According to Janzen (1971), *C. grandis* is often confused with *C. fistula*, but *C. fistula* has yellow flowers and a thinner pod than *C. grandis*. *Cassia fistula* is also in full bloom the same month as *C. grandis*, and often in many of the same areas. Nevertheless, *Cassia fistula* is native to India and nearby Southeast Asia (present in gardens and escaped from gardens into fields and forests) but was not available to the Classic Maya.

In distinction, *Cassia moschata* is native but rarely noticed and rarely published. At least we know it exists in Guatemala. Neotropical Flora database shows it listed for La Libertad and vicinity.

Cassia moschata H.B.K. — **Ref:** Irwin & Barneby, 1982: 33. — **Reg Use:** MED. — **Nv:** female cañafistula. — **Habit:** Tree.

(Balick, Nee and Atha 2000: 86).

- *Cassia moschata* is a bronze shower tree (orange bronze color), native to Mesoamerica, medicinal
- *Cassia grandis* is a pink shower tree. Native to Guatemala and common in Peten and nearby.
- *Cassia fistula* is a golden shower tree (actually bright yellow); native to India

There is a need for research on this topic, both to know which species are phylogenetic relatives of *Cassia grandis* and to investigate which plants are related ecologically.

Photo by: Nicholas Hellmuth, FLAAR Messoamerica. Mar, 30. 2023.
Camera: iPhone 14 Pro Max.

Where do *Cassia grandis* trees grow?

When driving along the highway in Peten you see *Cassia grandis* trees every several miles, often in what are flat areas. For Tikal, Schulze and Whitacre provide much more detailed information:

> Common species shared by True Swamp and Mesic Bajo are *Lonchocarpus guatemalensis, Pithecellobium belizensis*, and *Casearia corymbosa*. In addition to these species, the following wet-tolerant species were found at Tikal only in True Swamp: *Inga edulis, Pachira aquatica*, and *Cassia grandis*. In some regions of these swamps the terrestrial bromeliad *Aechmea* sp. forms a dense ground cover and gives a distinctive appearance to the swamp.

(Schulze and Whitacre 1999: 203).

I have seen thousands of *Pachira aquatica* trees along the edges of swamps and rivers, lagoons and lakes. But so far, I have not noticed many *Cassia grandis* along a river, other than the ones we photographed over a decade ago upstream from a tributary of Río la Pasión. I would say 99% of the *Cassia grandis* trees that I have seen are nowhere near permanent water (though some flat areas may be seasonally inundated).

That said, Schulze and Whitacre seem to have seen a lot of *Cassia grandis* trees in swamp areas:

> Figure 33. Representative distribution plots for Type 9 (…):
> "Swamp Obligates" - Species which occur virtually only in areas subject to high seasonal waterlogging of soils, but not excessive drought conditions in dry season. These conditions occur along arroyos (seasonal streams), swampy depressions in othewise upland areas, and at the very bottom of the topographic gradient, below the Scrub Swamps, where surface water may be present throughout the year. Some of these species occur sporadically in Sabal forest but can't be considered a regular component of this forest. The majority of these species are also characteristic of riparian forests in other parts of Peten and Belize. Species: *Pachira aquatica, Inga edulis, Pithecellobium belizensis, Lonchocarpus guatemalensis, Casearia corymbosa, Cassia grandis, Chamaedorea* sp.4, *Calyptranthes chytriculia, Sapium nitidum, Zanthoxylum caribaeum* and "*bamboo* sp".

(ibid.: caption for Figure 33, page 290).

I estimate that the "Bamboo sp" is *Guadua longifolia*, the common wild native bamboo that is along the Río Holmul, Arroyo Petexbatún and many other rivers in Petén and Izabal.

Cassia grandis trees are listed for Yaxhá (Plan Maestro 2006-2010, CONAP 2006: 146).

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica. Apr. 3, 2022.
Camera: iPhone 13 Pro Max.

To learn where a specific Tree grows, be sure to look in *The Vegetation of Peten* by ethnobotanist Cyrus Lundell

Lundell hiked many kilometers across areas of Petén over decades (1930's onwards). Plus, he had the help of knowledgeable local Mayan-speaking botanical assistants. Although he covered only certain areas of Petén and adjacent Campeche, where he did take notes he provides lists of all trees, vines, shrubs, etc. of each ecosystem. I show his documentation of *Cassia grandis* later in this FLAAR Report.

Helpful Medicinal Uses of Parts of the *Cassia grandis* Tree

Cassia grandis has such beautiful flowers (en masse) that the tree is notable for its natural beauty. But this tree also has considerable experience as a medicinal plant.

Gum or resin: The seeds of *C. grandis* are a potential commercial source of gums. Seed gum is a potential binder for the pharmaceutical industry according to the Agroforestry Database 4.0 (Orwa et al. 2009: 3).

Atran has knowledge of the plants of the Petén Itza Maya and also their language. Plus, he had the help of local people that can document the use of pertinent plants. This makes his book a helpful source of information on medicinal use in the Petén Itza Maya area (mostly north side of Lake Petén Itza, but also elsewhere). Here are their comments:

> *Cassia grandis* (Caesa.) (che') k'aax, 'ak'al: edible raw ich; tz'ak u-pach uy-ich when pod falls, put in humid ground 8 days & its "honey" (u-kab'-il) extracted for whooping cough (ix jink'i'), at times given with soup made from head of howler monkey (aj b'aatz' = Allouatta spp.); pod soaked 2 mos. & given at first menses; boil pach for tea to bathe skin rash; si', kot
>
> a legume extract is given to girls who have begun menstruating to foster "strong blood" (muk' u-k'ik'-el)
>
> (Atran et al. 2004:26).

An academic summary is provided on this family website by Ken Fern on Useful Tropical Plants, the citations are hot links to the name of the book. It is rare that a webpage cites sources:

> Medicinal
> The bitter fruit pulp is used as a laxative and purgative similar to C. fistula and reported to be more powerful [303, 348, 739]. Drunk with milk, it is said to fight anaemia and add iron to the blood [510]. The ripe pods and seeds are also used as a laxative [303].
>
> A decoction of the leaves is used as a laxative and in the treatment of lumbago [303].
> The fresh juice of the leaves is used externally in the treatment of ringworm [303].
> An ointment made from lard and the crushed leaves is employed commonly in treating cutaneous diseases, especially mange and other skin affections in dogs [331].

(tropical.theferns.info/viewtropical.php?id=Cassia+grandis).

Thus we highly recommend planting *Cassia grandis* trees around your house in Peten, Alta Verapaz, Izabal and other areas where this tree can thrive.

Cassia grandis **as a** Medicinal Plant also in Belize

Cassia grandis L. —**Loc Use:** MED, FOOD, BEV. — **Reg Use:** MED, ORN, FUEL, PRD, FOOD. — **Nv:** beef-feed, bu-kèt, bookut, bu-kut, bu-kút, carao, stinking toe. — **Habit:** Tree.

(Balick, Nee and Atha 2000: 86).

So *Cassia grandis* can be used for medicine, food, beverage, fuel, to make products, and of course as an ornamental plant in a garden.

Ashes of parts of *Cassia grandis* are used to make soap

Many native Maya plants can be used to make soap. These should be encouraged since doing laundry in the rivers with commercial soap made from manufactured chemicals is causing serious chemical pollution, especially in the Arroyo Pucté, a tributary of the Río de la Pasión. The soap has wiped out most of the water lily plants in this Petén area river.

You can also make a living fence from *Cassia grandis*

Several references, including the "Plants for a future" website and the Echo Technical Note Report on living fences (Franklin & Martin 1991: 11), mention *Cassia grandis* as a useful species to make living fences. One of the advantages mentioned about having this tree as a living fence is that in a short period of time this species grows enough to be used for this purpose. Also, its beautiful flowers decorate the fence in blooming season, and its leaves and pods can be used as cattle feed or forage for other smaller species that wonder by. Finally, leguminous trees (like *Cassia grandis*) are an important source of nitrogen for the soil, which otherwise is difficult to obtain.

However, the comprehensive article (Universidad del Valle) on the many plants and trees for living fences in Guatemala does not list any Cassia species (Anzuelo and MacVean 2000).

Likewise, an article on living fence species by Zahawi (2005) focuses on the five most common and obvious species of trees (*Erythrina berteroana, Erythrina fusca, Jatropha curcas, G. sepium*, and *B. simaruba*). The Anzuelo and MacVean article lists these plus almost a dozen more (since they include more than trees).

Living fences need more encouragement, since they provide food for birds, insects and animals. Some species may also be trimmed periodically and used as firewood or charcoal (in the case of *Cassia grandis* the ashes can also become soap). Many also provide flowers that make the otherwise ugly haciendas or fincas less destructive looking. Most importantly, a living fence means that you don't have to cut down "palo de tinto" or "palo de Campeche" for long-lasting fence posts, which is both illegal and destroys the riverside eco-systems. If taken care of, a living fence can be even more durable than a fence made of wood.

Dried pod of *Cassia grandis* can be used as a musical instrument

Atran says (for the Petén) that the dried pod can be scraped and used as a musical instrument (Atran et al. 2004:26). But he does not indicate how it is played, and whether by children or adults. However, his mention is a good tip for more research.

When does *Cassia grandis* flower and fruit?

As we noticed during our March 2023 field trip, March is a great time to see Cassia grandis in full flowering. We see it mostly in Peten, both throughout the Reserva de la Biosfera Maya (RBM) and southern Petén. Normally the trees are out in fields and forests but often have been planted around houses.

According to Velasco et al. (2010), the flowering stage occurs from February to May, and pod maturation lasts 18 weeks. These pods are long, reddish, brown or usually black, up to 75 cm long, being one of the largest among the species of its family. The length of these pods (I call them "the length and width of a machete) and their usually black color is what helps you identify this tree. But once you are close to a tree or have the pods in your hand, you notice they are oval in cross-section. They need a year to mature and do not open on their own. (Cordero and Boshier 2003: 442).

Road from Flores/San Benito towards Sacpuy, Peten.
Photo by Nicholas Hellmuth, iPhone 13 Pro Max, April 3, 2022.

Pertinent Information that has not been followed up:
Lundell observes that *Cassia grandis* is mostly around ruins

Several Mayanists have noticed that some tree species today grow more around Maya ruins than out in isolated areas where there were no artificial mounds built up over centuries by the Classic Maya.

Lundell worked with archaeologists of the Carnegie Institution of Washington for years. Also, Lundell was a botanist for chicle exploitation in the El Petén-Campeche area, the Maya Lowlands heartland. Therefore, he knew all the eco-systems and most of the tree species. Ironically, though he worked with the leading chicle company of that time, he seems to have focused on La Libertad, Petén. Perhaps because in the 1930's this was the last settlement before the wilder areas with few or no roads. There is no chicle anywhere near La Libertad, since most of this area is savanna around dome-shaped karst hills.

Some decades earlier, Teobert Maler in the 1880's or 1890's also used La Libertad as his "office", before going into really remote areas of the Mexican-Guatemala border.

Today there is a paved highway linking Flores and Lake Petén Itza through La Libertad to Sayaxché; another highway from La Libertad to Naranjo in route towards Mexico (Río de San Pedro Mártir). So, La Libertad is no longer the headquarters for much, although there was a large Taiwan papaya company outside. Plus, the main petroleum processing plant in Guatemala is also between La Libertad and Sayaxché.

Cassia grandis is not included in the "Manual de los arboles de Tikal by Felipe Lanza" (his 1996 book has less than 30 trees), so it would be worthwhile checking for sure whether or not it was present at Tikal or Yaxhá. However, both those areas are limestone hills, not the flatter land where I see most of the trees along the river and along highways.

Since Lundell observes that the Cassia fistula is mostly around ruins, this would suggest you should look around Tikal and Yaxhá and other ruins. The reason that some trees are around ruins is because they are remnants of what the Classic Maya were growing. However some tree species may like the disturbed remains that resulted from two-thousand years of the Maya changing the original hills and lands (mining stone, doing intensive agriculture, piling up material to build artificial hills on which to put their houses, temples, or palaces).

> *Cassia grandis* L. F. Bukut, cañafistula. Tikal, Bartlett 12641. A tree 60 cm. in diameter and reaching a height of 18 meters; common around aguadas in villages and ruins. I have not encountered this species growing wild in the forest except on the sites of old Maya cites.
>
> (Lundell 1937: 62).

> *Cassia grandis* L. f. Bocot. La Libertad, Lundell 2427. A large tree. At Chiche there is a grove of this species beside the aguada.
>
> (Lundell 1937: 169).

Lundell quite specifically states that he has NOT found the *Cassia grandis* growing randomly. And that he has found it ONLY growing around ruins. That said, Lundell lists *Cassia grandis* in "Central Petén Savanna Country" (1937: 107). But I estimate many, if not most of these savannas were utilized by the Classic Maya.

Since we do no clearing of undergrowth, and since we are not doing any survey, we ourselves are not able to answer this question of how often is a *Cassia grandis* tree in a house mound area. We see the trees along the highway out of the car window, or on the shores of rivers while we are in a boat. But archaeologists might use the March and April blooming season of *Cassia grandis* to do searches for house mounds, especially in areas far from ceremonial centers where no one has yet done such studies.

There were not many other trees blooming this week other than "mapola" (*Bernoullia flammea,* which blooms all around the Central Acropolis, around Plaza of the Seven Temples, the Lost World Pyramid and elsewhere in Tikal). It would be interesting to learn whether the mapola tree also prefers to grow on top of house mounds or other areas built up by the Classic Maya.

Summary and Conclusions

Our First priority is to include this tree in our FLAAR Reports for the CONAP project with FLAAR Mesoamerica to introduce this tree and its potential medicinal uses. Obviously, an individual should consult with a medical doctor first, but folk medicine has been helpful to local people for thousands of years.

Our Second priority is to make available a good introductory bibliography and list of suggested reading on *Cassia grandis*.

In a future year we will take macro photos of individual cascades and individual flowers. We will also show the mature seed pods so you can better see their size and thick shape. It would also be helpful to open the pods up in different stages so you can see the pulp and the seeds.

The Bucutz is a very interesting tree with many uses, it is important to continue research on its properties as well as encouraging planting around homes. We look forward to continuing further library research and further field trips to provide additional in situ documentation. For example, while doing library research I was pleasantly surprised to learn that you can make a musical instrument from the dried pod of *Cassia* trees! But need to learn whether it is *Cassia grandis* in Mesoamerica or *Cassia fistula* in India. I am very interested in musical instruments of the Classic Maya after discussing with Dr Igor Sarmientos all the potential for recreating Classic Maya music. He came to have lunch with us to see my reconstruction of the turtle "marimba" that is shown in drawings of Tikal Burial 10.

The tree is almost solid flowers when flowering. The flowering branches and twigs tend to have mostly flowers and no leaves. The leaves seem to be elsewhere. This aspect is not something easy to notice in an herbarium drawer, neither is it mentioned by Standley and Steyermark.

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One photo shows the typical mass of pink flowers. But when I opened this page again I saw a closer view of the flower mass, and a separate photo of a dozenof the oval pods.

www.cabi.org/isc/datasheet/11439
Description, distribution tables, pictures and general information

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Description and pictures

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Characteristics and uses

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Information and pictures

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Description, distribution and ethnobotany

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Botanical description

https://tropical.theferns.info/viewtropical.php?id=C
Reliable and trustworthy information because lists citations for every aspect.

Videos

There are dozens, scores of videos on *Cassia grandis*. I list a few samples to get you started. Best is if you come down to Guatemala and experience these trees and giant machete-length seed pods with your family and friends.

https://www.youtube.com/watch?v=1PzXqCzs158
Trees In Bloom, *Cassia Grandis, Cassia Rosa* Decorative plants, 1:13. Great to see the wind blowing the leaves and masses of flowers.

https://www.youtube.com/watch?v=n4qyqIknbRA
La Espectacular floración del Carao o Sandal (*Cassia grandis*), 5:15

https://www.youtube.com/watch?v=A3gLzevy_LA
Only 28 seconds but nice close-up (vertical format).

https://www.youtube.com/watch?v=yGRLrEOc
Los Cañafístolos (*Cassia moschata* Kunth y *Cassia grandis* L.f), 6:44. Shows both species. And in dry area (not along edge of a river).

https://www.youtube.com/watch?v=XSMserKa3DU
Rich Fruits In River Trail - dried *Cassia grandis*, 13:21 Shows *Cassia grandis* seed pods along edge of a river.

We appreciate the donation by Juan Manuel Segovia, Lonas Segovia

In the rainy season these waterproof tarps are essential. But even in the dry season it is essential to have a tarpaulin covering the equipment in back the pickup. It protects from dust raised on even paved roads. It protects equipment from fertilizer dropped down from birds flying overhead.

And for camping in remote areas, a tarp is crucial to cover the tent area (since most tents are not as waterproof as a solid, tough tarp from Lonas Segovia, courtesy of Juan Manuel Segovia, **www.LonasSegovia.com.**

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Isabel Rodriguez Paiz is in charge of fundraising and partnership development.

Edwin Solares is a photographer and videographer during our expeditions. Later, he edits this content to be used in our different materials.

Haniel López is a drone pilot and photographer during our expeditions.

Pedro Pablo Ranero with a degree in communication is responsible for editing videos of flora and fauna to create content on our sites.

Andrea Sánchez graphic designer who helps prepare the graphic line of our publications. She is our editorial art director.

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Juan Carlos Hernández is a graphic designer and part of the web team. Receive the material we produce to place on our sites.

María José García is a graphic designer and part of the web team. Receive the material we produce to place on our sites.

Andrés Fernández is a graphic designer and in charge of keeping our websites updated and more efficient for the user.

Karla Cho helps with general research and design assistant in the office.

Luis Molina is a professional illustrator specialized in line drawings of Maya vases, bowls, and plates.

Valeria Áviles is a graphic designer and illustrator. She is in charge of coordinating the activities of MayanToons, as well as making illustrations for the different materials that we prepare**.**

Laura Morales is a digital content engineer, She is in charge of directing the animation area of our MayanToons project.

Paula García is part of our MayanToons animation team. Her job is to bring our favorite characters to life.

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Isabel Trejo is a graphic designer and illustrator for MayanToons and for social media posts.

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Google Maps 2022; Asociación de Comunidades Forestales de Petén - ACOFOP - 2011; Wikimedia Commons 2019

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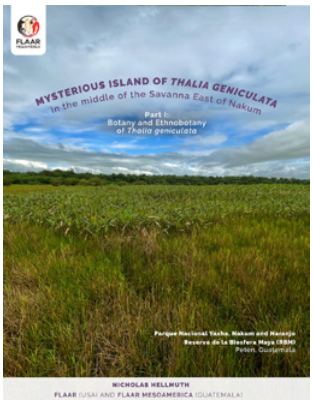

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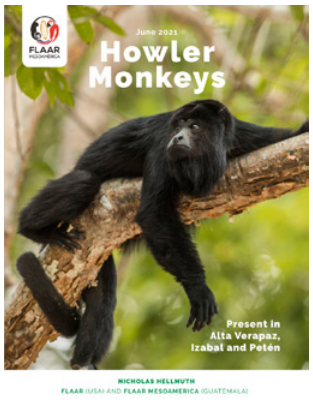

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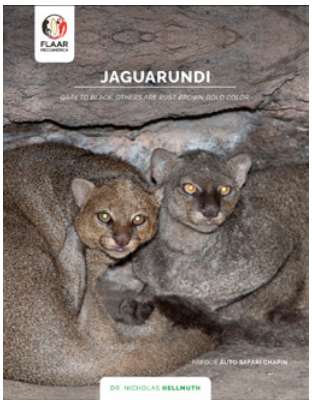

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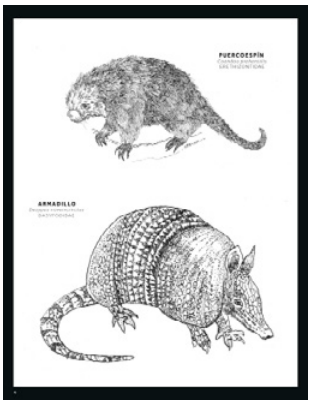

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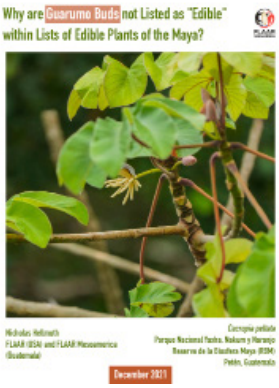

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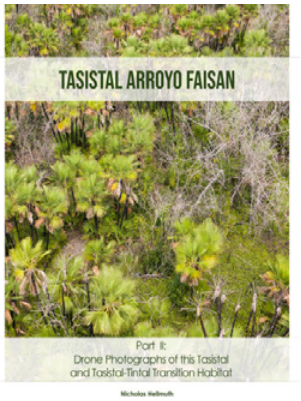

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