



ASOCIACION
FLAAR
MESOAMERICA

Tenth edition, Christmas week
December 2011

Maya Ethnobotany

**Complete Inventory:
fruits, nuts,
root crops,
grains, construction
materials, utilitarian
uses, sacred plants,
sacred flowers**

Guatemala, Mexico, Belize, Honduras

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Introduction

This opus is a progress report on over thirty years of studying plants and agriculture of the present-day Maya with the goal of understanding plant usage by the Classic Maya. As a progress report it still has a long way to go before being finished. But even in its unfinished state, this report provides abundant listings of plants in a useful thematic arrangement. The only other publication that I am familiar with which lists even close to most of the plants utilized by the Maya is in an article by Cyrus Lundell (1938).

- Obviously books on Mayan agriculture should have informative lists of all Maya agricultural crops, but these do not tend to include plants used for house construction.
- There are monumental monographs, such as all the trees of Guatemala (Parker 2008) but they are botanical works, not ethnobotanical, and there is no cross-reference by kind of use. You have to go through over one thousand pages and several thousand tree species to find what you are looking for.
- There are even important monographs on Maya ethnobotany, but they are usually limited to one country, or one theme, often medicinal plants.
- There are even nice monographs on edible plants of Central America (Chízmar 2009), but these do not include every local edible plant, and their focus is not utilitarian plants at all, nor sacred plants. *La flora silvestre de Guatemala*, by Luis Villar Anleu (2008), is another helpful publication, but our goal was to list every category: wild and domesticated, edible and utilitarian, and sacred (even if not eaten or used for construction).

There are plenty of other lists of all Maya whatever else, but for one single resource, which lists all plants: food, construction, sacred flowers, etc; such a list is not widely available (or if available is kept well hidden). The most inspirational list I have found is over seventy years ago, namely that already mentioned, of Cyrus Lundell.

I wrote this entire opus without access to Brücher's 1989. *Useful Plants of Neotropical Origin and Their Wild Relatives*. I found another list after I had finished my work: that of Legner, "*American Plants of Economic Importance*" where he cites Brücher and others. Another list that I found after I finished mine was a "*Crop List of Latin America*." I did not cross-check my list with that of *Plantas Comestibles Centro America* (Chízmar 2009) until I had finished my first and second editions. I found the list plants of the Maya Mountain Research Farm only after I had finished the present second edition. FLAAR is open to cooperation with these other entities and their lists. Just as we credit their work, we appreciate when other lists credit our several decades of work that has produced this second edition update and improvement on our first edition of last month (which was in turn the work of several decades).



After I finished the first two editions I continued to do more research and kept finding more complications of plants. A good example would be the article by Rico-Gray et al. 1991 for Yucatan.. Even though it was only “forest species” it lists about 250 plants. In almost every such list I find one or two plants that was not in my original list. Nonetheless, even my first edition had more useful and edible plants than most of these articles and monographs. But even after I had found severa hundred edible or otherwise utilitarian plants, I still find one or two when I read the work of an experienced specialist. For example, I found at least three plants in the University of Texas course material of Brian Stross that I had not seen listed elsewhere.

But as a work-in-progress I am constantly adding obscure edible or utilitarian plants to my list. But to keep the list within reason, I focus exclusively on the plants related to Maya culture: southern Mexico, Belize, Guatemala, and portions of Honduras and El Salvador.

This present version by FLAAR Reports has only a few illustrations ironically in part because the FLAAR Photo Archive has so many thousands of photos of ethnobotany and ethnozoology that it is time-consuming and expensive for a small research institute to go into this large an archive and pull out photos of each species. In a single 8-day period in early June 2011 we took over 42 GB of photographs (and these are compressed files; the actual total once in TIF format would be more than 80 GB).

Yes, obviously of course the archive should be coded and cataloged: but it has cost thousands of dollars to do the field work to bring in the photographs. It would cost even more to catalog them.

So we have a simple decision: spend money on field work: resulting in a larger and more informative archive; or spend money on cataloging what we have photographed in past years (result is no money for any more field work). Sorry, but I prefer field work, since a capable student or scholar can catalog the archive in the future. But travel in Latin America gets progressively more dangerous. In other words, in the next decade not many people will wish to venture into rural areas to do the needed photography. Plus many of the species will have been bulldozed by commercial companies or burnt by milpa agriculture or for cattle pastures. So the time to do photography of plants out in the field is now, not later.

The list you see below is the work of many years, including my research in the Archivo General de Indias (Sevilla) in 1971, and my ethnohistory work in the Archivo General de Central America (Guatemala City) before then (Hellmuth 1971; 1977). In other words my current publications on Maya ethnobotany are based on research initiated 40 years ago.



The thematic categories that I have selected are based on common sense and are categories that I have found easy to understand as a general practitioner (I rather obviously do not have a university background in biology or botany). My interest in botany comes from living 12 months in Tikal at age 19 (1965); and five seasons at Yaxha, Peten at age 35+ (1970-1975), plus twenty years of field trips through Campeche, Chiapas, Yucatan, Quintana Roo, Tabasco, Belize, and Honduras (1970's-1990's).

I am entirely self-taught in botany, and I appreciate the help of the more experienced Guatemalan biologists who have worked for FLAAR: Eduardo Sacayon for many years; Mirtha Cano for about two years; and presently Priscila Sandoval. It is also helpful to have the publications of the many capable Guatemalan botanists at the universities and government institutes. The publications of Ana Lucrecia MacVean and Elfriede Pöll are good examples.

It would be helpful to compare my themes with how the Maya themselves organize their plant world. This is a job of a linguist. I would expect the Maya to organize things very differently. But in order to do all my research, and to present the findings to an audience worldwide in a manner we can understand, it is more effective to keep the present listings in basic thematic groups. A linguist can in the future do a thesis on how a Mayan language group would classify their plant universe.

Thesis, dissertation research planning

One of many reasons I work on these Maya ethnobotanical listings is to assist and encourage students to do thesis and dissertation work on the plants of the Maya area (before these plants are burned out or bulldozed to extinction). But if you do intend to do a thesis, consider limiting yourself to one topic: fruits and nuts, or basketry, rope, and thread materials, or perhaps construction materials, vegetables, sacred flowers, etc. My mania to list everything is a constant stumbling block to getting things finished.

There are thousands of plants and to cover all this in a single thesis is not realistic. I am crazy for even attempting to list them all. But again, the list that follows are only notes; a progress report. But even in rough form, even unfinished, this PDF represents endless hours at my desk, and out in the Peten rain forests and savannas, as well as field trips throughout other areas of Guatemala, Belize, Mexico, and Honduras.

I first came to Mexico when I was 16; and was first in Guatemala when I was 17 years old. I am now precisely half a century in Mesoamerica and still working with plants and animals. I intend to continue research for several more decades!



I apologize in advance to botanists that I do not list all the botanist's names at the end of a species name. I want to get this work finished in a realistic time framework, and whether I list Lundell or Linnaeus or Standley or Morelet will not make or break the benefit of my thematic concept of listing. Standley's scholarly work of listing all antiquated names is great, but that is not my goal. I seek to provide practical assistance to students, scholars, and interested lay people in today's world of 2011. But I do follow botanical tradition in capitalization and italics. And I do my best to keep track of which books I have used or referenced by others in the bibliography.

If you know of a plant in any category which I should include, please let me know at ReaderService@FLAAR.org.



Flor de árbol de Ila, *Pseudobombax ellipticum* by Nicholas Hellmuth at FLAAR studio, Guatemala City, January 2012

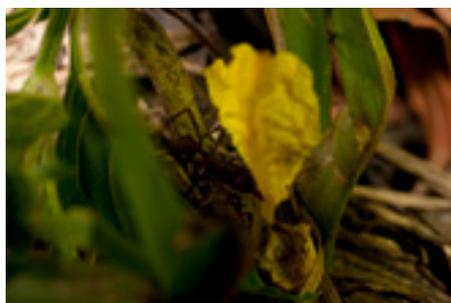


This report is an Annual Report for 2010-2011

This report is intended to be a form of “Annual Report” for 2010. Actually you could consider it an annual report for the decade from 2000 through 2010. Normally we are so full-time occupied doing research that we don’t stop research to write lists of what we have done previously. We are eager to do more research rather than cogitate on what we already did. But every once in a while we do need to stop long enough to get out reports on what we have amassed so far.

Three years ago Mirtha Cano was working with FLAAR and she put together in PDF format our initial lists in a nice tabulated format. This was issued as a FLAAR Report with basic illustrations. Compared with our list today, and in thematic groupings, you can see how much labor and library time and hours (and weeks and months) on the Internet has been dedicated and invested in this long range project even since 2008. As a note, we still cooperate with Mirtha Cano though she now works for the Parque Nacional Tikal, appropriately as a biologist.

I hope the thematic groupings can assist scholars who are interested in one specific theme.



zompopo and a yellow flower



Nicholas Hellmuth photographing leaf-cutting ant with a Canon EOS-1Ds Mark III with macro flash system. Near Sayaxche, Peten, late 2010 or early 2011.



This report can be considered a Chapter Outline for further research

Rather obviously our long-range goal is to have a “chapter” on each plant or flower. We already have “chapters” on some of the species, such as cacao, ceiba, etc. These are PDFs on our www.maya-archaeology.org web site. But the long range first step is to list all the plants.

Second step is to receive feedback from botanists, ethnographers, iconographers, epigraphers, and archaeologists on what species we should add (or comments from botanists on what species we should place in a different theme group).

Third step is to create a digital photographic reference archive of top quality photographs. We have been testing camera equipment the entire decade from 2000-2010 and recently we received another \$5000 in Canon camera equipment from a benefactor, Parrot Digigraphic (close-up lenses, close-up accessories, flash, and tilt-shift lens for wide-angle).

The urgent need for better photographs to aid scholarly research

There are several botanical photo archives with really nice photographs. The photographs in the Plant Guides of The Field Museum (Chicago) web site would be a good example. Photographs on the web sites of Jim Conrad are also of recommended quality. But too many photographs in older books are not professional quality or have other inadequacies:

- Over-exposed so the whites are burned out;
- darks too dark to see details;
- images out of focus;
- too much clutter distracting you from the flower or fruit.

And on the Internet today, and even in recent publications on plants, gardening, and botany, too many of the photographs are not of professional quality.

Ours are not always perfect, but we definitely get them better-than-average, and in many cases the photos we will be providing are a significant asset to scholarly research. Plus the photographs in the FLAAR Photo Archive are often of higher resolution than available elsewhere. The Canon EOS-1Ds Mark III is 21 megapixels as is our Hasselblad with a Phase One P25+ digital back.

As soon as donations or funding allow it, we hope to improve our photographic equipment even more, up to 60 megapixels minimum. The 80 megapixel option is a price we can't even dream of (unless a financial angel would assist). And yes, these cameras do exist: Phase One even invited me to the pre-launch of the 80 megapixel in Dubai earlier in 2011 (I was asked to be the head of the Dubai committee for printing and graphic design excellence so was flown to the United Arab Emirates by the committee). By coincidence the Phase One camera had its pre-launch event the same days in Dubai.



This list is a work-in-progress

It is ironic that after working for so many years, just a few weeks ago I was in Antigua Guatemala, in the local market. I found two food plants in this market that I had not noticed elsewhere previously. Probably they are listed in crop lists and probably listed by Lundell as well, but I had not noticed them. Yet the Guatemala assistants who were working with me, especially Sofia Monzon, knew the Spanish names and said they eat these plants regularly.

And every time I read a book or visit a web site I find another plant or flower that needs to be studied. For example, the informative book by MacVean on useful plants of Peten is long ago sold out, so I do not have any copy in my library. I did all my years of listing plants without referencing her three monographs (Peten plus two on the Highlands). I wanted to learn to find the plants by myself. But now that my list is comprehensive, I and research assistants are going to all "listing sources" and comparing their lists with our list. Any utilitarian plant that I missed we cite with the author's name of the monograph where we found the plant that we are adding. So I expect that other scholars and hopefully botanists and ethnographers will let me know what other edible or useful or sacred plants that I have not yet noticed.

Now, several months after our third edition, I have found so many more edible or useful plants that we are issuing a fourth edition.

For medicinal plants, however, there are so many hundreds that we do not yet realistically have funding to handle them. Our primary goal is to list edible, utilitarian and sacred plants.

This list is the tenth edition.

The eventual umteenth edition will include tabulations by scientific species name, alphabetical tabulation by English name, and alphabetical tabulation by Spanish name. In the meantime we are still working at getting "all" the useful plants included. Where we are missing many would be in wood used for house construction, since local people use about everything.

But I also find edible plants every month. . Every time we add ten more things we have read and every time we add five more plants, we reissue this as a new edition.

Plus we are preparing to add several new appendices, with special plant lists for specific categories. This week in November we are adding a list of plants for colorants from the PDF, on-line, Capacitacion de Tintes Naturales, Solola, published in association with jica, FGT, and AGUABEJA. This was the eighth edition.



So now we are issuing this tenth edition, our Christmas present to Mayanists and botanists. This tenth edition has the results of our visit to the Lake Atitlan area where the local Maya women's associations and cooperatives have revived the use of organic colorants primarily from local plants. In one of these facilities we were able to buy the book of Manuel Méndez, which improves our list of colorants. Plus now we have alphabetized the helpful list from Arellano Rodríguez et al. 2003 and compare their contributions with those of Hideo Kojima and the comprehensive book on ancient Maya color by Houston et al (2009).

The ninth edition included an improved bibliography on medicinal plants and improvements in listing of several species.

The fifth and sixth editions included additional plants and dozens of additional monographs in the bibliography. The seventh edition had the colorants added as Appendix C.

The full bibliography is still out into the future, as the world financial crunch puts some realistic limits on the number of staff we can assign to this project. We have no outside grants, donations, or funding specifically for this project; funding could really be a help. Nonetheless, the bibliography even at its present stage is pretty good.

Be aware that some “edible plants” are toxic

The list of “edible plants” is not a suggestion to actually eat these plants. Some are toxic unless cooked or heated: cashew nuts are a good example (my favorite nut). Others have one part of the plant that is toxic, but another part that can be eaten. A few plants are seriously toxic in all aspects.

For the list of medicinal plants, these are intended to be an inventory of plants but not a medical treatise. Do not attempt to use these plants to cure yourself.

Citations for each plant are in the plant-by-plant descriptions, which are separate PDFs in preparation.



Cashew, Peten June 2011 by Nicholas Hellmuth.



Edible plants

Grains

Maize

Teosinte, *Zea luxurians*,



Grain amaranth, *Amaranthus cruentus*, is primarily known for non-Maya Mexico but in fact is used by Highland Maya also.

Vegetables

We discuss the botanical distinctions between what is a vegetable and what is a fruit in the upcoming detailed “chapters” on each theme.



Black beans

Beans

Chaya, *Cnidocolus aconitifolius*, toxic unless cooked.

Chayote, dark green güisquil, *Sechium edule*;
Sechium compositum



Beans

Chile peppers, sweet

Chile peppers, picante

Perulero, smaller, smoother surface, another kind of güisquil. Also name of a town in Guatemala.

Squash of dozens of species

- Ayote
- Calabaza
- Calabazita
- Chilacayote, *Cucurbita ficifolia*
- calabaza melón (Mexico), melo-cotón (Guatemala), *Sicana odorifera*

However this is from South America and not yet convincingly documented to be prehispanic in the Maya area (but it is cultivated as food and as an ornamental today).



Sometimes it is only the seed of a squash that is eaten (pepitorio) other times the flesh; other species both.

Maracuya Chino (the name in Panama, Chízmar 2009:153-154), *Cionosicyos macranthus*. Some botanical web sites list this for only lower Central America; others say “Mexico south to...” Is not a passion flower but a member of the Cucurbitaceae plant family.

Bitter melon, condiamor, *Momordica charantia* (Chízmar 2009:155-157). Read warnings in botanical web sites before eating this fruit.

Rytidostylis carthagenensis (Chízmar 2009:158-160). Bizarre super-fine “hairy” type vegetable with remarkable flower (nothing like any wiskil).

Tomato & Miltomate



Tomato, *Lycopersicon lycopersicum*

Tomatillo, tomate verde, mitomatl, *Physalis ixocarpa*

Tree tomato *Cyphomandra betacea* (Stross, course outline), tamarillo.

However this plant is not (yet) documented as pre-Columbian in Mesoamerica, so should not be in the list of preHispanic Maya foods.

Edible leaves

Often it is easier to have a plant included in several theme-sections if different parts of the plant have different uses. Edible leaves is a category in a brief discussion of ethnobotany by Ana Lucrecia de MacVean and Elfriede Pöll (Chapter 8, Table 2). Many leaves are primarily for seasoning, rather than eating per se.

Allspice, pimenta gorda, leaves are used for tea

Bledo, amaranth greens, *Amaranthus cruentus* and/or *Amaranthus hypochondriacus*

Calabash, *Cucurbita moschata*

Canak, arbol de las manitas, *Chiranthodendron pentadactylon*

Cestrum racemosum (Chízmar 2009:302-303).

Calabash





Chaya, *Cnidosculus aconitifolius*

Chayote, *Sechium edule* (root, flowers, and leaves are edible).

Chile pepper, *Capsicum frutescens* (Elevitch 1998:3)

Chipilin, *Crotalaria longirostrata*

Macuy, *Solanum americanum*

Manioc, *Manihot esculenta* (Elevitch 1998:3)

Sinclairia sublobata (Chízmar 2009:113-116).

Sweet potato *Ipomoea batatas* (Elevitch 1998:3)



Chayote leaves

Edible seeds

Amapola blanca, *Bernoullia flammea*, Uacut, chunte', Cante, Bombacaceae (Parker 2008:100-101)

Cerasee, Sorosi vine, *Momordica charantia*, pods orange or yellow; Izabal.

Jicara, morro (two different plants, but not many people use only one name) *Crescentia alata*.

Pepitoria, Pumpkin seeds, squash seeds, various species are grown more for their seeds than for the vegetable portion.

Sterculia apetala, ground seeds to make a drink (Parker 2008:890).

Provision Tree, Zapaton, zapote bobo, *Pachira aquatica*. The flower of this tree is similar to flowers favored in scenes on Maya pottery (Zidar 2009).

We will be adding more seeds from trees of the Bombacaceae family.



Pepitoria seeds



Edible Seed pulp

I added this category after learning how many species and relatives there are of Inga that are edible. But it is the pulp around the seed that you eat: not the seed itself. Our categories are deliberately informal, because obviously with some fruits you eat everything; with others you eat only the pulp, with others you eat only the seeds.

Bri Bri, *Inga edulis*, (when it is mainly the seed pulp that is eaten, we have separate section on seeds).

Xelex, *Inga thibaudiana*, (Chízmar 2009:191-192)

Inga vera, (Chízmar 2009:193-194)

Paterna, *Inga paterna*, seed pods; common in Guatemala



Paterna seed pods

Plus there are other fruits whose pulp (and in some cases also seeds) are edible.

Cacao, *Theobroma cacao*; seed pulp is also eaten (has no chocolate taste whatsoever, but is delicious). However does not survive shipping, so you can taste it only if you pick the fruit from the tree in the orchard and eat it on the spot. Yummy. I have not tried pulp of pataxte because these pods are so high in the tree you can't harvest them yourself.

Theobroma angustifolium, monkey cacao.

Berries

Acai berry, acai palm tree, *Euterpe oleracea* (don't blame me; it's called a berry, but you can also consider it as a nut).

Allspice berry, *Pimenta racemosa*, I list this also under seasoning.

Vaccinium confertum, Tlo'Chaj, a berry from the Tajumulco region.

White Maya Tree, *Miconia argentea*

There are hundreds of secondary web sites that quote each other, thus spreading slight misinformation. These sites all say that the Maya diet included "fruits and berries"; or whatever. Yes, dozens of fruits: but actually not many berries are pre-Columbian in the core lowland Maya area. I have never heard of berries being a common food of the Maya, past or present.



Fruits (primarily trees, lots of annona first)

Anona, cherimoya, *Annona cherimola*.

Anonillo, *Annona primigenia*,

Anonillo, *Annona glabra*.

Custard apple, *Annona reticulata*

Anona Blanca, papauce, llama, *Annona diversifolia*

Soncoya, matacuy, *Annona purpurea*. Covered with conical spines.

llama, *Annona diversifolia*

Soncoya, matacuy, *Annona purpurea*. Covered with conical spines.

Sugar apple, *Annona squamosa*

Guanábana, custard apple, soursop *Annona muricata*

Each area or Mesoamerica shares some species of Anonna but several areas have another species that is not as common elsewhere. We will track them all down sooner or later.

As is so typical of Spanish nomenclature, there are fruits that are not botanically related which are stuck with names that sound like anona.

Cymbopetalum pendulifloerum, orejuela, anona de Montaña

Other Fruits (primarily fruits from trees)

Aceituno, wild pigeon plum *Hirtella racemosa*, *H. americana*, *H. triandra*

Anay, *Hufelandia anay* (Popenoe)

Arbol de manzana, *Bellucia grossularioides*, (Chízmar 2009:235-236)

Ardisia revolute, (Chízmar 2009:247-248).

Avocado, *Persea americana*



Guanabana Fruit



Persea americana



wild avocado, aguacatillo, *Persea donnell-smithii*,

Baboon Cap, *Couepia dodecandra*

Couepia polyandra (Chízmar 2009:144-145; E. N. Anderson for Yucatan)

Breadnut, ramon, *Brosimum alicastrum*

Bri Bri, *Inga edulis*, (when it is mainly the seed that is eaten, we have separate section on seeds).

Cacao, *Theobroma cacao*

(monkey) cacao, *Theobroma angustifolium*

Capulin, *Muntingia calabura* L. (Chízmar 2009:244-246,

Celtis iguanaea

Chilindron, Huevo de Gato, *Thevetia ahouai*, (Chízmar 2009:55-57).

Ciricote, *Cordia dodecandra*

Coyo, *Persea schiedeana* (Popenoe)

Craboo, *Byrsonima crassifolia*

Cuajilote, see Wild Cucumber Tree

Estococa, *Carludovica palmate* (Chízmar 2009:169-171).

Guano, *Sabal mexicana*; thatch palm, also used for weaving baskets.

Guarumo, trumpet tree, *Cecropia peltata*

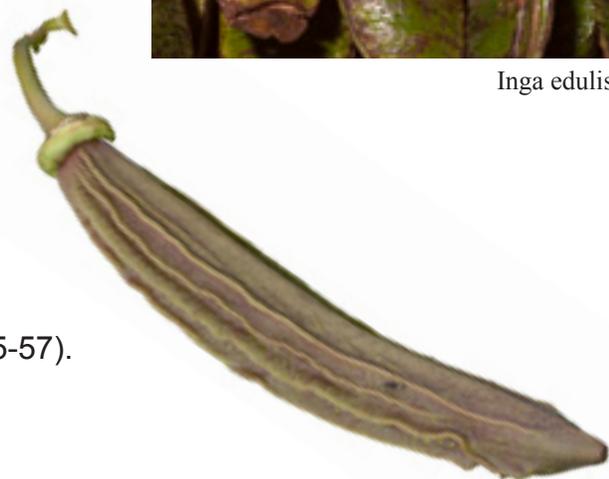
Guarumo de montana, *Pourouma bicolor*, *Pourouma aspera*

Guava, Guayaba, Guayava, *Psidium guajaa*,

Guaya, *Talisia olivaeformis* (MacVean 2003:122)



Inga edulis



Cuajilote

Guayaba





Guazuma ulmifolia, also used to flavor chocolate (Chízmar 2009:307-311).

Guapinol or huapinol, *Hymenaea courbaril* (Jim Conrad, backyardnature.net)

Guazuma ulmifolia, Pixoy (Lundell; Parker 2008:888-889).

Güiligüiste, Huilihuiste, *Karwinskia calderonii* (Chízmar 2009:263-265).

Psidium guineense (Chízmar 2009:249-251).

Hog Plum, ciruela cochino, jocote jobo, *Spondias mombin* or *S. purpurea*

Jilotillo, Salsoco, Raisoco, *Asplundia utilis* (Chízmar 2009:167-168).

Jocote, *Spondias purpurea*; a suburb of Antigua Guatemala is named after this fruit.

Lagartillo, *Alibertia edulis*. Flower potentially sacred (my estimate)

Leucaena leucocephala

licaco, *Chrysobalanus icaco*

Jagua, *Genipa americana* (Chízmar 2009: 271-275).

Jacaratia mexicana (Parker 2008:146), wild papaya, bonete.
But this is not what is called wild papaya in most parts of Guatemala.

Mamey Amarillo, *Mammea americana*

Lemon drop mangosteen, *Garcinia intermedia*; edible fruit, handsome flowers; wood used for construction and utilitarian uses.
www.montosogardens.com/garcinia_intermedia.htm

Malmea depressa (Parker 2008:49-50).

Malvaviscus arboreus, (Chízmar 2009:230-232).

manax: wild cherry *Pseudolmedia spuria*



Jocotes



Mamey



manzanilla, tropical hawthorn, *Crataegus pubescens* var. *stipulata* (Popenoe 1921)

Maxbal, moco, *Saurauia kegeliana* (Chízmar 2009:18-19).

mora, *Rubus glauca*, *Rubus adenotrichus*

nance, *Byrsonima crassifolia*, favorite food of mythical deity 7 Macaw

shaving brush tree, *Pachira aquatica* (also listed under sapoton in zapote list)

papaya, *Carica papaya*.

Pataxte, *Theobroma bicolor*. See also two other cacao, listed under "c".

Posoqueria latifolia (Chízmar 2009:278-280)

Sauco, *Sambucus mexicana*

Sea grape, *Coccoloba uvifera*

Tamarind, *Dialium guianense* (Chízmar 2009:179-181).

Wild Cucumber Tree, Candle Tree, Cuajilote, Caiba, Pepino de Arbol Silvestre, *Parmentiera aculeata*.

This is a close relative of calabash trees.

Zapatero (Peten), **Negrito** (Belize), *Simarouba glauca*,



Nance



Cuajilote, *Parmentiera aculeata*



Pataxte

Fruits (typical misnomer mishmash of Spanish language)

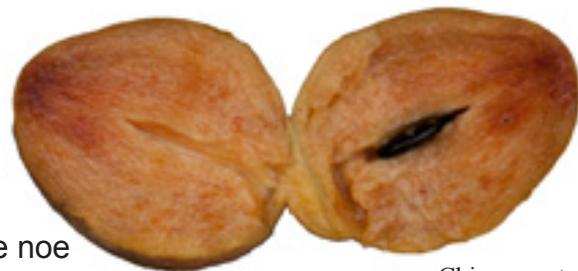
Sapote or Zapote is not really a word for one tree or fruit, it is a generic word. It is typical in Spanish nomenclature for pre-Columbian things to use a similar word for things which in the scientific designation are not related (other than superficially). Spanish can be a very imprecise language for tagging plants and animals!

Black zapote, *Diospyros digyna*

Chico Zapote, sapodilla, sap produces chicle, *Manilkara zapota*

Green zapote, *Pouteria viridis*, called *Achradelpha viridis* by Pope noe

Mamey sapote, *Pouteria sapota*



Chico zapote



Canistel, *Pouteria campechiana*, a yellow-looking sapote

sansapote, sonzapote, monkey apple *Licania platypus*

red zapote, *Mammea americana*, zapote mamey

white zapote, matasano, *Casimiroa edulis*

Zapote bobo, sapoton, *Pachira aquatica*

Zapote



Fruits on vines

Granada (pomegranate), *Punica granatum*, is totally different than granadilla.

Granadilla, fruit of passion flower vine, *Passiflora ligularis*.

Maracuya, another passion flower vine fruit, *Passiflora edulis*

Passiflora foetida (Wikipedia)

Passiflora seemannii (Chízmar 2009:254-256)

Corky Stem Passionvine, *Passiflora suberosa*

Passiflora adenopoda, (Chízmar 2009:252-254)

Granadilla



Split leaf philodendron, ceriman, Piña anona, *Monstera deliciosa*. Not a fruit but is on a vine.

Edible fruits from cactus or cactus-like vines

nopal and tuna, cactus, *Opuntia ficus*

Pitaya, Pitahaya, *Hylocereus undatus*.



Pitaya

Arias (2010) lists nine cacti from Mexico that have edible fruits. Most if not all of these are outside the Mayan area. However there are plenty of cactus species in the upstream valley of Rio Motagua, Guatemala. So hopefully this list of Mexican cacti will encourage Guatemalan botanists to make comparable lists of edible cactus and cactus-like vines for Guatemala (they may exist already).

Pochas, *Ferocactus latispinus*



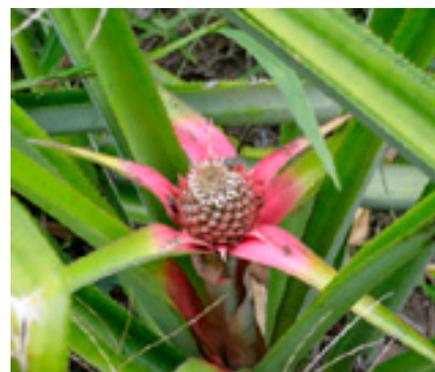
Chilitos de biznaga, *Mammillaria* spp.
 Junco espinoso, *Aporocactus flagelliformis*
 Limón de biznaga, *Ferocactus pilosus*
 Tuna de biznaga, *Echinocereus* spp.
 Alicoche, *Echinocereus* spp.
 Garambullos, *Myrtillocactus geometrizans*
 Pitayo, pitayo de mayo, *Stenocereus pruinosis*
 Pitayo xoconostle, *Stenocereus stellatus*

Other fruits (not in trees)

Pineapple, a terrestrial bromeliad, *Ananas comosus*.

Piñuela, *Bromelia pinguin*, motate

Piñuela, *Bromelia alsodes*, (Chízmar 2009: 130-132)



Pineapple field

Nuts, Palm trees

coconut (potentially arrived before Spaniards)

corozo palm: plentiful and still eaten in Peten today

coyol, *Acrocomia aculeata*

Brahea aculeata, palmilla

Brahea dulcis, capulin

Ractrisbarronis major



Coconut

Rosengarten, in his excellent book on nuts of the world, does not mention corozo palm nuts.

Palm trees with edible parts

Capuca, *Calyptrogyne ghiesbreghtiana* (Chízmar 2009:87-88)

Chamaedorea pinnatifrons (Chízmar 2009:89-91)

Chocho palm, chapay, *Astrocaryum mexicanum*, shoots, heart, and flowers edible (Haynes and McLaughlin 2000).



Cohune palm, oil palm, *Astrocaryum cohune*, in addition to the edible nut, the heart is also edible.

Gonolobus taylorianus, some parts toxic (Chízmar 2009:107-109)

Huiscoyol, *Bactris major* (Chízmar 2009:84-86)

Manaco, *Manicaria saccifera* (Chízmar 2009:103-104)

Palmito, ternera, *Euterpe precatoria* (Chízmar 2009:100-102)

Piva, peach palm, *Guilielma utilis*, edible fruits

Mexican Sabal palm,

Nuts and food that is considered a “nut”

Acorns (present in Highlands but not often eaten by local people)

Breadnut, ramon nut, *Brosimum alicastrum*

cashew (marañon), *Anacardium occidentale* L.

cashew, marañon Silvestre, *Anacardium excelsum*, (Chízmar 2009:23).

ramon nuts (see breadnut)

Peanut, *Arachis hypogaea*; first in Peru but got to Mesoamerica also.

Coconut is a rather substantial “nut” but we discuss palm products in a section on palms. There are many palm oil nuts that are edible.



Cashew or marañon

Cooking oil

Acrocomia aculeate

Corozo (cohune) palm oil

Chamadorea elegans

Gonolobus taylorianus (Chízmar 2009:107-110)



Gonolobus



Jatropha curcas, physic nut, oil for soap and other uses. Toxic as food.

Zapatero, *Simaruba glauca*, Paradise tree, oil, medicine, and fruit.

Several other palm tree parts can be used to produce oil.

You could also make a list of “oil” used as a lotion (we would consider that “medicinal”). I would assume that the ancient Maya could obtain cooking oil from wild boar and other animals. It is also logical to look for vegetable oils too.

Other plants which have edible parts

Mangrove fern, *Acrostichum aureum* (from pollen at Copan; Fedick 2010)

Fern, *Microgramma lycopodioides* (from pollen at Copan; Fedick 2010)

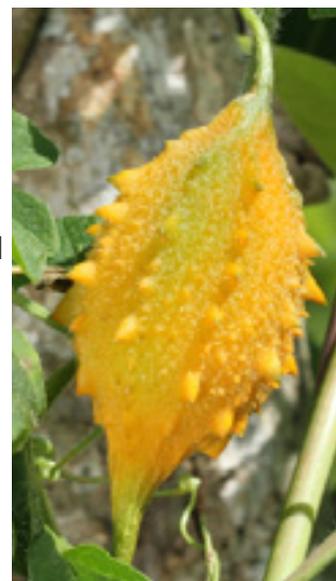
Cattail, **reed**, *Typha latifolia* www.rook.org/earl/bwca/nature/aquatics/typhalat.html

Sorosi Vine, *Momordica charantia*, common in Izabal area.

white milkwood, lechoso, *Tabernaemontana alba*; chewing gum substitute
Spathiphyllum friedrichsthali

Spathiphyllum phryniifolium (Chízmar 2009:60-62)

Yuc, *Spathiphyllum blandum* (Chízmar 2009:58-59)



Sorosi vine

Root crops

Sweet potato, camote *Ipomoea batatas*

Jicama, yam bean, *Pachyrhizus erosus*.
Flower is distinctive shape and beautiful lavender colors.

Cassava, sweet manioc, yuca, *Manihot esculenta*

Malanga, *Xanthosoma* species (these four featured by Bronson 1966:63-65)
Kaqiox, Marac, Quequescamote, *Xanthosoma sagittifolium*

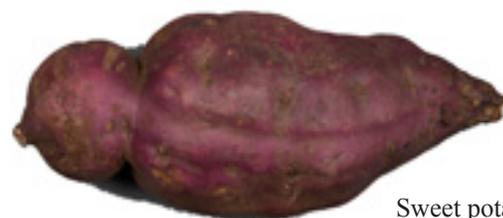
Chayote, ichintal, root of chayote or güisquil, *Sechium edule*
(root, flowers, and leaves are edible).

Iron cross plant, *Oxalis deppei* (Stross, UTexas course outline)

Maranta arundinacea, (Chízmar 2009:233-234)

Mexican Shell flower, *Tigridia pavonia*
(Stross ethnobotany course outline)

Smilax spinosa (Chízmar 2009:295-296)



Sweet potato



Ichintal chayote root



Yuca



Water plants: rivers and lakes

Since I have been studying the water lily for years, I am always curious why, out of all the many other plants that grow in the rivers and lakes, why only the water lily is so important to the Classic Maya. I have discovered several aspects of why the Maya selected the water lily (more than just the fact that the water lily seed pod could potentially have been the cheapest and most readily available source of tasty chemicals for Maya rituals).

Brasenia schreberi

Waterlily, *Nymphaea ampla*, is edible, and parts are eaten in many other parts of the world.

Surely there must be other water plants that were harvested and eaten. Tule is primarily for making baskets and mats.

Flavoring, herbs, and spices

See also all the flavorings (in the next section) for cacao drinks.

Allspice, *Pimenta gorda*, *Pimenta racemosa*



Pimenta gorda

Achiote, Annatto, *Bixa orellana*

bay-leaves *Litsea glaucescens*

boldo, *Peumus boldo*

Chia, *Salvia hispanica*; seeds used; in juice; sprouts, etc

Chipilin, *Crotalaria longirostrata*.

Unique flower; Parts edible, part toxic (Morton 1994)

Chili pepper, *Capsicum* species



Chili pepper

Dipteryx panamensis seed is listed in a Tico ethnobotanical dictionary as flavoring tobacco (on-line).

Dorstenia contrajerva, roots flavor tobacco Tico ethnobotanical dictionary as flavoring tobacco (on-line)

Flor de nardo, *Polianthes tuberosa*. (Schoenhals 1988:206). Also an additive to balche drink of Lacandon.



Myroxylon balsamum, powder added to tobacco (Nations 2006:96)

Guarumo, leaves also used for tobacco

Coriander, *Porophyllum ruderale*

Culantro, cilantro, samat *Eryngium foetidum* (Chízmar 2009:40-41).

Guanacaste, *Enterolobium cyclocarpon*

hierba de conejo, *Tridax coronpifolia*, *Castilleja lanata*

Hoja Santa, *Piper auritum*

Marigold, *Tagetes minuta* and *Tagetes elliptica*

“oregano” or “marjoram” in the cookbooks, but I suspect that local herbs are meant in the first place. At least two different herbs are known as “**Mexican oregano**”: *Poliomintha longiflora* (Lamiaceae) and *Lippia graveolens* (Gernot Katzer, Geographic Spice Index)

Porophyllum tagetoides

Pumpkin seed (*Cucurbita* spp)

Renealmia aromatica, MacVean gives local words as tzi or chucho (Alta Verapaz), nabay (Petén), and rat plantain for Belize.

She says pulp of the fruit is used to flavor tea. (MacVean 2003:136).

Sapoton, *Pachira aquatica* (Gomez 2008:84)

Sarsaparilla, *Smilax regelii*, is used for root beer after sassafras (root of tree of that name) was found to have bad side effects.

Talauma mexicana (Gomez 2008:84)

Wormseed, Epazote, *Chenopodium ambrosioides*

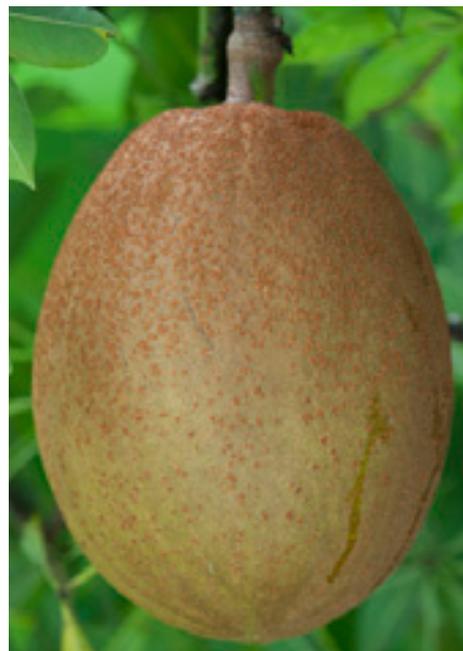
Probably another dozen spices could easily be added, though most modern spices come from India, Asia, Africa, or Europe. For example, *Coriandrum sativum*, is not indigenous.



Hoja Santa



Marigold



Sapoton, *Pachira aquatica*



Flavoring for cacao drinks

Flavorings for cacao are nicely listed by Sophie Coe (1994) and then also by Sophie and Michael Coe (2007) but you can find additional spices for cacao drinks listed elsewhere. In upcoming FLAAR Reports on cacao flavoring I will cite all the flavoring that Sophie Coe and Michael Coe carefully include and compare with ingredients that I have found during the past three years of ethnobotanical research. Below is just the basic list of the most commonly known ingredients, which are included in most of the better discussions of cacao and chocolate.

As a side comment I raise cacao in and around my house (literally) and the seeds I planted about four years ago have grown enough they have their first flowers this year. As the first rains of the rainy season hit, the tree trunks burst into producing actual cacao pods (through self-pollination I assume, as at 1500 meters above sea level, in the middle of Guatemala City, I doubt I have any or many of the appropriate species of midges to pollinate the flowers).

I also raise pataxte, though this grows much more slowly. To be an archaeologist, and iconographer, and with a personal interest in plants and animals, to actually live surrounded by cacao trees and a host of other Maya-related plants gives me an experience that I was not able to achieve associated with a university campus with snow surrounding my apartment. However there are definite advantages of a university campus as well: best is to have both: access to a campus and access to an ethnobotany garden.

Flowers & seeds (mostly to flavor cacao)

- Achiote, *Bixa orellana*
- allspice, pimenta gorda, *Pimenta racemosa*
- *Quararibea funebris*, Rosita de cacao, cacahuaxochitl
- Marigold (*Tagetes lucida*) flor de muerto
- *Calliandra anomala*, tlacoxochitl (Sahagun)
- *Cymbopetalum penduliflorum*, Guanacaste, uei nacaztli in Nahuatl, ear flower, orejuela
- mecaxochitl (*Piper amalago*) mecasuchiles, Higuillo de limón. String flower.
- teonacaztli (*Chirantodendron pentadactylon*) String flower (black pepper family)
- *Magnolia mexicana* flowers, yolloxochitl, heart flower
- Popcorn flower, *Bourreria huanita*
- piztle (the seeds of *Calocarpum mammosum*, mamey sapote)
- Vanilla, *Vanilla planifolia*
- Chile
 - Chilchote, *Capsicum frutescens*
 - Chiltipiquin,
 - Tonalchiles
 - Chilpaelagua
 - Chile that is sold in Guatemalan markets and called “chile chocolate”
 - Tobacco juice (Ritual of the Bacabs, 35-37).



The following are listed as flavorings by Ratsch, but are not widely listed in most books on cacao.

- *Calliandra anomala*, tlacoxiloxochitl (Ratsch 2005:501).
- *Pimenta dioica*, xocoxochitl (Ratsch 2005:501).
- *Solandra* spp. Tecoaxochitl (Ratsch 2005:501). Teonanacatl, *Psilocybe mexicana* and other species of cactus (Ratsch 2005:501).

Another plant should also be studied further: *Virola* species, cacao volador (Martinez 1987:1238 quoted by Ratsch 2005:529).

Flowers, sacred

Charles Zidar has accomplished excellent ethnobotanical work to identify sacred flowers in Maya art. When his PhD dissertation is eventually available, even more material should be available. In the meantime, here is a basic “starter list” of sacred flowers. I would also include plants and flowers which were used for smoking, for incense, for religious ceremonies (imbibing or injecting them via enema), as sacred to one degree or another. Defining “sacred” is of course a challenge, since what is sacred depends on your culture and your philosophy.

Flower of **zapote bobo**, *Pachira aquatica*

Flower of **ceiba** tree, various species

Waterlily, *Nymphaea ampla*

Plumeria species, flor de Mayo, bak nikté'

flores del nardo, *Polianthes tuberosa*. (Schoenhals 1988:206).

Also an additive to balche drink of Lacandon.

flowers that attract hummingbirds

flowers on Maya bowls, vases, plates (that have not yet been identified).

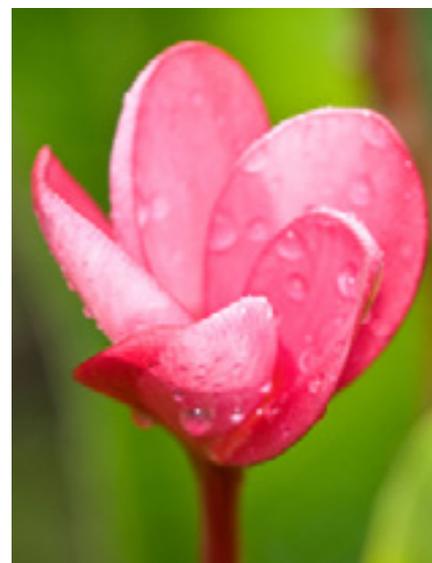
Aak' alyoom “night flower from which Kisin was born”

<http://home.planet.nl/~roeli049/gloseng.pdf>

Chipilin flowers: white petaled, red petaled, yellow petaled (Popol Vuh), *Crotalaria longirostrata*, *Crotalaria guatemalensis*.

Squash flower(s), related to ballgame

Probably another ten species, plus or minus



Flor de mayo



Chipilin flowers



Flowers, edible

Biznaga colorada, Cactus flowers, *Ferocactus pilosus*, (Arias 2010)

Chayote, *Sechium edule* (root, flowers, and leaves are edible).

Dahlia, Tzoloj, *Dahlia imperialis* (Chízmar 2009:111-112)

Isote tree (also spelled izote), spineless yucca, *Yucca elephantipes*

Loroco, *Fernaldia pandurata*

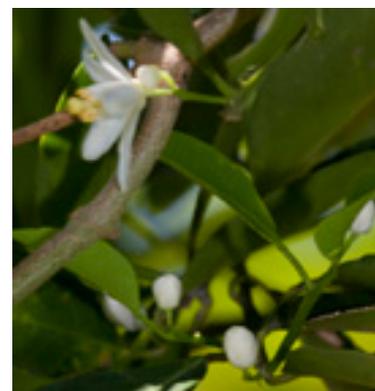
Pacaya, palm, *Chamaedorea pacaya*

Many parts of the waterlily, *Nymphaea ampla*, are edible.

This list will grow.



Flor de Izote



Loroco flowers

Plant substances for cosmetics

See also separate section on medicinal plants, and on colorants.

Charcoal, for black

Cochneal, for red colorant. These are insects but their host is a plant, *Opuntia* species.

Flowers as models and inspiration for earring jewelry design

The recognition that Mayan earrings are flower shaped is all over the Internet. One web site even sells “5-petal bloodwood Mayan Flower Plugs.” Although the tree is South America the earrings look just like those of the Maya. That earrings were flowers was also noticed by Mary Butler, Piedras Negras Pottery, Pottery Vessels (1935:128).

Botanist Charles Zidar has also recognized the flower origin of Mayan earrings (personal communication 2009). The advantage of his contributions are double: first, he is an experienced botanist. Second, he is familiar with Mayan culture.

If you peruse books of flowers of Mesoamerica you quickly find flowers that should be checked to see if they are similar to earrings. One is Ciricote, *Cordia dodecandra*.



Lundell lists flowers which are “strung as necklaces and bracerents.” I would guess these are in Yucatan, Campeche, and Quintana Roo.

- black seed of *Canna edulis* Ker. (chankala, platanillo),
- the scarlet and black seed of *Abrus precatorius* L. (xocoak)
- *Rhynchosia pyramidalis* (Lam.) Urban,
- and the fruits of *Acrocomia mexicana* Karw. (cocoyol)

Additional Flowers to check out

This is a list of flowers that attract my attention when I see them. Thus it is worth checking to see if any of these was edible, was a scared flower, or was a model for an earring or other aspect of jewelry.

Alamanda species

Annatto flower is quite showy, *Bixa orellana*

Acnistus arborescens (Chízmar 2009:297-298)

Balsa flower, *Ochroma pyramidale*

Bucut, *Cassia grandis* (OFI-CATIE: 439), impressive mass of white-pink flowers on a tree.

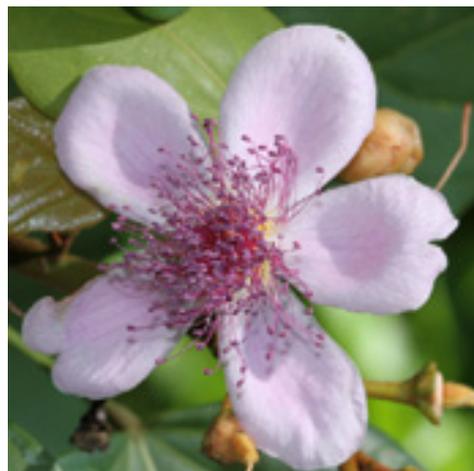
Flor de tigre, *Tigridia pavonia*, oceloxochitl (in murals of Malinalco).

Cestrum racemosum (Chízmar 2009:302-303).

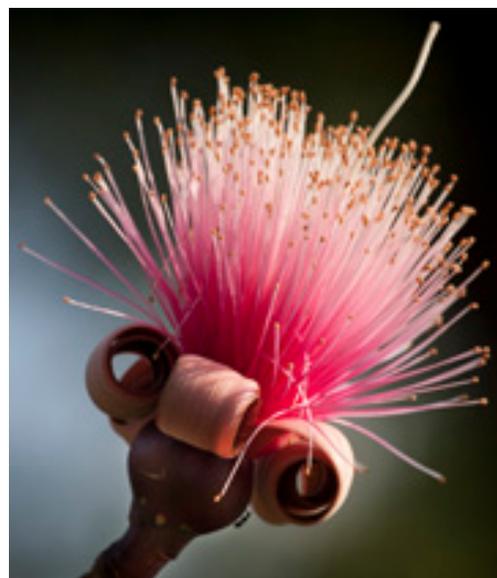
Ila, *Pseudobombax ellipticum*

Clavellina, *Bombax palmeri* Clavellina is another typical Spanish misnomer in that five (or more) flowers absolutely unrelated to each other have the identical name, Clavellina. One is a cactus!

Coralillo, *Russelia equisetiformis*



Annatto flowers



Pseudobombax ellipticum flowers



Ipomoea pes-caprae, beach morning glory.

Lacmellea standleyi,

Mexican Butterfly weed, Blood Flower, *Asclepias curassavica*

Mexican primrose willow, *Ludwigia octovalvis*

Peacock Flower or **chaparral** in Spanish, *Caesalpinia gaumeri*

Pentalinon andrieuxii

Tobacco flowers, *Nicotiana tabacum* and *Nicotiana rustica*



Mexican butterfly weed

Zinnia: it always helps to let people in North America understand how much of what they have originated in Mexico or Central America.

Plants which are sacred

I would not rule out that some of the flowers of the plants listed below may also be sacred.

Beans

Chile-seeds

Coral tree, seeds of tzite, arbol de pito, (divination),
Erythrina corallodendron,
Erythrina berteroana; Parts edible, part toxic (Morton 1994)

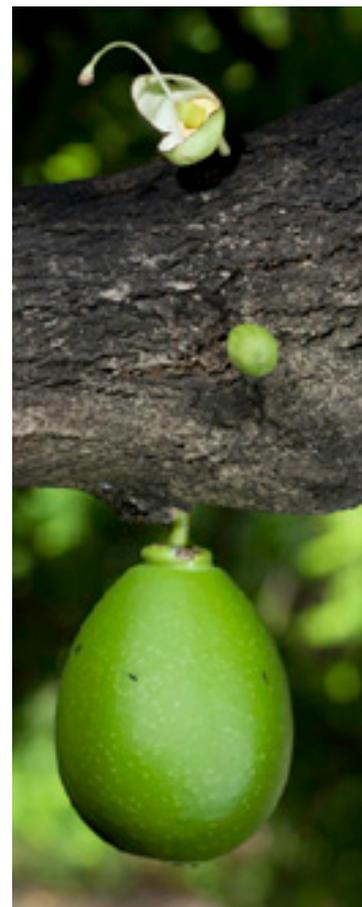
Jicaro, *Crescentia cujete*

Morro, *Crescentia alata*, Villar p. 45, 87 (Popol Vuh)

Palo de lagarto, Limoncillo, Naranjillo, *Zanthoxylum procerum*

Palo de Lagarto, Chanté, *Zanthoxylum microcarpum*,

Naranjillo *Zanthoxylum elephantiasis*
(Estacion biologica Las Guacamayas) Bianca Bosarreyes



Morro



Lagartillo: *Alibertia edulis*, *Heliotropium* (CR); *Zanthoxylum* (CR)

Lagarto: *Abelmoschus* (C); *Zanthoxylum* (CR)

Lagarto amarillo: *Zanthoxylum* (CR)

Lagarto negro: *Lacmellia* (CR); *Zanthoxylum* (CR)

Palo de lagarto, *Ceiba aesculifolia*, may have spines like “ceiba”

Ceiba, *Ceiba pentandra*, Sacred Maya tree, national tree of Guatemala

Ceiba schottii, but primarily in Yucatan (not in Guatemala).

Jocote de jobo: *Spondias* (N)

Jocote de mico: *Simarouba* (N)

Jocote montero: *Spondias* (N)



Jocote tree

Pochote, typical Spanish imprecise designation: can stand for many different trees with spines, *Bombacopsis quinata* (not listed for Guatemala), or *Ceiba aesculifolia* (listed as palo de lagarto above).

Pochote could also be *Bombax vitifolium*, for Sayaxche area of Peten.

Squash, planted near the ballcourt, (Popol Vuh)

Squash seeds fall from head suspended over ballcourt, (Popol Vuh)

Trees with spines that are replicated on incense burners and cache vessels

Alchornea latifolia

(www.nhm.ac.uk/research-curation/research/projects/el-salvador-coffee/specieslisttrees.html)

Bombax quinatum Jacq, *Bombacopsis quinata*, and *Pachira quinata*. Not listed for Guatemala, have spectacular conical spines.





Ceiba aesculifolia, see palo de lagarto.

Ceiba, *Ceiba pentandra*, Sacred Maya tree, national tree of Guatemala

Ceiba schottii, but primarily in Yucatan (not in Guatemala).

Pochote, typical Spanish imprecise designation: can stand for many different trees with spines, *Bombacopsis quinata* (not listed for Guatemala), or *Ceiba aesculifolia* (listed as palo de lagarto above). Pochote could also be *Bombax vitifolium*, for Sayaxche area of Peten.

Palo de lagarto, Limoncillo, Naranjillo, *Zanthoxylum procerum*

Palo de Lagarto, Chanté, *Zanthoxylum microcarpum*,

Naranjillo *Zanthoxylum elephantiasis* (Estacion biologica Las Guacamayas) Bianca Beatriz Bosarreyes Leja. Not in Parker (2008:816-820)

Lagartillo: *Alibertia edulis*, *Heliotropium* (CR); *Zanthoxylum* (CR). CR means Costa Rica, since there are more complete publications on the plants and animals of Costa Rica than the incomplete monographs on the other Central American countries. I do not yet know the species which goes with each Spanish name. We will update this list as we have more information. At the end of this list of trees-with-spines I re-list all *Zanthoxylum* in alphabetical order

Lagarto: *Abelmoschus* (C); *Zanthoxylum* (CR)

Lagarto amarillo: *Zanthoxylum* (CR)

Lagarto negro: *Lacmellia* (CR); *Zanthoxylum* (CR)

Palo de lagarto, *Ceiba aesculifolia*, may have spines like “ceiba”

pochote amarillo, *Zanthoxylum rhoifolium* Parque Nacional El Imposible, El Salvador

Pochote, *Bombax vitifolium*, for Sayaxche area of Peten.

Sandbox tree, *Hura polyandra*, synonym *Hura crepitans*

Zanthoxylum caribaeum

Zanthoxylum culantrillo

Zanthoxylum elephantiasis (see naranjillo)



Pochote tree at Sachayche, Peten



- Zanthoxylum fagara*
- Zanthoxylum flavum*
- Zanthoxylum gentlei*
- Zanthoxylum gillettii*
- Zanthoxylum juniperinum*
- Zanthoxylum microcarpum* (see palo de lagarto)
- Zanthoxylum petenense* Lundell
- Zanthoxylum procerum*
- Zanthoxylum rhoifolium* (see pochote Amarillo)

Most pito trees also have spines.



Pochote tree

Plants mentioned in myths

(see appendix on plants of the Popol Vuh)

- bromeliad
- oak trees, encinos, growing on the ballcourt area
- ocote, pitch pine, as torches, to light caves, etc
- rushes, tule
- sauco, *Sambucus mexicana*

Plants to produce Alcohol

- agave, Agave Sisal, *Agave fourcroydes*
- *Arcacia angustifolia*, flavoring for pulque (Ratsch 2005:28).
- Balche
- Chicha, fermented drink from maize
- White Maya Tree, *Miconia argentea* (ambergriscaye.com)
- Cashew nut wine (Standley and Record 1936:43)
- *Acrocomia mexicana*, Coyol (Standley and Record 1936:79)
- Coyol, *Acrocomia aculeata* (Chízmar 2009:66-70), (Balick 1990)
- Cacao, *Theobroma cacao*



Cacao showing seeds used to produce alcohol

Relacion de Merida (11:49) indicates that the roots of a maguey agave were used with balche in northern Yucatan (LucidConsciousness.com).

This list will be expanded as I hope that books such as Alcohol in Ancient Mexico (Bruman 2000) and the PhD dissertation by Litzinger (1983) and Marino Ambrosio (1966) will list additional plants.

To be valid as a list of all utilitarian plants of the Classic Maya, it is silly not to list plants commonly used for alcohol and drugs. However these are not our focus; there are already plenty of books on these subjects, especially Ratsch for the latter.



Plants used for drugs

- *Banisteriopsis muricata*, a vine (Ratsch 2005:89).
- *Calliandra anomala* (Ratsch 2005:118-119)
- Datura; most claims for use are overstated; but I would still estimate that datura was known and used (just that most discussions mis-identify the flowers). *Datura* flowers stand up; *Brugmansia* flowers hang down.
- Florifundia, *Brugmansia* species. Although not listed as native to Guatemala (Wikipedia) in fact this flower is common today, including in public parks of Guatemala. Ratsch (2005:98) cites Brent Berlin (et al. 1974:280) as suggesting the plant reached Mexico in pre-Columbian times. Several other species are pictured by Ratsch.
- Guarumo, smoked in Alta Verapaz, *Cecropia obtusifolia* (Standley and Steyermark 1946:22). MacVean indicates that *Cecropia peltata* is smoked in Peten (2003:48), also known as Guarumo throughout Guatemala and trumpet tree in Belize.
- Habin (Peten), Dogwood (Belize), *Piscidia piscipula*; also fish poison
- *Acacia cornigera*, Subin, Ratsch (2005:28-29) lists two species of Acacia: *A. cornigera* and *A. angustifolia*. Subin is very common throughout Lowland Guatemala; the other species is not as well documented in the literature.
- Tobacco, *Nicotiana tabacum*
- Wild tobacco, *Nicotiana rustica*
- Water lily, *Nymphaea ampla*, probably more commonly used than given credit for.
- Morning glory (used in Central Mexico; not yet as well known for Maya). *Turbina corymbosa*, *Ipomoea* species grow along the highways of Escuintla.



Brugmansia

Water lilies





- fly agaric skins, *Amanita muscaria*
- Ololiuqui, *Turbina corymbosa* Ratsch (and probably others before him) suggest this is the vine on a world tree at Chichen Itza (2005:516).
- *Passiflora foetida*, amapola (many plants in Mesoamerica are informally called amapola).
- Sinicuichi, *Heimia salicifolia*, Reko, Victor A (1926). "Sinicuichi". La Revista Médica de Yucatan 14: 22–27.
- *Quararibea funebris*, Rosita de cacao,
- Ipecac, raicilla, *Cephaelis ipecacuanha*, induces vomiting.
- *Tanaecium nocturnum* (Zidar, on-line). Does occur in Guatemala (Trees of Guatemala, p. 86)
- *Typha latifolia*, cattail (Ratsch 2005:387) who gives a list of other tobacco substitutes.
- *Virola guatemalensis*, sangre (has a red sap).

It might be educational to check what chemicals amaranth flowers or roots may have. Ratsch notes that species elsewhere in the world are so used.

It is debated whether the appropriate mushroom was available to the Maya in pre-Columbian times.

Also check Almendro (Peten), Cabbage bark (Belize), *Andira inermis*, as possible narcotic use (Parker 2008:450).

This list can be expanded by scholars interested in chemicals of plants, though hallucinogenic and narcotic drugs are not a focus of my research. However it is probable that the Maya took plant substances in about every orifice of their body except their ears. Every other tribe living in tropical America ingested about every tasty chemical they could get their hands, mouths, noses and body parts close to. Many Maya scholars have documented that the Maya even included enemas as a way of getting even more chemicals into their bodies.

The Aztecs and inhabitants of dry areas of Mexico were even more into using remarkable plant substances for spiritual journeys. There are so many books on this that there is not space to list them all. The number of plants is almost endless. Ratsch (2005) lists most of them. Many of these plants have not been noticed for Guatemala.



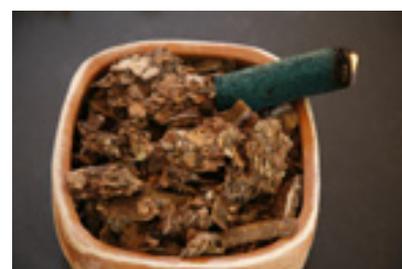
Trying to pretend the “peaceful” Maya spent their time raising maize, doing astronomy, writing hieroglyphic texts and building pyramid-temples completely and conveniently avoids seeing what life was really like in the palace acropolises, plazas, and temple rooms for over a thousand years. The list above is more than a dozen plants specifically for the Maya area, which is actually more than most monographs on drugs list. Any student or scholar who really had an interest in tasty chemicals could surely discover twice this number of plants. So to ignore the rather obvious readily available drug plants in the Maya area in monographs on the Maya is a tad unrealistic.

Note that we do not list plants used as drugs by the Aztec unless the plant could also grow in Guatemala, Belize, Honduras or the Maya portions of Mexico and El Salvador.

But chemicals are not our research topic. We are interested in the iconography of sacred flowers and plants, and in utilitarian plants, plus which flowers were featured as hieroglyphs.

Plants or trees that are used to produce incense

- Artemisia Mexicana (Ratsch 2005: 73)
- Balsam, *Myroxylon* species,
- Copal pom, *Bursera microphylla*
- pom, copal incense Protium copal
- Palo-jjote, muliche, indio desnudo, *Bursera simaruba*
- pine resin as incense, *Pinus pseudostrobu*, *Pinus oocarpa*.
- Liquidambar, arbol de estoraque, *Liquidambar styraciflua*
- Croton (cochinal croton) red tree sap *Croton sanguifluus* (Popol Vuh),
- Quercus species (oak tree)
- Rubber, hule, *Castilla elastica*
- marigold, flor de muerto, *Tagetes erecta*, *Dahlia variabilis*.
- pericón blanco, yerba anis, *Tagetes lucida*, a village in Huehuetenango and another in Chiquimula. yauhtli, cuahuyauhtli in Nahuatl, Mexican tarragon. *Tagetes lucida*, burned with pericon blanco, decorates cemeteries (Atran et al. 2004:93).





- *Tagetes micrantha*, licorice marigold (Gernot Katzer spice pages).
- *Stevia eupatoria*; more often medicinal than incense
- *Hymenaea courbaril* (Stross, UTexas course outline).
- *Vanilla planifolia*

Bitumen was also used as an incense in some parts of Mexico, but this is not a plant product.

Plants used in divination (in addition to incense)

Muc ceh. An herb used in witchcraft. Standley, Bolles; but no identification of what species.

In addition to incense, alcohol is used in divination; see that category (alcohol).

Plants smoked

Many plants have different parts which each have a different use. So a single species can be in several use groups in this FLAAR Report.

Also each use group can include multiple uses: so a “flavoring” can also be medicinal; other flavorings can be smoked with (or instead of) tobacco.

I am finding so many Guatemalan plants that are listed as being smoked by the local Maya, that for the 8th edition update of this report, I added a use-group for “plants smoked.”

I would not be surprised if some incense is as much for the participants to inhale as it is smoke for the gods. The large cigars sold in some local Maya markets for shamanic useage, are, to some degree, more “incense.”

Dipteryx panamensis seed is listed in a Tico ethnobotanical dictionary as flavoring tobacco (on-line).



Guarumo, smoked in Alta Verapaz, *Cecropia obtusifolia* (Standley and Steyermark 1946:22). MacVean indicates that *Cecropia peltata* is smoked in Peten (2003:48), also known as Guarumo throughout Guatemala and trumpet tree in Belize.



Guarumo flower



Guarumo leaves

Amapola (written as mapola by Parker, p. 101), *Bernoullia flammea*, chunte' (Itza), Yucatec Maya wakut (lucid consciousness web site) or uacut (Parker 2008). If the seed pod were found carried in anyone's hand on a Maya vase, all iconographers would call it cacao (due to the flutes).

Myroxylon balsamum, powder added to tobacco (Nations 2006:96)

Nicotiana tabacum

Nicotiana rustica

Pericón, used by the Huichol
(Sierra, "Plantas, Ofrendas y Rituales en el Centro de México")

The Aztecs flavored their tobacco with

- *Ear flower*
- *Bitumen*
- *Vanilla*
- *Piper amalago*
- *Mushrooms*
- *Fern or narcotic root*
- *Uacalxochitl, Xanathosom sp or Phyllodendron affine*
- *And other plants not yet identified by ethnobotanists Winter 2000: 301, citing Anderson and Dibble 1954:69)*



Mushrooms & Fungi

Morales, Bran, Caceres, and Flores, of the Proyecto Hongos Comestibles de Guatemala, Diversidad, Cultivo y Nomenclatura Vernácula studied in all the Highland departments of Guatemala. The resulting list is impressive. It would be nice to see comparable lists for the lowlands: Peten and Alta Verapaz.

Since their list is available on-line (just Google the title from our bibliography) there is no need to repeat their list here.

These biologists are from the Departamento de Microbiología, Escuela de Química Biológica, Instituto de investigaciones Químicas y Biológicas, Facultad de Ciencias Químicas y Farmacia, Dirección General de Investigación, Universidad de San Carlos de Guatemala.



Mushrooms and fungi

Plants used for medicine

There are hundreds and hundreds of plants used for medicine in the Maya areas of Mesoamerica. Since there are already dozens of monographs on pre-Columbian medicinal plants, I do not try to keep up with the huge number of species used for medicine. Some of these monographs are by.

- Appel, M.
- Arvigo and co-authors
- Berlin E., and Brent Berlin
- Caceres, A.
- Gonzales, Juiio
- Lee, Sandra
- Martinez, M.
- Mendieta, R and S. del Amo
- Roys, Ralph
- Villatoro, Marina



Medicinal plants at a spot in a local market Guatemala City

Yes, I am interested in medicinal plants, but first we have hundreds of sacred and edible plants to photograph and then more hundreds of utilitarian plants. With funding we can achieve more, with no specific funding, we cover as much as we can with long hours at nights and on weekends.



Please realize that many plants are toxic, even if “edible” or “medicinal.” We do not recommend trying any plant for any purpose.

Some of the plants listed below I harvested from the book Campeche en Flor and Guatemala Arboles Magicos y Notables and lists of plants elsewhere. To complete the list of medicinal plants would take longer than all other categories put together, so should be a separate opus and separate project.

Canak, arbol de las manitas, *Chiranthodendron pentadactylon*

Candle Bush, *Senna alata*

Caesalpinia pulcherrima

Cerasee, Sorosi vine, *Momordica charantia*,
pods orange or yellow; Izabal.

Cestrum nocturnum, night-blooming Jessamine, huele de noche
(very common in Guatemalan gardens). (Ratsch 2005:162-163).

Esquisuchil, *Bourreria huanita*

Guava, Guayaba, Guayava, *Psidium guajava* (Arvigo and Balick 1994: 121).

Guayacan, *Guaiacum sanctum*

Guazuma tomentosa

Liquidambar

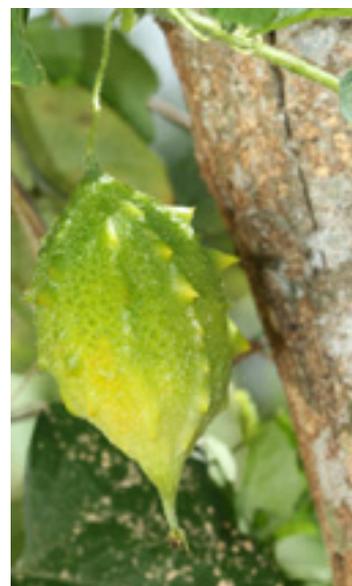
Logwood, also makes dye

Madre de cacao

Mimosa tenuiflora and other species (Ratsch 2005:362-365)

Passiflora foetida (Wikipedia)

pochote, *Ceiba aesculifolia*,



Sorosi vine



Ceiba aesculifolia



Rhoeo discolor

Sauco, *Sambucus mexicana*

Sea bean, *Merremia discoidesperma* (www.beachbeans.com)

Stevia eupatoria

Plants to produce colorants (dye)

Achiote, *Bixa orellana*

Aguacate, *Persea americana*

Aloe vera, sábila.

Añil, Anile, *Justicia spicigera*
(Standley & Dahlgren 1931:360)

Annona reticulata, custard apple,
leaves and branches produce blue or black dye.

Arrabidaea species (Standley & Dahlgren 1931:353)

Black zapote, *Diospyros digyna*

Cedro, *Cedrela mexicana*

Cola de León, *Leonurus cardiaca*

Chilca, *Bacchalis salicifolia*

Chipilin, *Crotalaria longirostrata*

Chulul, *Pouteria mammosa*

Encino, *Quercus sp.*

Flor de muerto, *Tagetes erecta*



Persea americana



Anona



Flor de muerto



Granada, *Punica granatum*

Old fustic, *Justicia tinctoria*, dye; wood utilitarian

Genista tinctoria, (Parker 2008: 447)

Indigo, *Indigofera suffruticosa*

Ilamo, *Alnus sp*

Jagua, *Genipa caruto* (Standley & Dahlgren 1931:367)

Jaboncillo, *Phytolacca icosandra*

Niij, in Mesoamerica lacquer is also from an insect as it is in Asia (from the lac insect). We have found the Maya equivalent in Guatemala, still used by Maya craftsmen today (and already known to biologists at Universidad del Valle in Guatemala). The insect looks just like the cochinitilla on a cactus but the varnish one is much larger. It is called niij in the local Mayan language, and it needs a host plant (Jocote tree is the most common). The insect on the jocote tree provides a varnish-like protective liquid, not a color.

Madre de cacao, *Gliricidia sepium*; Ralph Roys (1967: 161) lists this as cante, yellow dye tree.

Malanga, *Alocasa spp.*

Mangrove, mangle, *Rhizophora mangle*, dye

Palo de pito, coral tree, Tzite, *Erythrina corallodendron* and/or *Erythrina berteroana*. Another species is *Erythrina americana* (Ratsch 2005:234).

Palo de tinta, *Haematoxylon campechianum*, logwood

Pericon, *Hypericum perforatum*

Putunin, *Eupatorium albicaule*,
(Standley & Dahlgren 1931:384-385)

Remolacha, *Beta vulgaris*

Zanahoria, *Dacucus carota*



Punica granatum



Malanga root



I will add another dozen plants when time is available (since my days are also filled with work on ethnozoology, iconography, and advanced digital imaging technology). Lundell adds another six:

Syckingia salvadorensis (standl.) Standl. Chacahuante, chactemuch, palo colorado.

Indigofera suffruticosa Mill. Chob, añil

Morinda yucatanensis Greenm. Xhoyoc, bejuco piñoncillo

Caesalpinia platyloba Wats. Chacte

Ditaxis tinctoria (Millsp.) Pax & Hoffm. Tinta roja

Additional colorants are listed in the recent monograph by Houston et al. (2009:1003-1009) on ancient Maya color. Their list is helpful, but provides no photographs of the actual plants. Nonetheless the amount of weeks in a library and/or on the Internet to prepare their list is impressive.

Other colors are listed in reports related to projects of Hideo Kojima. We have also found more plants for colorants in the book by Manuel Mendez. So we put all these in Appendix D.

It would make a great dissertation for a student to go out, find each and every plant in the list of Houston et al., Mendez, Kojima, etc and prepare a recipe, and show actual color samples (Kojima's team did a great job at starting, however the mordants were modern). Actually one person has done this already (decades before the book on color was conceived) for scores of local plants but it has been over 40 years (literally) since I saw the original (one copy is all that exists) in a library.

Plants for decoration (necklace beads and comparable)

Erythrina, various species.

Ormosia, various species.

Rhynchosia pyramidalis

Martinez 1987 lists additional plants (Ratsch 2005:240).



Erythrina

Plants to make clothing

amate, *Ficus* species, bark paper was used as clothing in addition to as paper

cotton, *Gossypium hirsutum*, is native to Americas as other cotton was in India and other parts of the Old World also. More than 15 species of native cotton are listed for Mexico alone. Native cotton is also known for Peru.



Cotton flower



agave, especially in areas where these plants grow.

Maguey, *Furcraea* species

Several other plants can also produce thread or cloth.

Plant material used for basketry, ropes, mats

The diversity of materials used for basketry is considerable. Each part of Guatemala has different materials (since their local eco-system is different). So this segment of the list will continue to grow.

Another dozen plants used for making baskets are in the FLAAR Report on Guatemalan basketry, available as a PDF from our www.maya-archaeology.org. In the meantime here is an introductory list of about two dozen plants used for making petates, baskets, and cordage.

Capulin, *Trema micrantha*; bark produces cordage (Parker p. 928).

Capulin, *Muntingia calabura*, fiber from bark for baskets (MacVean 2003:62).

Carludovica palmate, can be used for making hats.

Cattail, *Typha angustifolia* (Lundell)

Cymbopetalum penduliflorum, the dried flowers are called Orejuelas and is major flavoring for cacao; bark is used to make rope (Parker 2008:47).

Desmoncus quasillarus, stalks used to make baskets (Palenque area)
Vogl et al. 2002: 637

Guano, *Sabal mexicana*; thatch palm, but also for hats and mats (Lundell)

Guazuma ulmifolia, Pixoy (Lundell; Parker 2008:889).

Helicteres guazumifolia, fiber used for cordage (Parker 2008:889)

Wild cotton, *Hibiscus pernambucensis*,

Mano de leon, *Hampea stipitata*;

Mimbre, *Monstera pertusa*, peel the roots for material for baskets (MacVean 2003:32)

Basketry





Nance, *Byrsonima crassifolia*, strong fiber (Bye and Linares 1990:158)

Philodendron, *Philodendron* sp., roots used for baskets;
weven in pre-Columbian times (Tikal, Early Classic burial; Moholy-Nagy 2001: 91).

Sisal, maguey, henequen, *Agave sisalon*, *Agave fourcroydes*

Maguey, *Furcraea* species. There are many species.

Tule, *Typha dominguensis*

Lundell also mentions the following:

Aechmea magdalenae André. Cham, piñuela

Sida acuta Burm. Chichibe

Abutilon lignosum (Cav.) Don. Zacxiu, yaxholche

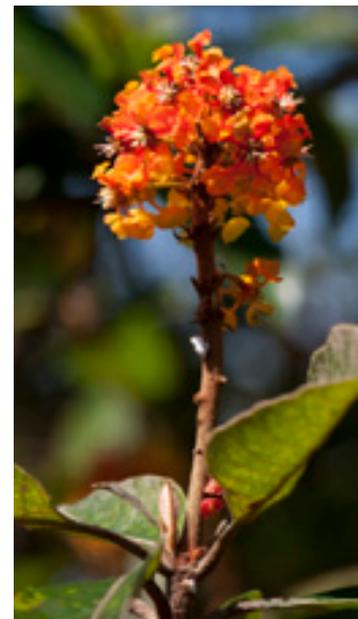
Muntingia calabura L. Capulin (Chízmar 2009:244-246)

Heliocarpus spp.

Hibiscus tiliaceus L. Xtolol

Guazuma ulmifolia Lam. Pixoy

Belotia campbellii Sprangue. Moho



Nance flower

Plants for other utilitarian use

Aceituno, wild pigeon plum *Hirtella racemosa*, *H. americana*, *H. triandra*

Bottle gourd, *Lagenaria siceraria*

Curatella americana, leaves used for sandpaper (Lundell 1938)

Escoba palm, *Cryosophila argentea*, common
in Peten; easily to identify due to medium size and
lower trunk covered in spines.

Cryosophila stauracantha, Belize (Ford 2008:Table 3).

Belotia mexicana, bark to tie broom material together
(Vogl et al. 2002: 637)

Mangifera indica, broomstick (Vogl et al. 2002: 637)

Ochroma lagopus to carry heavy loads
(Vogl et al. 2002: 638)



Bottle gourd

Materials for making basketry





Cotton-like fiber from Ceiba, for pillows

Ochroma pyramidale, balsa

Typha angustifolia

Thrinax (chit) are all mentioned by Lundell 1938.

Arthrosyloidium pillieri and *Arthrostyloidium spinosum* are used for fish spears (Lundell 1938).



Cotton-like fiber from Ceiba

Utilitarian use: tanning

Four trees, whose bark is used for tanning (Lundell 1938)

Rhizophora mangle L. (tapche, red mangrove),

Curatella americana L. (saha),

Pithecolobium albicans (Kunth) Benth. (chimay),

Albizzia lundellii Standl.

I would add (for tanning)

Nance, *Byrsonima crassifolia* (Bye and Linares 1990:158)



Nance fruit

Utilitarian use: soap

I have seen comments on about four different plants that can produce soap: one is the Soap tree, *Sapindus saponaria*.

Jatropha curcas, physic nut, oil for soap and other uses. Toxic as food.

I will expand this section as time allows; presently our team is working on finding all the palo de lagarto, sangre de drago trees, and all plants for condiments.

Utilitarian use: poisons

Lundell lists four plants used for fish poison

Paullinia,

Serjania,

Jacquinia,

Salmea,



Plant materials used in constructing houses, (Palms)

Asterogyne martiana

Lancetillo, *Astrocaryum mexicanum*

Copernicia argentata

Corozo, cohune, *Attalea cohune*, thatch palms

Corozo, *Attalea butyracea*

Guano Palm, *Sabal mauritiiformis*, *Sabal mexicana*;
thatch palms,

Sabal pumos

Sabal uresana

Sabal yapa

Santa Maria, lemonwood, *Calophyllum brasiliense*

Bayal, palm, but a vine, *Desmoncus schippii*
used for wall material not thatch.

Plus other palm tree species;
but the above are the most common in the Peten area

Brahea aculeate, palmilla

Brahea dulcis, capulin

Gaussia maya

Roystonea regia

Thrinax radiata

Grass, *Imperata contracta*, occasionally used for thatch (Lundell 1938) (not often in Peten, where palm is used most often).

Plus other palm tree species; but several of the above (guano and corozo) are the most common in the Peten area.



Corozo palm



Guano palm



Plant materials used in constructing houses, fences, etc (other than palms)

You could probably find scores and scores of trees used for construction of houses, furniture, and even more for building fences. I list here only a few (later updates will list more). The purpose of this first edition is primarily to show the plant categories and give a general idea of how the long-range project is being organized.

Almendro (Peten), Cabbage bark (Belize), *Andira inermis*,

Barba Jolote, *Pithecellobium arboreum*, *Cojoba arborea*

Bucut, *Cassia grandis* (OFI-CATIE: 439)

Bulhop (Peten), Bullhoof (Belize), *Drypetes brownii*,

Spanish Cedar, Cedro, *Cedrela odorata*, *Cedrela mexicana*

Cedrillo, *Guarea glabra*

Chichipate (Peten), Billy Webb (Belize) *Acosmium panamensis*, *Sweetia panamensis*.

craboo *Byrsonima crassifolia*

Old fustic, *Chlorophora tinctoria*, dye; wood utilitarian

Guanacaste, *Enterolobium cyclocarpum*; large tree, useful for lumber.

Guayacan, is a typical Hispanic name used for many unrelated trees. *Guaiacum sanctum* is the one intended for this listing.

Habin (Peten), Dogwood (Belize), *Piscidia piscipula*, Lacandon area.

Higuerillo, *Vitex gaumeri*, yax nik (Ford 2008: Table 3).

Madre de cacao, Cante, *Gliricidia sepium*,

Mahogany, caoba, *Swietenia macrophylla*

Malerio, *Aspidosperma cruentum* (Ford 2008: Table 3).



Matilisguate, roble de savana, *Tabebuia rosea*.

Palo blanco, gold tree, *Roseodendron donnell-smithii*

Philodendron, roots used as “rope”

puk-te: bullet tree, *Bucida buceras*

Rosewood, *Dalbergia stevensonii*, construction.

Tabebuia species; several are lumber trees (Parker 2008:93-95)

Tamarind, *Dialium guianense* (Chízmar 2009:179-181).

Tiricio, spoon tree *Trichilia havanensis*

white milkwood, lechoso, *Tabernaemontana alba*

Zapatero, Negrito, *Simaruba glauca*; also oil from the seed.

Plants from Mexico but outside Maya area:

Dioon edule, used for starch

Dioon spinulosum

Miscellaneous plants that need to be checked further

I list the following plants because they need to be checked to see if they are utilitarian or not.

Quararibea yunckeri or *Quararibea parviflora* Lundell



Madre de Cacao flower



Most common introduced plants (not native)

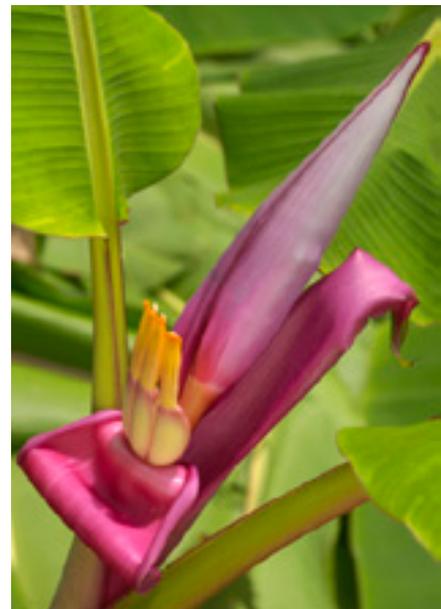
Banana

Citrus fruits

Onion

Grains (oats, wheat, barley, rye)

Rubber tree from Brazil (there was a different species already in Mesoamerica, but that is not the rubber tree used for tires and other products today).



Banana Plant

When we know the page count of a monograph, we list this as an extra feature.

If you know of a book which I should include, please let me know at ReaderService@FLAAR.org.

Articles I list in a separate bibliography (at the end of the list of monographs); I prefer to list monographs in a dedicated list on books, since books are more likely to have adequate photographic coverage. I have seen too many articles with zero photographs. I have even seen entire theses with practically no photographs whatsoever!

Web sites we are gathering a list, which will be in the chapter-by-chapter summaries over the course of on-going research. But I would definitely include there the web sites of Jim Conrad (Yucatan), El Pilar (Belize) and Ambergris Caye (Belize).



Acknowledgements

Capable photography has been contributed by Jaime Leonardo, Sofia Monzon, Jennifer Lara. Recently Daniela da'Costa has begun to work with our photo teams also. Capable work in Adobe Photoshop has been undertaken by all of them plus Juan Luis Sacayon.

Estuardo Torres is accomplishing helpful HD SLR video in Guatemala. In our St Louis office two more are working: Cami and Gustavo: video team, so a total of ten people (plus a support staff of office manager, office assistants, etc).

PDFs have been put together by many of the above as well as biologist Priscila Sandoval and archaeology students Ana Cristina Guirola and Antonieta Cajas. The present edition, especially the layout of the photographs, is the graphic design work of Josue Daniel Mazariegos Ochoa

Biological research has received help from Guatemalan biologists Eduardo Sacayon, Mirtha Cano, and Priscila Sandoval.

We appreciate the access to plants at the zoo in Guatemala City (yes, they also have nice ceiba and other trees in the La Aurora zoo). We thank the helpful people at the botanical garden in Guatemala City plus managers and guides at CECON in Monterrico (Centro de Estudios Conservacionistas, Universidad de San Carlos in Guatemala City). We thank the owner and managers and guides at AutoSafari Chapin for access to the plants and trees there (plus access to the animals and birds). We thank the managers of Estación Biológica "Las Guacamayas", Parque Nacional Laguna del Tigre, Peten, Guatemala for access and hospitality while there.

We appreciate the hospitality provided at the Missouri Botanical Garden by Charles Zidar as well as sharing of his information with us.



Daniela da'Costa is a student of biology at Universidad del Valle. She does photography for the FLAAR field projects and helps with research



Sofia Monzon, graphic designer and photographer, taking digital images of water lily plants in the Monterrico area of Guatemala. Photo by Cristina Guirola, FLAAR Reports.



Jennifer Lara taking pictures of avocados at Antigua Guatemala, photo by Gustavo Gallegos

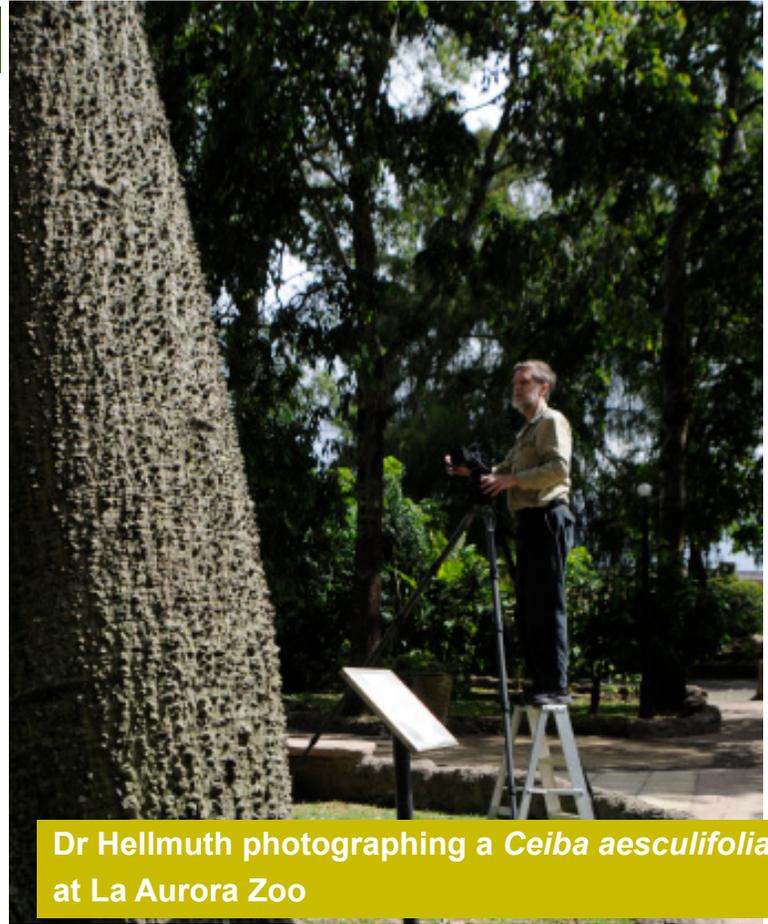
Since most libraries in Guatemala are not open at night or on weekends, and as I prefer to avoid having to drive back-and-forth, I rarely use a library since they are not convenient. So I concentrate on the several hundred books on tropical flora and fauna which are in my own work room. Despite not having access to a major library, our list of utilitarian plants is relative complete compared with the helpful books and articles written on Maya plants in the past hundred years (keeping in mind we do not attempt to make a list of medicinal plants, since there are too many, and already a dozen monographs and significant articles already exist: for Mexico, for Peten, for Belize, etc).

And I am nowhere near finished: I find new plants every month. As soon as we can bring back home the flora and fauna portion of our library that has been on-loan for a decade, we can improve our scholarship. But already our 10th edition is a milestone for Maya ethnobotany, and our photographs-per-plant-species are typical for what FLAAR is known for: extensive photography, high-res photography, and good lighting for the subjects.

Considering there is a recession and we have zero outside funding: no donations and no grants, we are doing the best we can under the circumstances.



AutoSafari Chapin



Dr Hellmuth photographing a *Ceiba aesculifolia* at La Aurora Zoo

Estación Biológica
“Las Guacamayas”





Appendix A

Thematic division of plants: comparison of Lundell and Hellmuth

Lundell lived and worked in Campeche and Peten for decades. He was a botanist and write his lists from his experience.

I have lived in Peten many many years (started visiting in 1963) and have photographed Puuc, Chenes, and Rio Bec architecture of Maya sites of Campeche, Quintana Roo, and Yucatan over several decades. Plus I have visited the Maya sites of Tabasco and Chiapas during the 1960's through 1990's.

My thematic categories are based first on iconography and sacred plants; then on common-sense categories. My theme categories are intended to assist archaeologists, epigraphers, iconographers, and ethnographers (obviously ethnobotanists also). I assume that botanists will know the plants inside out from their own training in biology.

I have no formal university training in biology, zoology, or botany (other than what I have learned from decades in the Maya area, including many years living in the remote rain forests before population hit these areas).

A further reason for the categories I have selected is to help interested lay people and students to learn the interesting, useful, and sacred plants of the Maya peoples. By 2010 my theme categories were well established. The report was issued in May 2011 and put on the www.maya-archaeology.org web site in June.

During research to finalize the report I stumbled upon an article on edible mushrooms of Guatemala, and realized this was a kind of plant that was not in my list anywhere. So I felt that it should be added as a separate category, since there are 70 species of edible mushroom in Guatemala alone. I would calculate there would be a few different species in Belize, Honduras, El Salvador and lots of different species in Mexico. What is notable is that I do not remember seeing mushrooms in any other list of food plants for the Maya. Perhaps they were in front of me and I simply did not notice. I will have to look at Lundell to see if mushrooms are listed there. Surely mushrooms are listed in good lists, but I sure did not notice.

And another rational behind my theme groups is to assist dividing the huge mass of plants into topics that would fit on individual web pages. Web pages of excessive length are not always fruitful. If there is more material than can fit on a single web page, then that material should be put into a PDF as a download.



Presently, each theme will receive one page on our www.maya-archaeology.org web site. Later, as we can afford to hire botanists, we will expand coverage to every single solitary individual plant: one page per plant. This will be a separate new web site on Maya ethnobotany, since this many new pages would max out our Maya archaeology web site.

For all of the above reasons it is understandable that my grouping of plants will tend to differ from groupings of a botanist. Actually now that I am creating the tabulation below, I am pleasantly surprised how many of my categories are comparable to those of Lundell. The only category I missed was trees for dugout canoes. So this category I will add. It is worth commenting that Lundell was primarily interested in trees: he worked for the chicle company. I am interested in every plant, and especially in flowers.

I did not find the list of Anabel Ford until mid-2011, so did not have it available for my categories, nor did I have her list of over 400 plants when I made my list. I had used individual pages of El Pilar documents when I was searching for extra information plants that I had already found.

Both Lundell and Ford have a category for ornamentals: I do not have this category since my list is focused on utilitarian use: food, construction, or sacred. However utilitarian is a valid cultural category.

I do not include forage since the Classic Maya had no cattle.

Tannin, gum, latex and poison I would include within other categories. "Production" is a category I would have to ask what it means. Fuel is a valid category but pine and other fuel plants tend to have other uses and thus would mostly be in my list under other uses.

Of all the thematic listings, I would like to add "for dugouts" from Lundell and fuel from Ford. These, plus my categories, cover about all the thematic categories that will assist transmitting this information to the readers of our publications. I fully understand that we also need the original indigenous Mayan categories too. This would be a valid project for a linguist, ethnographer, or ethnobotanist that had time, funding, and expertise with linguistics.



Lundell 1930's	Hellmuth 2010-2011	Ford, El Pilar, Belize
HUMAN FOODS:	Edible plants	food
cereals and vegetables	Grains	
	Vegetables	
	Edible leaves	
	Berries	
Cultivated, semi-, fruits	Fruits: all annona	
	Fruits	
	Fruits named "sapote"	
	Fruits from vines or cacti	
	Other fruits (not in trees)	
Wild fruits	Nuts	
	Seed pulp	
	Cooling oil	oil
	Other plants	
	Root crops	
Seasoning, flavoring	Water plants	
	Flavoring, herbs, spices	spice
	Flavoring for cacao	
	Flowers, sacred	
	Flowers, edible	
	Plant for cosmetics	
	Flowers for earrings	
	Additional flowers	
	Sacred plants	ritual
Beverage plants	Plants in myths	
	Plants produce alcohol	beverage
	Plants for drugs	
	incense	
Dye plants	Medicinal plants	medicine
Fiber plants	colorants	dye
cordage	Clothing (fibers etc)	fiber
Misc. useful plants	basketry, ropes	
thatching materials	Other utilitarian use	
timbers	Construction: palms	
	Construction: other plants	construction
For dugouts		
decorations		
Shade trees, ornamentals		
		fuel
		production
		ornamental
		poison
		forage
		tannin
		gum
		latex
	Introduced plants	



Appendix B

**Major trees listed in Villar's book
on notable and magic trees of Guatemala****VILLAR ANLEU, Luis**

2006 Guatemala Arboles Magicos y Notables. Artemis Edinter Editores, Guatemala City.

The book by Luis Villar Anleu is one of the better resources for a full-color photographic record of trees which had a sacred or other special value for the Quiche Maya. Most of these same species were revered or used by the Classic Maya of Peten in earlier times. Naturally some species are found only in the highlands, some mainly in the Peten and Verapaz lowlands, and a few are more common in the Pacific coast and piedmont.

The book of the Popol Vuh that is available to us today comes from the Quiche highlands. But the origin of these sacred myths is clearly in the Lowlands. The concept of a large sacred bird in a fruit tree is found two thousand years ago in the Pacific lowlands of Izapa (the Mexican side of the Guatemalan border, between Tapachula, Chiapas and the border).

Other representations of the specific features of Hunahpu using his blowgun to aim at 7 Macaw are found on the lids of Early Classic pottery from the Peten Lowlands. Indeed these representations are in full three-dimensional ceramic modeling. My point is that there were probably diverse regional versions of the Popol Vuh, with slightly different plant and animal species featured. Most of the animals featured in the Popol Vuh are more common in the Lowlands of Peten than in the Highlands of Quiche.

One feature of the book by Villar is that the photographs of the trees are excellent; frankly they are much better than other photos in other books.

A few major sacred trees are missing, such as frangipani (flor de Mayo), balche, nance, but for the trees that he does include, the book is attractively presented.

Ocote, p. 22 (Popol Vuh, as torches)

Encinos, p. 24, 81 (Popol Vuh, growing on ballcourt and in general)

Balsamo, p. 31, Pacific coastal plain

Copal, p. 31, *Bursera excelsa*,

Copal, p. 31, *Protium copal*

Liquidambar, arbol de estoraque, p. 31, 113, incense, Verapaces

Palo-jicote, muliche, indio desnudo, p. 31, 34, incense



- Tzite, Palo de pito, pp. 43, 45, 66, seeds for divination; created men (Popol Vuh)
Zibak, p. 45, created women (Popol Vuh)
Jicaros, *Crecentia kujete*, p. 45, 87 (Popol Vuh)
Morros, *Crecentia alata*, p. 45, 87 (Popol Vuh)
Amate, p. 49, source of bark paper
ilamo, p. 54, several species, associated with sacrifice in Highlands
Saúco, pan de tzolo'h, p. 55, edible
Arbol de hormiga, p. 58-59, drums are made of this wood
Zapotes, p. 66, edible
Cacao, pp. 67-69
Pimenta gorda, pp. 70-71
Canak, mano de leon, mano de mico, arbol de las manitas, majagua, pp. 72-72, Highlands only
Aguacate, pp. 74-75
Iximche, ramon, pp. 76-77
Guayaba, pp. 78-79
Hule, pp.88-89
Chico zapote, p. 93
Esquisuchil, pp. 126-131, medicinal, sacred among Aztecs, perfume
Ceiba, pp. 135-139



Appendix C

List of colorants from Japanese projects

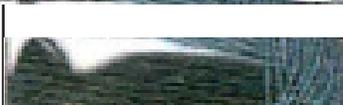
The following list is buried in an informative report, Capacitacion de Tintes Naturales, Solola, published in association with jica, FGT, and AGUABEJA. Professor Hideo Kojima is associated with several Japanese projects in Guatemala related to colorants, especially cochinitilla, but also for other colorants.

Since cochinitilla is an insect, we cover that in our FLAAR Reports on zoology, on our web site www.maya-ethnozooology.org. So far we have found only the larger cochinitilla, which lives on the jocote tree, and is used for varnish (not for red dye). As soon as we can find the smaller red dye insect in Guatemala, we will add a page on that species.

In the meantime, below is an extract of the list of colorants from the Japanese projects. Priscila Sandoval has corrected the spelling of some scientific names.

Nombre popular	Parte que utiliza	Nombre Científico	Mordiente	
Mozote	Flor	<i>Bidens bicolor</i>	Al	
Mozote	Flor	<i>Bidens bicolor</i>	Sn	
Cabello de ángel	Parásito vegetal	<i>Cuscuta corymbosa</i>	Al	
Madre cacao	Corazón de Tronco	<i>Gliricidia sepium</i>	Al	
Palo de mora	Corazon de Tronco	<i>Chlorophora tinctora</i>	Al	
Flor de muerto (Mari-gold)	Flor	<i>Tagetes erecta</i>	Al	
Aliso o ilamo	Corteza	<i>Alnus arguta</i>	Al	
Con pallo de mora	Corazon	<i>Chlorophora tinctoria</i>		
Mangle con	Corteza	<i>Rhizophora mangle</i>	Al	
Palo de mora	Corazón	<i>Chlorophora tinctoria</i>		
Coco con	Cascara	<i>Cocos nucifera</i>	Al	
Palo de mora	Corazón	<i>Chlorophora tinctoria</i>		
Añil (muy denso)	En forma De polvo	<i>Indigofera guatemalensis</i> o <i>I. suffruticosa</i>	O	
Añil (denso)	En forma De polvo	<i>Indigofera guatemalensis</i> o <i>I. suffruticosa</i>	O	
Añil (mediano)	En forma De polvo	<i>Indigofera guatemalensis</i> o <i>I. suffruticosa</i>	O	



Añil (pálido)	En forma De polvo	<i>Indigofera guatemalensis</i> o <i>I. suffruticosa</i>	O	
Añil (muy pálido)	En forma de polvo	<i>Indigofera guatemalensis</i> o <i>I. suffruticosa</i>	O	
Añil (denso)	Polvo	<i>Indigofera guatemalensis</i> o <i>I. suffruticosa</i>	O	
Con Palo de mora	Corazón	<i>Chlorophora tinctoria</i>	Al	
Añil (mediano)	Polvo	<i>Indigofera guatemalensis</i> o <i>I. suffruticosa</i>	O	
Con Palo de mora	Corazón	<i>Chlorophora tinctoria</i>	Al	
Añil (palido)	Polvo	<i>Indigofera guatemalensis</i> o <i>I. suffruticosa</i>	O	
Con Palo de mora	Corazón	<i>Chlorophora tinctoria</i>	Al	
Encino (Base tanino)	Corteza	<i>Quercus sp</i>	Al	
Cochinilla	Insecto	<i>Dactylopius coccus</i>	Al	
Aliso (Base tanino)	Corteza	<i>Alnus arguta</i>	Al	
Cochinilla	Insecto	<i>Dactylopius coccus</i>	Al	
Nance (Base tanino)	Corteza	<i>Byrsonima crassifolia</i>	Al	
Cochinilla	Insecto	<i>Dactylopius coccus</i>	Al	
Aguacate (Base tanino)	Corteza	<i>Persea americana</i>	Al	
Cochinilla	Insecto	<i>Dactylopius coccus</i>	Al	
Mangle (Base tanino)	Corteza	<i>Rhizophora mangle</i>	Al	
Cochinilla	Insecto	<i>Dactylopius coccus</i>	Al	
Coco (Base tanino)	Cascara	<i>Cocos nucifera</i>	Al	
Cochinilla	Insecto	<i>Dactylopius coccus</i>	Al	



Banano (Base tanino)	Tronco	<i>Musa sapientum</i>	Al	
Cochinilla	Insecto	<i>Dactylopius coccus</i>	Al	
Hilo blanco (sin tanino)		<i>Dactylopius coccus</i>	Al	
Cochinilla	Insecto	<i>Dactylopius coccus</i>	Al	
Mangle (Base tanino ligero)	Corteza	<i>Rhizophora Mangle</i>	Al	
Cochinilla (Ligero)	Insecto	<i>Dactylopius coccus</i>		
Palo de Brasil	Corazón de tronco	<i>Heamatoxylon brasiletto</i>	Al	
Palo de tinto (palo de Campeche)	Corazón de trono	<i>Haematoxylon campechianum</i>	Al	
Aguacate	Corteza	<i>Persa americana</i>	Cu	
Coco	Cascara	<i>Cocos nucifera</i>	Cu	
Aguacate (base tanino)	Corteza	<i>Persa americana</i>		
Con Conchinilla	Insecto	<i>Dactylopius coccus</i>	Cu	
Coco (Base tanino)	Cascara	<i>Cocos nucifera</i>		
Con Cochinilla	Insecto	<i>Dactylopius coccus</i>	Cu	
Mangle (Base tanio)	Corteza	<i>Rhizophora Mangle</i>	Al	
Con Cochinilla	Insecto	<i>Dactylopius coccus</i>	eu	
Mangle (Base tanino)	Corteza	<i>Rhizophora Mangle</i>	Al	
Con Cochimilla ligero	Insecto	<i>Dactylopius coccus</i>	Cu	
Aliso+Cochinilla	Corteza + insecto	<i>Alinus arguta + Dactylopius coccus</i>		
Con palo de mora	Corazón de tronco	<i>Chlorophora tinctoria</i>	Al	
Encino	Corteza	<i>Quercus sp.</i>	Fe	
Madre cacao (Ligero)	Corazón de tronco	<i>Gliricidia sepium</i>	Fe	
Aguacate	Corteza	<i>Persea americana</i>	Fe	
Añil denso con Aliso	Polvo	<i>I.guatemalensis</i>	Fe	
	Fruto	<i>Alnus arguta</i>		



Añil denso con Madre cacao	Polvo Corazon de tronco	<i>I.guatemalensis</i> <i>Gliricidia sepium</i>	Fe	
Palo de Campeche	Corazon de tronco	<i>Heamatoxylon campechianum</i>	Sn	
Palo de Campeche	Corazon de tronco	<i>Heamatoxylon campechianum</i>	Cu	
Palo de Campeche	Corazon de tronco	<i>Heamatoxylon campechianum</i>	Fe	
Palo de Campeche	Corazon de tronco	<i>Heamatoxylon campechianum</i>	Fe	
Mangle	Corteza	<i>Rhizophora mangle</i>	Al	
Mangle	Corteza	<i>Rhizophora mangle</i>	Al*	
Mangle	Corteza	<i>Rhizophora mangle</i>	Cu	
Mangle	Corteza	<i>Rhizophora mangle</i>	Fe	
Coco	Cascara	<i>Cocos nucifera</i>	Al	
Coco	Cascara	<i>Cocos nucifera</i>	Cu	
Coco	Cascara	<i>Cocos nucifera</i>	Fe	
Nance	Corteza	<i>Byrsonima crassifolia</i>	Cu	
Nance	Corteza	<i>Byrsonima crassifolia</i>	Fe	
Aguacate	Corteza	<i>Persea americana</i>	Al	
Aguacate	Corteza	<i>Persea americana</i>	Cu	
Caoba	Corteza	<i>Swietenia Jacquin</i>	Cu	
Nacascolo	Fruto	<i>Caesalpinia coriaria</i>	Chi	



Nacascolo	Fruto	<i>Caesalpinia coriaria</i>	Fe	
Aliso	Fruto	<i>Alnus arguta</i>	Cu	
Aliso	Fruto	<i>Alnus arguta</i>	Fe	

Palo de mora	Corazon de Tronco	<i>Chlorophora tintoria</i>	Fe	
Madre cacao	Corazon de Tronco	<i>Gliricidia sepium</i>	Sn	
Guachipilin	Corazon de Tronco	<i>Diphysa floribunda</i>	Al	
Cabello de angel	Parasito Vegetal	<i>Cuscuta corymbosa</i>	Sn	
Cabello de angel	Parasito Vegetal	<i>Cuscuta corymbosa</i>	Al	
Añil (denso)	En Forma de polvo	<i>Indigofera guatimalensis o l. suffruticosa</i>	O	
Añil (Mediano)	En Forma de povo	<i>Indigofera guatimalensis o l. suffruticosa</i>	O	
Añil (Manera Antigua)	En Forma de povo	<i>Indigofera guatimalensis o l. suffruticosa</i>	O	
Sacatinta	Hoja	<i>Justicia spicigera</i>	--	
Cochinilla	Insecto	<i>Dactylopius coccus</i>	Al	
Cochinilla	Insecto	<i>Dactylopius coccus</i>	Sn	
Cochinilla	Insecto	<i>Dactylopius coccus</i>	Cu	
Cochinilla	Insecto	<i>Dactylopius coccus</i>	Fe	
Cochinilla	Insecto	<i>Dactylopius coccus</i>	Fe	
Cochinilla	Insecto	<i>Dactylopius coccus</i>	Chi	



Nance con cochinilla	Corteza Insecto	<i>Byrsonima crassifolia</i>	Al	
Nance con cochinilla	Corteza Insecto	<i>Byrsonima crassifolia</i>	Al	
Cochinilla con palo de mora	Insecto Corazon	<i>Arriba mencionado</i>	Sn	
Cochinilla con palo de mora	Insecto Corazon	<i>Arriba mencionado</i>	Sn	
Granada	Cascara de Fruta	<i>Punica granatum</i>	Al	
Granada	Cascara de Fruta	<i>Punica granatum</i>	Chi	
Añil Parrido con Polo de m	Polvo corazón	<i>Mencionado</i>	Al	
Anil (mediano) polo de mo	Polvo corazón	<i>Mencionado</i>	Al	
Caoba	Corteza	<i>Swietenia humilis ó macrophylla</i> S.	Al	
Café	Hoja	<i>Coffea arabica</i>	Cu	
Cedro	Viruta de Tronco	<i>Cedrela mexicana</i>	Al	
Cedro	Viruta de Tronco	<i>Cedrela mexicana</i>	Cu	
Caoba	Viruta de Tronco	<i>Swietenia macrophylla</i>	Al	
Caoba	Viruta de Tronco	<i>Swietenia macrophylla</i>	Cu	
Mozote	Flor	<i>Bidens bicolor</i>	Cu	

*M=Mordiete Al=aluminio Cu=Cobre Sn=Estaño

Fe = Hierro Chi = Chitaneo O = Hidrosulfito con Soda Caustica



Appendix D

Sources and Resources for Maya colorants: Bibliographic citations

A dozen or so colorants are so well known to Mayanists that no citation makes sense to show the source. Achiote would be an example. It grows everywhere and I would hope most Mayanists realize it is a common colorant for foods and cloth. However yes, a bibliography for each plant will appear in www.maya-ethnobotany.org as we add a dedicated page or PDF or PowerPoint for each individual plant. Since we have 400 plants to find, photograph, and document, we have a long way to go (unless a grant or funding becomes available, in which case we could produce the complete Maya utilitarian plant list, with impressive photographic illustrations, in two years).

We have been gathering information on Maya use of plants since the 1970's and I first experienced Maya use of plants in the mid-1960's onward. Then I worked on waterlily iconography and animals in Maya art for my PhD dissertation (1985; published in 1987 with abundant illustrations). Since then I have been working to improve my understanding of the waterlily flower, plant, seeds, and eco-system. Plus I have become interested in all the other flowers in Maya art. So I have been out in the forests, rivers, mangrove swamps, mountains, and both Atlantic and Pacific coastal areas for the last six or more years. So the present opus is already the result of many years, and countless field trips with a complete photographic crew and a botanist.

We add an additional appendix every several months. This opus is being updated and expanded the last nine or more months (and is now in its 10th edition).

Appendix B shows all the trees in Luis Villar Anleu's book on Guatemalan magic and noble trees.

Appendix C shows all the natural plant dyes listed in a report on Japanese projects (Hideo Kojima and others).

Appendix D tabulates which color dyes are found in which major lists of colorants. The informative book by Stephen Houston, Claudia Brittenham, Cassandra Mesick, Alexandre Tokovinine, and Christina Warinner, 2009, on *A History of Ancient Maya Color*, University of Texas Press, has one of the most helpful summaries of colorants. I would estimate the authors worked weeks or months in a good library to harvest this list. This appendix of theirs is on their pages 103-109.

I felt it would be helpful to students and scholars, as well as to the Maya people who are still using Maya colorants today, to have this list in alphabetical order. So Mishelle Mis, general assistant at FLAAR Mesoamerica, put the list in A to Z order. Then Priscila Sandoval, head botanist at FLAAR Mesoamerica, proofread the scientific names. We provide the alphabetical reordering as the second half of Appendix D.



We apologize if the Yucatec Maya or other Mayan language names have a spelling glitch. As soon as the world economy recuperates, we would like to provide a position for a capable Guatemalan student of linguistics. Then it would be useful to have the list in alphabetical order in Yucatec Maya, and then in appropriate Lowland Mayan languages such as Chol, Chorti, and the many important Highland Mayan languages.

Sources and Resources for Maya colorants: Bibliographic citations

Botanical name	Common names	Already in the FLAAR inventory of colorants	Kojima and related Lake Atitlan sources such as Manuel Mendez G.	Houston et al.
<i>Acacia farnesiana</i>	Cassie, sweet acacia, huisache			
<i>Alnus sp</i>	Ilano, aliso, ilamo			
<i>Alocasa sp</i>	Malanga			
<i>Aloe vera</i>	Sabila			
<i>Annona reticulata</i>	Anona			
<i>Argythamnia tinctoria</i>	Azafran, tinta roja			
<i>Bacchalis salicifolia</i>	Chilca			
<i>Beta vulgaris</i>	Remolacha			
<i>Bidens bicolor</i>	Mozote			
<i>Bidens sulphurea</i>	Xochipalli, orange cosmos			
<i>Bixa orellana</i>	Annato, achiote			
<i>Byrsonima crassifolia</i>	Nance			
<i>Caesalpinia echinata</i>	Uitzquauitl			
<i>Caesalpinia coriaria</i>	Nacascolo			
<i>Cedrela mexicana</i>	Cedro			
<i>Chamaesyce prostrate</i>	Golondrina			
<i>Chlorophora tinctoria</i>	Palo de mora			
<i>Cocos nucifera</i>	Coco			
<i>Coffea arabica</i>	Café			
<i>Colubrina elliptica</i>				
<i>Colubrina reclinata</i>				
<i>Commelina coelestis</i>				



<i>Crotalaria longirostrata</i>	Chipilin				
<i>Cuscuta sp.</i>	Barba de leon				
<i>Dactylopius coccus</i>	Grana, cochinilla				
<i>Diospyros digyna</i>	Zapote negro				
<i>Diphysa floribunda</i>	Guachipilin				
<i>Daucus carota</i>	Zanahoria				
<i>Erythrina americana</i>	Palo de pito				
<i>Exosterna caribaeum</i>					
<i>Gliricidia sepium</i>	Madre cacao				
<i>Guaiacum coulteri</i>					
<i>Haematoxylon campechianum</i>	Sacatinta, palo de tinta, palo de campeche				
<i>Haematoxylum brasiletto</i>	Palo de tinta brasil				
<i>Hymenaea courbaril</i>	Jatobá				
<i>Hypericum perforatum</i>	Pericon				
<i>Indigofera guatemalensis</i>	Indigo, añil				
<i>Indigofera suffruticosa</i>	Indigo, añil				
<i>Jatropha dioica</i>					
<i>Justicia spicigera</i> y <i>Justicia tinctoria</i>	Añil, sacatinta				
<i>Leonurus cardiaca</i>	Cola de leon				
<i>Karwinskia calderoni</i>	Capulin				
<i>Miconia laevigata</i>					
<i>Musa sapientum</i>	Banano				
<i>Neea sp</i>					
<i>Neea fagifolia</i>					
<i>Opuntia sp.</i>					
<i>Persea americana</i>	aguacate				
<i>Phytolacca icosandra</i>	Jaboncillo				
<i>Pinus sp.</i>	Pitch pine				
<i>Pithecellobium albicans</i>					
<i>Piscidia piscipula</i>					
<i>Pouteria mammosa</i>	Chulul				
<i>Psidium guajava</i>	Palo de guayaba				
<i>Prosopis juliflora</i>	Mesquite				
<i>Punica granatum</i>	Granada				
<i>Purpura pansa</i>	Purpura				



<i>Quercus sp</i>	Encino				
<i>Randia truncata</i>					
<i>Randia lactevirens</i>					
<i>Randia obcordata</i>					
<i>Rhizophora mangle</i>	Mangle rojo				
<i>Rivina humilis</i>					
<i>Salvia hispanica</i>	Chia				
<i>Simira salvadorensis</i>					
<i>Swietenia jacquin</i>	Caoba				
<i>Tagetes erecta</i>	Flor de muerto				
<i>Tradescantia spathacea</i>					

Absent

Present

Note that it would be useful in the future to provide a list of the mordants. But even with no recipes, the list by Houston and co-authors is really a nice reference. To learn more about mordants, Google about mordants and you will find helpful information. Kojima already lists mordants for the natural plant materials that he discusses. However are these modern mordants (?). It would be great to have a student or chemist or interested individual experiment to learn the possible natural mordants.



Bibliography

This is an introductory bibliography. You can get a more complete bibliography in any major monograph.

I will list the web sites in the reports on individual plants.

Since with a staff of 20+ there are not really any universities which have space for the FLAAR team, I have not been on-campus for about six years now. Ironic since I loaned my entire library to the Museo Popol Vuh, Universidad Francisco Marroquin. The other irony is that although I live only about 3 km from the university, it's such a pain to be limited to opening hours of a university or museum library so I built up a basic (small) second library of ethnobotany and ethnozoology in the FLAAR offices. Since I live in the same building I have access to my books 24 hours a day.

Although my background is at universities, frankly I prefer to work from my excursions to do photography and asking local people what plants they use. So I did not use either of Lundell's useful works in the initial preparation of this comprehensive listing of Maya plants and flowers. Once I was through building up my own list, by reading tons of web sites after I came back from the field, then I compared my list with that of Lundell 1938. We each found plants not listed by the other, so the trade was about equal.

Although a biologist could hopefully add many titles, what we have gathered together on the following pages is a good start for iconographers, epigraphers, archaeologists, ethnographers as well as botanists who are interested in the plants related to pre-Columbian cultures.

For the articles, they are endless. It is much easier for a scholar to go to the bibliography in a monograph, plus on the Internet, and get the technical articles. So we concentrate on finding and listing the monographs, since we can purchase them at reasonable price. It is hard for us to obtain articles because of the excessive prices demanded by resellers.

The bloodsucking resellers of articles from scholarly journals should be ashamed of their pricing of reprints. It is sad that scholars allow this to happen, though I am fully aware of the tradition of having your articles in peer-reviewed journals. To us, peers include our readers, which so far are over a million people in recent years. Our goal is to provide information to as wide an audience of interested people as possible. We include scholars and students but also wish a wider general public to learn about the ethnobotany of the Maya without the public being at the mercy of sensationalistic or other skewed visions. It is sad when the public learns more from Domesday in 2012 than from archaeological tomes. A good balance are the informative publications such as those by botanist Ana Lucrecia de MacVean, Universidad del Valle, Guatemala.



It is much faster to publish our own articles electronically rather than go through peer reviewed journals (which are read, at most, by a few thousand people during an entire year). Our FLAAR Reports are read by that many people in a single month, plus this way we can include full-color illustrations. So we issue our own reports in PDF format (as free downloads).

Coverage is for Maya plants; not Aztec or Mixtec

To keep this project realistic, we cover plants of interest to the Maya people, past, present and future. I also do research on Olmec, Teotihuacan, Aztec, Mixtec, Toltec, Zapotec and Classic Veracruz iconography, ethnobotany, and ethnozoology, but these cultures are not the focus of the present report on FLAAR research of recent past and present years.

For the Maya coverage is primarily on Guatemala, then Belize (since the output is manageable) and less thorough on Mexico (due to the immense size of the bibliography on plants of Mexico). I am interested in Honduras and FLAAR has done iconography photography there over many decades, but books on Guatemala are more realistic for us to access. We do not have any university providing us facilities nor funding; and there are no outside grants for this long-range ethnobotanical study either. Nonetheless, the list of plants on previous pages is more complete in many theme areas than that of the exceptionally well done summary by Lundell. I would have to check scores of articles and dozens of monographs on Mayan agriculture, but I would be pleasantly surprised if any of them had a tabulation that is as complete as in the previous pages.

We could do even better photography and provide more coverage if grants and funding were available, but we have done our best with our resources.

FLAAR is open to cooperating with botanical gardens and university departments

For both research and teaching purposes the FLAAR Photo Archive section on Mayan ethnobotany probably is one of the larger photography reference archives for those plants and flowers that we have found and photographed. Rather than having a few photos of thousands of species, we may have 500 photographs of a single species (such as of “wiskil”)

Although water lilies are a common flower, and often photographed, and readily available, I would calculate that our photo archive is one of the largest available, and not many other archives have images of 60 MB each photo. Plus our photos are not totally burned out in the white part of the spectrum. We also have underwater images of the water lilies.



If a botanical garden, or university, or museum of natural history wishes to do joint projects with us, this means that we would tend to make major sections of our photo archive available to that institution in return for their help in raising funds for our projects.

And this is a good time to point out that although FLAAR has enviable quantity and quality of professional photography equipment, both for lab and for field trips, we are not wealthy in cash and are not ourselves a source of funding. We have been successful due to decades of grinding hard labor out in the field and years of working 12 to 14 hour days, 7 days a week in our office. This makes up for our lack of affluency in cash.

If we also had adequate funding, considering our experience, our knowledge of where to go for most species, we would be a good partner for any institute in Latin America, North America, Europe or Asia.

We know people who know where to find plants. We are familiar with security issues in Guatemala, And our Guatemalan staff are familiar with their colleagues in the country (Hellmuth, by accident of birth, was not born in Guatemala, but has certainly made up for this by producing information of use to Guatemalan students and scholars for decades). We are also proud of the number of capable Guatemalan students who have received priceless training in digital photography, digital imaging, and report writing at FLAAR.

Comment on coverage of plants by the various countries of Mesoamerica

Mexico has produced dozens of gorgeous coffee table books on the plants and flowers of Mexico. This is because many successful commercial companies in Mexico have a tradition to issue an annual "Christmas present" corporate presentation book on topics of interest to local national pride.

Guatemala has produced a few such books on topics of national pride, but nowhere near as many as has Mexico.

We at FLAAR Mesoamerica would enjoy cooperating with corporations to produce corporate-sponsored books on utilitarian plants of the Mesoamerican companies.

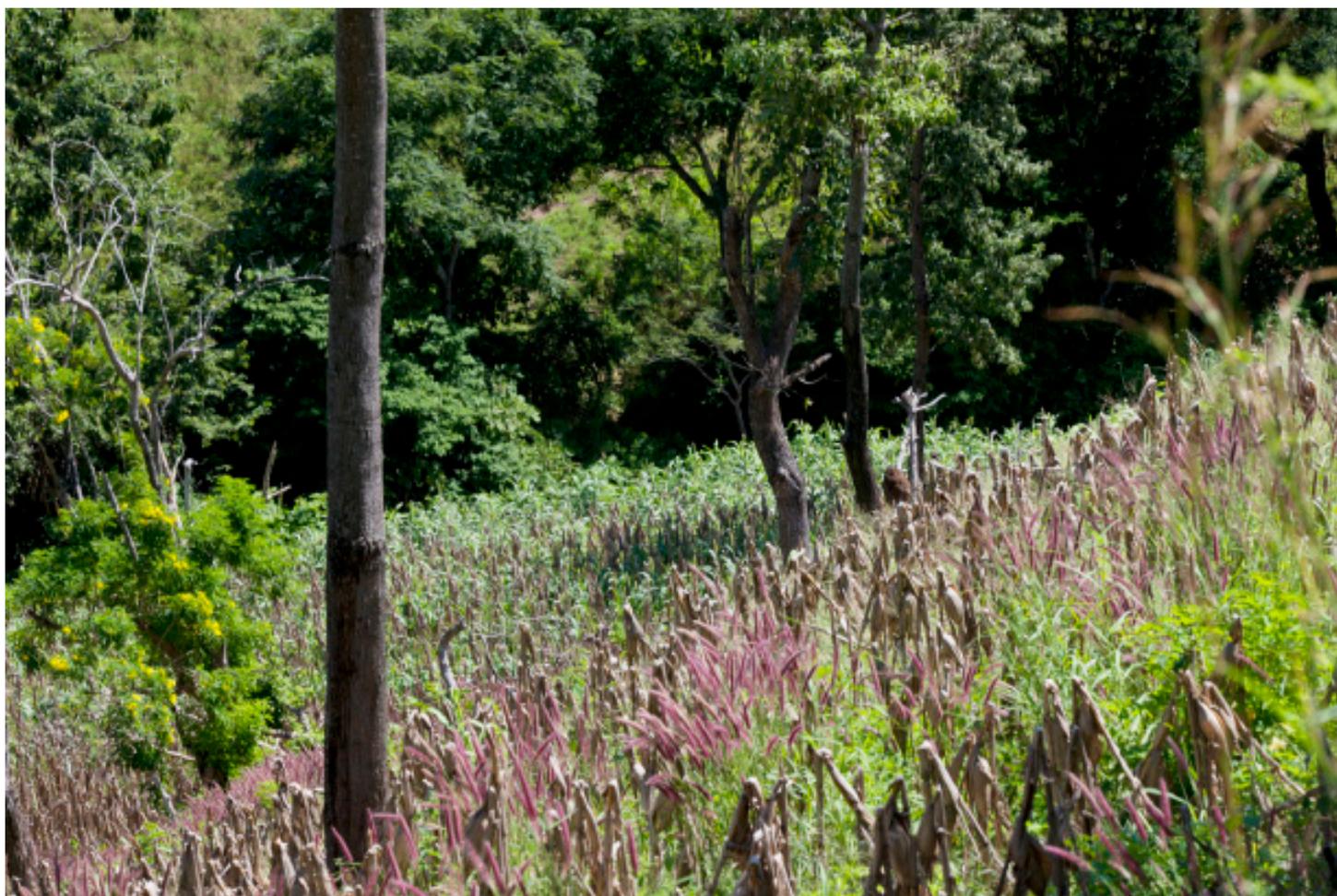
Costa Rica has produced the most titles on flora and fauna of any country in Central America. Plus the illustrations are all in color. And each tome covers the selected topic pretty well.

Belize does well with web sites on botany related to the Maya culture (we mention one below). But I have not seen as many coffee table books on ethnobotany of Belize as exist for Mexico or even Guatemala.



One of my goals with this FLAAR Reports is to encourage institutes, individuals, and corporations to move forward with better coverage of the tropical plants of their countries. I have not seen monographs from Honduras or El Salvador, for example, at the level of the books produced in Costa Rica and Mexico. FLAAR would be glad to cooperate with botanists from these countries (and in Costa Rica, Belize, and Mexico also).

But FLAAR is rather obviously dedicated with an interest, enthusiasm in working with botanists, co-authors, and book producers in Guatemala to generate funding from private individuals and corporations to move our digital photography of plants forward to completion so that hard-cover coffee table books as well as scholarly monographs can be produced.



Although we do most of our photography in Guatemala, we also wish to extend our coverage to Honduras, Mexico, and Belize. Here are recent photographs from Parque Nacional El Imposible, El Salvador. This visit was arranged courtesy of a local biologist, Melissa and her husband Luis.



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1956 The Rain Forests of Golfo Dulce. University of Florida Press. Reissued 1977, Stanford University Press

AJQUIJAY ON, Adela

1997 CholQ'Utu'n recetario de cocina Maya.Iximulew, Guatemala 296 pages.

This is one of the few cookbooks that is really based on actual Maya cooking, albeit of course in today's world.

ANDERSON, E. N. et al.

2003 Those who bring the Flowers: Maya ethnobotany in Quintana Roo, Mexico. El Colegio de la Frontera Sur, Chetumal, Mexico.

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ARAGON, Claudia

2004 Arboles de Costa Rica. Trees of Costa Rica, Vol. III. INBIO, Costa Rica. 556 pages.

Trees of Guatemala is only in English and was written outside Guatemala. Trees of Costa Rica is bi-lingual, is written entirely in Costa Rica, and published in Costa Rica. In general, INBIO of Costa Rica has published more scholarly research than any institute in any other country of Central America.

And, the print quality of the INBIO books is consistently better than most monographs or journals published elsewhere in Central America. But, no book is perfect. The significant downside of this handsome publication is that you can't see much or any detail on the flowers. The fruit is adequately shown, and of course the leaves are perfectly illustrated, but weak on any dedicated to the flowers other than showing them at a size that is not large enough to really assist a curious reader.



Font is very small and pages don't open adequately to read the book comfortably. I bet that if you tried to open any page the binding would crack and the book would fall apart before you finished reading it.

I seem to have found only Volume III (at a book fair in Guatemala about two years ago).

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2003 Nomenclatura, Forma de Vida, Uso, Manejo y Distribucion de las Especies Vegetales de la Peninsula de Yucatan. Universidad Autonoma de Yucatan, Merida, Mexico.

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2010 Diversidad de cactaceas y su aprovechamiento en Mexico. Instituto de Biologia, Jardin Botanico, UNAM. PowerPoint, on-line. 27 slides.

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2007 Guate Flora Plantas ornamentales más utilizadas en jardines guatemaltecos. SOLMAR, Guatemala.

Someone forgot to put any pagination in this book, and I somehow am thus not inspired to count the pages myself. Shows a purple water lily flower and not the correct white one. Sadly does not mention which flowers are native and which are introduced. But if you wish to have a garden in Central America, or you wish to see photographs of several hundred flowers, this book could potentially be useful.

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2005 Evidence for Ritual Use of Entheogens in Ancient Mesoamerica and the Implications for the Approach to Religion and Worldview. On-line, 33 pages.

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2001 Biodiversity and Conservation of Siera Chinaja: A rapid assessment of biophysical, socioeconomic, and management factors in Alta Verapaz, Guatemala. MS, University of Montana. 169 pages.

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An update of his PhD dissertation of 1940. Whew, nice to still be working on a topic after 60 years !

BUENO, Joaquin, ALVAREZ, Fernando and Silvia SANTIAGO-FRAGOSO (editors)

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1935 Piedras Negras Pottery. Piedras Negras Preliminary Papers, University Museum, No. 4.

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2006 Vademecum nacional de plantas medicinales. Ministerio de Salud Pública y Asistencia Social; Programa Nacional de Medicina Popular Tradicional y Alternativa, USAC.

I have two completely different editions; but only front cover is different. Inside is comparable but the 2009 edition has 314 pages; the 2006 edition has 262 pages. The first one I obtained was published Editorial Universitaria, Universidad de San Carlos de Guatemala, dated 2009. Only recently did I find the earlier edition.

CAMACHO Pulido, Juan R.

2005 Plantas comestibles silvestres especies de mayor uso. IMSS, Mexico. 104 pages.

In coffee table book format, but not really a slick style. Actually includes many plants that are not in other books. But most is on the dry areas of Mexico, including the north, so not really pertinent to the Maya homeland. But still worthwhile as a reference due to mention and nice photographic coverage of plants that are not commonly included in other books. One example would be the water plant, berro, pp. 20-21.



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2006 Cacao, Vanilla and Annatto: Three Production and Exchange Systems in the Southern Maya Lowlands, XVI-XVII Centuries Journal of Latin American Geography - Volume 5, Number 2, 2006, pp. 29-52.

CASTILLO MONT, Juan J.

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Chízmar FERNANDEZ, Carla

2009 Plantas comestibles de Centroamerica. Instituto Nacional de Biodiversidad, INBio, Costa Rica. 360 pages.

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CONRAD, H. S.

1905 The waterlilies: A monograph of the genus Nymphaea. Carnegie Institution, Washington, D.C.

COUPLAN, François

1998 The Encyclopedia of Edible Plants of North America: Nature's Green Feast. Keats Publishing, Inc. 584 pages.

Useful for USA and perhaps Canada, but the author clearly states he does not intend to cover "tropical Mexico." However technically, geographically, "North America" extends as far south in Mexico as the Isthmus of Tehuantepec. This book specifically excludes tropical Veracruz and tropical West Mexico. I would suggest retitling the book "USA, Canada, and Northern Mexico since the edible plants of Highland Central Mexico get complex quickly.



Has a nice glossary and ample bibliography, but again, this is not a book that covers pre-Columbian Mesoamerica. Nonetheless, many plants from Mesoamerica are also grown in northern Mexico and southern USA, so the book is an acceptable reference.

Only a small portion of the plants are illustrated (in nice line drawings by the author). No photographs; not even B&W.

CROW, Garrett E.

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2008 Duke's Handbook of Medicinal Herbs of Latin America. CRC Press. 832 pages.

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2009 Flores de pasión de Costa Rica: Historia natural e identificación. Editorial INBio. 448 pages.



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2010 The Maya Forest: Destroyed or cultivated by the ancient Maya? PNAAS, Proceedings of the National Academy of Sciences. Vol. 107, no. 3: 953-954.

FIGUEROA viuda de **BALSELLS, Catalina**

2006 Cocina Guatemalteca arte, sabor y colorido. Editorial Piedra Santa. 140 pages.

It would be nice to have a book on recipes related to the Maya and their indigenous foods. Most cookbooks, such as the one here on Guatemalan recipes (except for rare ones in Mexico) tend to include onions, lemons, and a dozen foods that are not pre-Columbian.

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1982 Maya Subsistence: Studies in Memory of Dennis E. Puleston. Academic Press, New York.

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1979 The Natural History of the Cotton Tribe. Texas A&M University Press, College Station, TX.

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2002 Foods of the Maya: a taste of the Yucatan. University of New Mexico Press. 128 pages.

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2003 The Lowland Maya Area: Three Millennia at the Human-Wildland Interface, Riverside University of California. 659 pages.

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The Instituto Nacional de Biodiversidad has published more books on flora and fauna of tropical Central America, with more nice color photos, professionally printed on quality paper than any other country in Mesoamerica.

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2001 Mansfeld's Encyclopedia of Agricultural and Horticultural Crops. Springer. 3700 pages.

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2009 Trees of Belize. Self-published. 120 pages.

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1977 Cholti-Lacandon (Chiapas) and Peten-Ytza Agriculture, Settlement Pattern and Population. In *Social Process in Maya Prehistory*, edited by Norman Hammond, pp. 421-448. Academic Press, London.

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2006 *Heilen und Kochen mit Aloe Vera*. Droemer Knaur. 160 pages.

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HOUSTON, Stephen, BRITTENHAM, Claudia, MESICK, Cassandra, TOKOVININE, Alexandre, and Christina WARINNER

2009 *Veiled Brightness: A History of Ancient Maya Color*. University of Texas Press. 148 pages.

Mostly on the cultural associations of color; for plant sources of color has short chapter but an extensive list back in an appendix area. This is not a book on ethnobotany, it is a discussion of color which includes color from plants. The list of plants which provide colorants, Appendix pp. 103-109, probably took someone many months in a really good library, and represents a huge amount of work.

What would be a good next step is for a student to take this list, find each plant one by one, and do an ethnobotanical study of them all.



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Michigan Academy of Science, Arts and Letters, Papers, Vol. 24, No. 1, pp. 37-56.

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1998 Edible leaves of the tropics. Echo. 194 pages.

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2002 La vegetaion de Calakmul, Campeche, Mexico: Clasificacion, descripcion y distribucion.
Boletin de la Sociedad Botanica de Mexico, Dic, Num. 71, pp. 7-32.



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1993 Campeche en Flor. Universidad Autonoma de Campeche, Centro de Investigaciones en Bosques Tropicales, Campeche, Mexico. 226 pages.

Carefully identifies which plants are native and which were introduced from other parts of the world. Photographs are typical home-made but serve their basic purpose to show several hundred Campeche flowers. Campeche is a good chunk of the former and present Maya homeland. Would be helpful if a book like this were available on Chiapas, Tabasco, Yucatan, Quintana Roo, Campeche, Peten, and other parts of pre-Columbian Mesoamerica.



I hope botanists can use books such as this to see why over-exposed white color removes all and any detail of the flower.

NELSON, Lewis S., SHIH, Richard D., and Michael J. BALICK

2007 Handbook of Poisonous and Injurious Plants. The New York Botanical Garden, Springer. 340 pages.

NOGUERA, Felipe A., VEGA RIVERA, Jorge H., GARCIA ALDRETE, Alfonso N., and Mauricio QUESADA AVENDANO

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Medicinal plants of Central America. Covers primarily Costa Rica and its neighbors but also includes Guatemala. Available on-line. Excellent book, helpful descriptions; photographs are all in color and mostly good quality.

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OLAYA, Clara Ines

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Well illustrated coffee-table book. Shows tree, fruit, flower, recipes, but only of the more popular fruits. Good for each fruit it does cover, but this is not an encyclopedia of all fruits of tropical America whatsoever.

OLMSTED, I, and G. R. DURAN

1987 Listado floristico de la Reserva de Sian Ka'an. Amigos de Sian Ka'an, Puerto Morelos, Quintana Roo, Mexico. 71 pages.



PARKER, Tracey

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A great book because it has everything in one volume. Even without a single photograph (other than the one on the front cover) this is still an essential book. However this book is not intended to be for ethnobotanical uses. In the future would help to have an ethnobotanical co-author. So although this book is a bible, you still need the ethnobotanical monographs on Mexican trees and hundreds of articles to get the full picture of the ethnobotany of trees for the Maya past and present.

When you utilize this book realize that this is a library compilation of the monographs of the 1930's through 1950's. This is a summary of all that has been written before: it is not intended as fresh new field work by the author herself.

I would add that this book is really reasonable priced considering it is over a thousand pages.

A complete index to this book is available on-line: www.bookmasters.com/marktplc/02192index.pdf

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231 pages.

Thorough, but a botanist's book, not an ethno-botanists'.

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de RIOJAS, Regina Aquirre and Elfriede de PÖLL

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ROBLES GIL, Patricio (editor) and Rodolfo DIRZO (author)

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ROSEN, Winifred and Andrew T. WEIL

2004 *From Chocolate to Morphine: Everything You Need to Know About Mind-Altering Drugs*.

ROSENGARTEN, Frederic, Jr.

1984 *The Book of Edible Nuts*. Dover. 384 pages.

Helpful book but definitely not focused on Mesoamerica. For example, although includes coconuts, does not have chapters on palm “nuts” such as corozo palm. Yet he includes seeds: from pumpkin and watermelon! Totally missing is a chapter on the walnut (my second favorite nut food, after cashew). Nonetheless, essential reading if you need insight into the few nuts that he does cover which also occur in Mesoamerica.

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1912 *Sacred Flowers of the Aztecs*. Revised and reprinted from the *Volta Review*, Vol. XIV, No. 2, May, 1912. Judd & Detweiler, Washington D.C.

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SCHLEIFFER, Hedwig, compiler

1973 Sacred Narcotic Plants of the New World Indians. An Anthology of Texas from the 16th century to date. Hafner Press. 156 pages.

Not a book I would rush out to buy. There are better (more comprehensive) monographs on sacred plants of Mesoamerica.

SCHLESINGER, Victoria

2001 Animals & Plants of the Ancient Maya. A Guide. University of Texas Press. 351 pages.

For over a decade this has been the primary textbook for students. The illustrations by Juan C. Chab-Medina are great. But the list of plants is woefully incomplete. The list of animals is okay but also nowhere near complete. It is because of the utter lack of adequate listings of plants and animals in any textbook on the Maya that I have spent so many years out in the fields, forests, and swamps of Guaemala tracking down plants. And many years in my library and hours on the Internet.

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YOUNG, Allen M.

2007 The Chocolate Tree: A Natural History of Cacao, Revised and expanded edition, Univ. of Florida Press.

(for Charles ZIDAR, see articles below; we keep track of references by books and articles; this way it is easier for us to track down each kind of reference to add to our reference library.)

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I prefer to list articles separately from monographs in part because there are so many that they quickly clog a bibliography. It is easier to see the monographs if they are not surrounded by articles.

Thousands of articles can be found. I prefer to list the monographs, since in these you can find all the articles. Since the Internet is available to Google any subject, any plant, and get all the articles, this is more realistic than re-listing every article here. But I do list those articles which are especially useful, or which I have consulted myself.

ANDRADE-CETTO, Adolfo and Michael HEINRICH

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Exceptionally well rendered colored line drawings by Molly Bang.

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Seventh edition added a list of plants for colorants as Appendix C., November 14, 2011.

Eighth edition added several more monographs to the bibliography and added two new theme groups: plants for smoking and trees with spines.

Ninth edition added seven monographs on medicinal plants. Plus we improved the listings for three or four plants, based on a four-day field trip to Rio Dulce, Izabal area of tropical Guatemala. Written the last weeks of November, published December 5, 2011.



Nicholas Hellmuth photographing ceiba

Nicholas Hellmuth and Sofia Monzon photographing waterlily
eco-system in Guatemala, 2010.





FLAAR has one of the largest archives of photographs of the water lily in the world. This is in part because this plant was the subject of Dr Hellmuth's PhD dissertation (available in coffee table edition as *Monster und Menschen in der Maya Kunst*, ADEVA, 1987; available from FLAAR in hardcover and leather bound autographed edition).

The second reason we are building up such a large photo archive on the water lily is because this is the flower most frequently pictured in Mayan art. Why is it so common? Hmmm, seems the flower has some tasty ingredients.

But so far I have resisted trying these. Our main interest is the iconography, epigraphic, mythical, and ethnobotanical value of this plant. But we estimate this plant was a major "food" resource for the pre-Columbian peoples.

