

Maya

Ethnobotany

Complete Inventory

Fruits, nuts, root crops, grains, construction materials,
utilitarian uses, sacred plants, sacred flowers



Guatemala, Mexico, Belize, Honduras

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. It has at most several hundred plants; I have not counted all the plants I have found, but I estimate the quantity in this report by FLAAR is over 400 plants.

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 CentroAmerica (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 now umteenth edition update and improvement on our first edition of about three years ago (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 compilations 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 were 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 several 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. During two years ago (2012) I found most of these plants buried in technical articles or monographs; many other species I found in-person in house-side gardens and milpas.

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). During November and December 2012 we took probably 23 Gigabytes of additional photographs. Presently (in early 2014) we have about 78,000 high-resolution photographs. We hope to find a university or botanical garden which would like to acquire this unequalled research so that there is funding to finish finding and photographing the plants which are still missing.

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; then Daniela da'Costa (Universidad del Valle) and presently Ilena Garcia. 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, Elfriede Pöll, and Armando Caceres 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 and ethnographer. 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. Topics such as vegetables can fill an entire thesis. Sacred flowers would encompass botany, ethnobotany, and iconography, etc. My mania to list “everything” is a constant stumbling block to getting things finished.

There are thousands of plants and to cover even all the utilitarian plants 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 months 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 ethnobotanical 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 tradition of listing all antiquated botanical 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 2014. 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.



leaf-cutting ant by Nicholas Hellmuth



This report was an Annual Report for 2010-2011

and then for 2012

This report was originally 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 our initial lists in a nice tabulated layout. 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 cooperated with Mirtha Cano though she now worked for the Parque Nacional Tikal, appropriately as a biologist, up through the end of 2013 and first month of 2014. At that point she moved to a new area of Guatemala.

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

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 in 2011 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). Parrot Digigraphic earlier provided a complete Canon EOS-1Ds Mark III system to FLAAR. We thank Greg Lamb, Global Imaging, for providing a Phase One P25+ digital back (for our Hasselblad). Unfortunately the Phase One sensor wore out by late 2012 and the Canon camera was stolen in early 2014: we are now working a raising funds to replace both with newer and better equipment.

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 IQ180 model 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. However we do not have the \$40K that this better camera would cost, so we continue to use the several-year-old P25+ It wore out by the end of 2012.

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. Season by season we have found more plants during field trips; and long hours of research with monographs and peer-reviewed journal articles. So now, as we enter 2014, this is our umteenth edition.

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

This list is the thirteenth 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 thirteenth edition. It has more entries in the bibliography, a few new theme sections (including a section on blood-sap trees), and various corrections, especially in the list of flavorings for cacao, which is a section I am focused on finding each species, one by one.

During December 2011 I worked to create the 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.

Some e-mail systems at large corporations will not accept an attachment over 5 megabytes, so we are moving the bibliography to become a separate PDF of its own.

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, by Nicholas Hellmuth.

Note for twelfth edition

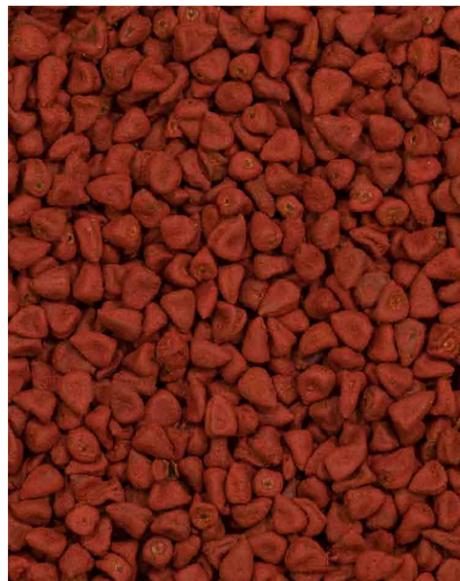
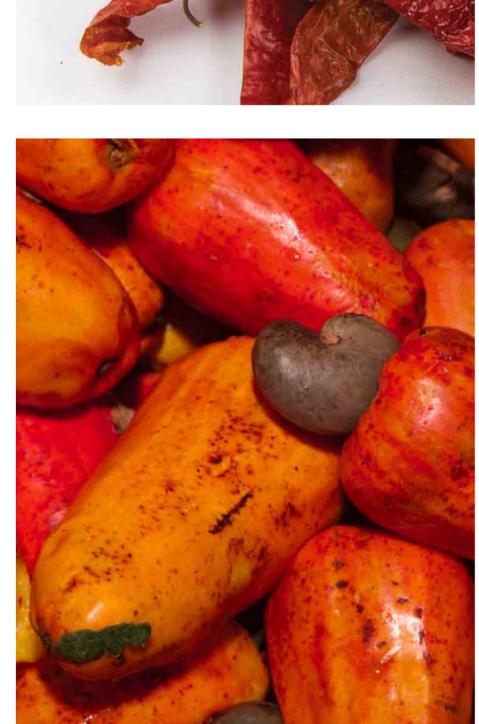
Already by the third edition (two years ago) this list of plants was longer than that of Lundell "Plants probably used by the Maya...". Today in 2013 the list has continued to grow as I find more plants on field trips, and during botanical research in libraries. The list is now so long that it will need to eventually be reorganized by alphabetical order and an index will be needed. Presently I have been adding so many plants that the original concept is in need of reorganization. I may opt to have a version with tabulations by use-theme.

In the meantime, however, I wanted to get this year 2013 version out so that students could have this available for the current semester.

Any professor who wishes to use FLAAR Reports in their curriculum are allowed to have their students download the reports at no cost, either from www.maya-archaeology.org or www.maya-ethnobotany.org.

Note for this thirteenth edition

We now have arranged several theme plant groups alphabetically by species. Most botanical treatises arrange plants by family, and A to Z by genus within a family. I prefer to make it easier for scholars in all disciplines to recognize the plants so I arrange the A to Z order by individual plant (genus and then by species within a genus).



Edible plants

Grains

Maize, *Zea mays*, corn

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.

Beans of many different varieties and colors.

Chaya, roctish (K’ekchi), *Cnidocolus aconitifolius*, toxic unless cooked. Booth (1992) gives *Cnidocolus chayamansa* Mill., citing Standley and Steyermark 1949.

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 until it is better documented. Tree tomato is common at altitudes in Guatemala higher than that of Lake Atitlan (Lake Atitlan itself is not high enough).

Tomato, *Lycopersicum lycopersicum*

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

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 melon (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).



Maize, corn



Beans



Calabaza

Sometimes it is only the seed of a squash that is eaten (pepitoria) 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.

Phytolacca rivinoides Kunth & Bouche (Standley and Steyermark 1946).

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

Tinantia erecta Jacq. K'ekchi, tziton, cana de cristo, pleado (Booth 1992:295).

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 until it is better documented. Tree tomato is common at altitudes in Guatemala higher than that of Lake Atitlan (Lake Atitlan itself is not high enough).



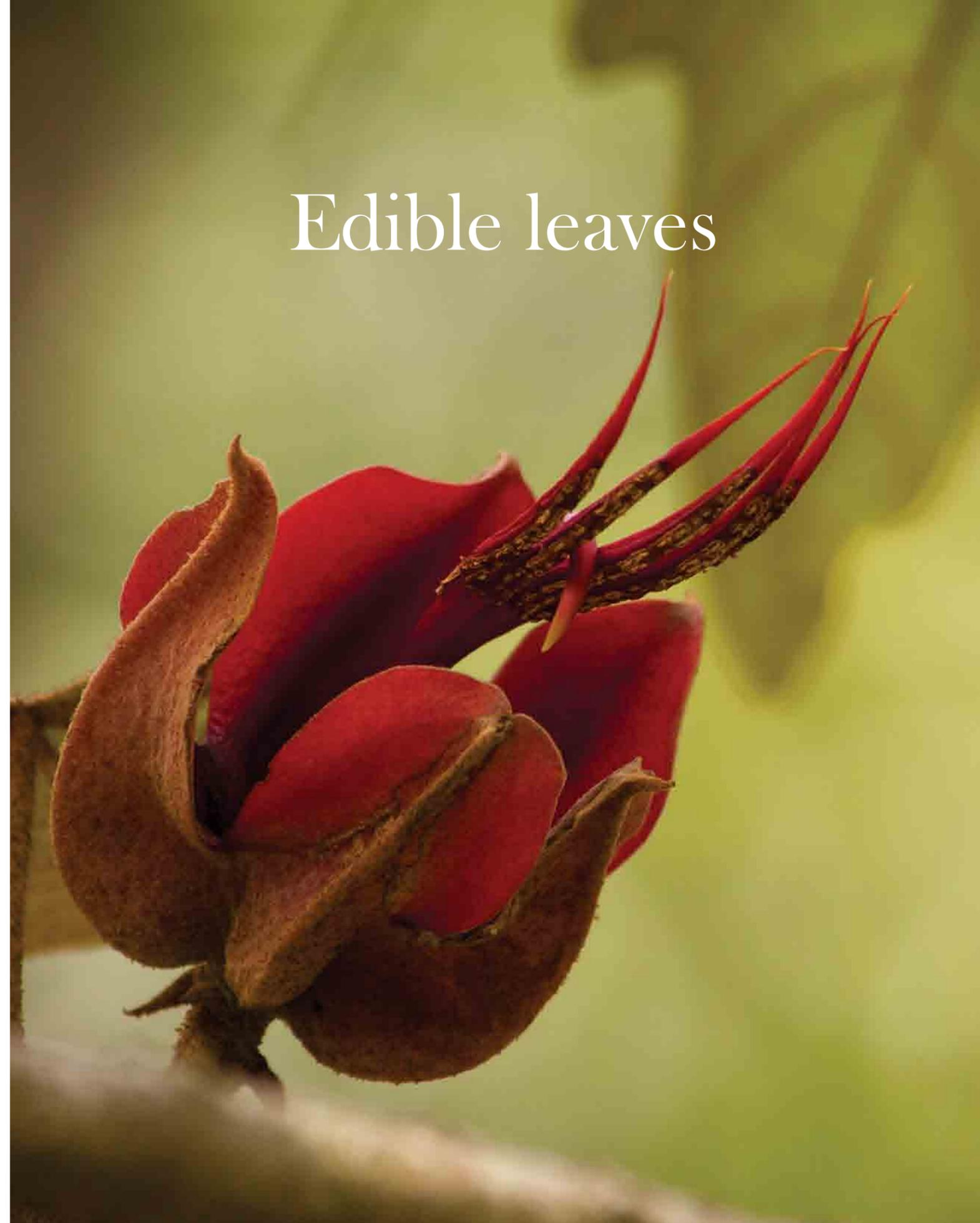
Tomatillo



Tomato



Tomatillo



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.

Amaranthus cruentus and/or *Amaranthus hypochondriacus*, **Bledo**, amaranth greens Booth (1992:290) uses *Amaranthus caudatus* L. based on Figueroa 1983 and Perez and Salan 1986).

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

Cestrum racemosum (Chízmar 2009:302-303).

Chilacayote, guicoy, cucurbita ficifolia B. (Booth 1992:292 based on Perez and Salan 1986).

Chiranthodendron pentadactylon, **Canak**, arbol de las manitas,

Clerodendrum ligustrinum (Jacq.); *moste*, *ikimte'*, *itsinte'* (Barrera 1976), leaves to flavor fish (Gibson in Standley, Williams and Gibson 1973: 193). Family Lamiaceae

Cnidosculus aconitifolius, **Chaya**.

Crotalaria longirostrata, **Chipilin**.

Cucurbita moschata, **Calabash**,

Dahlia imperialis, Roetzl. **Dablia**, Called txoloj by K'ekchi (Booth 1992 based on Nash and Williams 1976). Family Verbenaceae.

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

Lippia graveolens HBK., leaves as a flavoring (Gibson in Standley, Williams and Gibson 1973: 211).

Lycianthes synanthera B., **Chomtee** (K 'ekchi), chilete dulce (Chiapas), (Cotto 1999:2-3). Family Solanaceae.

Lycianthes synanthera B., Bitter, chomtee (Booth 1992 based on Gentry and Standley 1974).

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

Myriocarpa longipes Liebm. (Booth 1992 based on Standley and Steyermark 1952).

Pimenta dioica, **Allspice**, pimenta gorda, leaves are used for tea.

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

Sinclairia sublobata (Chízmar 2009:113-116).

Solanum americanum Mill., **Macuy**.



Crotalaria longirostrata, **Chipilin**



Canak arbol de las manitas



Dahlia imperialis



Guicoy



pimenta gorda



Other Edible seeds

The plants below are primarily seeds of trees, or vines (Pepitorio). Seeds of grains are already listed previously, in a separate category, namely grains.

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

Guanacaste, *Enterolobium cyclocarpum* (Niembro Rocas 2002, MacVean 2003:84-85)

Cualote, *Guazuma ulmifolia* Lam. (MacVean 2003:128-129).

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***

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

Pseudobombax ellipticum, shaving brush tree (flower is shaped like a shaving brush). I doubt many people eat the seeds, and I would not wish to try (considering that the tree is also known as amapola).

Sterculia apetala, castaña, 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). This tree produces a supposedly edible nut, but I doubt many people eat it today, a shame, as this tree is fast growing and is quite common in its tropical habitat.

We will be adding more seeds from trees of the Bombacaceae family as we complete our research on this important plant family.



Jicara



Bernoullia flammea, Mapola flower

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

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**.

Vallesia glabra Cav. (Martin et al. 1987:82).



Cacao seeds



Paterna



Cacao seeds



Cacao seeds

Berries

This list will depend on how you define what is a "berry."

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).

White Maya Tree, *Miconia argentea*

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

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

Vaccinium consanguineum (Chízmar 2009:174-175).

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)

Annona cherimola, **Anona**, cherimoya,

Annona glabra, **Anonillo**,

Annona diversifolia, **Anona Blanca**, papauce, **llama**,

Annona muricata, **Guanábana**, custard apple, soursop,

Annona primigenia, **Anonillo**

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

Annona reticulata, **Custard apple**,

Annona scleroderma Saff., Poshte (Martin et al. 1987:81).

Annona squamosa, **Sugar apple**,

Each area of Mesoamerica shares some species of *Annona* 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 yet which are stuck with names that sound like anona.

Cymbopetalum penduliflorum, orejuela, **anona de Montaña**

Cymbopetalum mayanumm Tulche

Malmea depressa, anona (Parker 2008:49-50; MacVean 2003:24-25).



Sugar apple fruit flower, *Annona*



Sugar apple *Annona squamosa* flower



Annona muricata



Annona purpurea

Other Fruits (primarily fruits from trees)

I would be impressed to find a list of fruits potentially used by the Maya which is even 50% of the fruits listed below. Yet every month I find another edible fruit. A good example is the book, *Perennial Edible Fruits of the Tropics: An Inventory*, USDA, 1987, available at no cost on-line <http://naldc.nal.usda.gov/download/CAT87886130/PDF>.

In mid-April 2014 I found an excellent book on the edible fruits of Veracruz, Mexico (Lascurain 2010). Unfortunately it does not tell the reader which of the plants are native and which have been introduced from Asia, Africa or South America.

As time allows trying to sort out which of these edible fruits is pre-Columbian in the Maya area of Mesoamerica we will be expanding our already surprisingly long list of Maya fruits later during 2014.

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

Ardisia compressa (Lascurain 2010).

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

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

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

Breadnut, ramon, *Brosimum alicastrum*

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

Papaya, *Carica cauliflora* Jacq. (Parker 2008:145), but this species has probably been moved to another genus since then. Parker gives no local names. She takes her information from Bolivia and Nicaragua, which for a book titled "Trees of GUATEMALA" is not adequate.

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

Guarumo, trumpet tree, *Cecropia peltata*

Celtis iguanaea (Jacq.) Sarg. Family Ulmaceae, uña de gato.

licaco, *Chrysobalanus icaco*

Sea grape, *Coccoloba uvifera*

Cordia dentate Poir, Boraginaceae (Lascurain 2010:39)

Ciricote, *Cordia dodecandra*

Baboon Cap, *Couepia dodecandra*

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

Corallillo, *Hamelia patens* (MacVean 2003:118-119).

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

Crataegus Mexicana Moc. & Sesse ex DC., Family Rosaceae, north of Maya area (Lascurain 2010:53)

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

Sauco, *Ehretia tinifolia* L., family Boraginaceae (Lascurain 2010:49). The plant better known as Sauco is *Sambucus mexicana*.

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

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

Guazuma ulmifolia, Pixoy (Chízmar 2009:307-311, Lundell; Parker 2008:888-889).

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

Anay, *Hufelandia anay* (Popenoe)

Guapinol or huapinol, *Hymenaea courbaril*; also used as a flavoring.

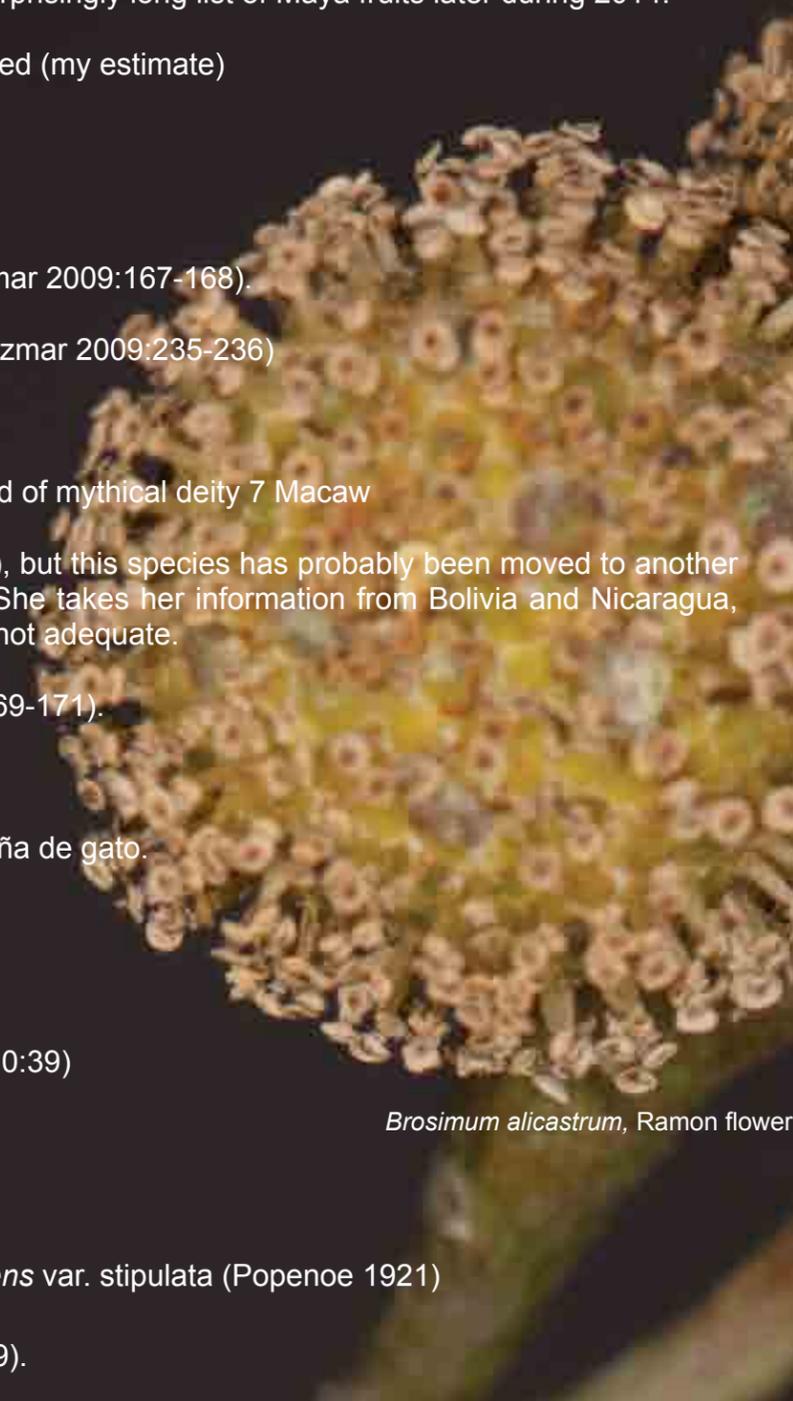
Bri Bri, *Inga edulis*, (when it is mainly the seed that is eaten, we have separate section on seeds).

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

Jacaratia digitata, from Ecuador, has spines the precise same size, shape, layout as both species of *Ceiba* in Guatemala. *Jacaratia spinosa* also has spines just like a *Ceiba* of Mesoamerica. So far I have no evidence that either of these two *Jacaratia* species is native to Mesoamerica in pre-Columbian times.



Guarumo Flower



Brosimum alicastrum, Ramon flower



Anona



Annona squamosa



Guanábana

Papaya orejona, K'uun che' (Yucatec Maya), bonete, *Jacaratia mexicana* A. DC. (Martin et al. 1987:91). Also called wild papaya in Parker (2008:146) (but is not the tree which in Guatemala is called wild papaya and has plum-sized fruits and otherwise the tree looks just like a normal papaya; that tree is probably *Carica pétala* which now has a totally different name. The fruit looks a tad like a cacao fruit. Good photos on www.yucatanadventure.com.mx/Papaya_fruit_trees.htm

Jarilla chocola Standl., No species of Jarilla is listed in Trees of Guatemala (Parker 2008) but most botany web sites include it for Mexico and Guatemala (www.ars-grin.gov). Elsewhere it is not listed for Guatemala whatsoever! I give up for the moment.

Lantana camara L., Chiligua nigrita (Jalapa); cinco negritos (Guatemala, Retalhuleu, Sacatepe'quez); ek-cuaiyak (Alta Verapaz); mora de muerto (Alta Verapaz); sincuria (Izabal); vivarana (Guatemala). Fruit occasionally eaten by children, and birds (Gibson in Standley, Williams and Gibson 1973: 202-204).

Leucaena leucocephala

Cherry, Barbados cherry, acerola, *Malpighia emarginata*

Malvaviscus arboreus, (Chízmar 2009:230-232). mora, *Morus celtidifolia* Kunth. (Parker 2008:566). *Rubus glauca*, *Rubus adenotrichus* is also called mora.

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

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

Wild Cucumber Tree, Candle Tree, **Cuajilote**, Caiba, Pepino de Arbol Silvestre, *Parmentiera edulis*. This is a close relative of calabash trees.

Avocado, *Persea Americana*, used for much more than just a meal. Avocado is the most common tree in house gardens in the Lake Atitlan area and adjacent Highlands.

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

Coyo, *Persea schiedeana* (Popenoe), Family: Lauraceae

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

Posoqueria latifolia (Chízmar 2009:278-280).

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

manax: wild cherry *Pseudolmedia spuria*

Guava, **Guayaba**, Guayava, *Psidium guava*,

Psidium guineense (Chízmar 2009:249-251).

mora, *Rubus glauca*, *Rubus adenotrichus*. *Morus celtidifolia* Kunth. is also called mora.

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

Sauco, *Sambucus mexicana*. A lay person might consider the spherical fruits as a "berry."

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

Zapatero (Petén), **Negrilo** (Belize), *Simarouba glauca*, Paradise Tree, *Bitterwood*



Guarumo



Guayava



Jocote fruit



Manzanilla



Nance



Papaya

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

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

Syzygium cumini (L.) Skeels, Java plum. Need to double-check to see if native in pre-Columbian times.

manzana, *Syzygium jambos* (L) Alston, eaten by children

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

Guaya, *Talisia oliviformis* (Kunth) Radlk. Note difference in spelling of the species.

Tanto, *Tapirira mexicana* (Parker 2008: 38).

Pataxte, *Theobroma bicolor*.

Cacao, *Theobroma cacao*

(monkey) cacao, *Theobroma angustifolium*

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

Mountain **papaya**, *Vasconcellea cauliflora*, is clearly listed for Mesoamerica (Mexico through Central America) into northern South America (www.ars-grin.gov). Formerly this was *Carica cauliflora*. It is worth noting that the otherwise comprehensive TREES OF GUATEMALA still has the old name, *Carica cauliflora* (Parker 2008:145), listed for Izabal, Montañas del Mico.

Bejuco de agua, *Vitis tilifolia* Humb. & Bonpl. (MacVean 2003:134-135)



Wild papaya

Zapote 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*, or *Diospyros ebenaster* Retz. Also note that *Diospyros nicaraguensis* Standl, also has a fruit. But this has no zapote or sapote related name. All *Diospyros* species should be checked, since most seem to have edible fruits (www.wdt.qc.ca/treesna2list.asp?start=2701).

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

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

Mamey sapote, *Pouteria sapota*

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*



Zapoton Fruit



Zapote



Zapote



Mamey zapote

Fruits on Vines

Fruits on vines is by no means limited to passionflowers, but there are definitely more of this genus than any other. All the passionflower fruits we saw one day in Chichicastenango were not native (they were introduced from South America). Four different passionflower vines which produce flowers in the FLAAR gardens are all also from South America. But gradually we are locating other species which are more likely pre-Columbian. We appreciate the assistance of passionflower expert John MacDougal. He is in the same city as the FLAAR office, St Louis.

The passionflowers of Belize are not all resident in Guatemala; some species in Guatemala grow only in the cool Highlands; others grow only in the hot Lowlands. So we have a lot more research and field trips to track down each species one-by-one.

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

Passiflora adenopoda, (Chízmar 2009:252-254)

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

Passiflora foetida (Wikipedia)

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

Passiflora quadrangularis L. This has a giant fruit; many times larger than all other passionflower fruits.

Passiflora seemannii (Chízmar 2009:254-256)

Passiflora suberosa, Corky Stem Passionvine,

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



Granadilla



Edible fruits from cactus or cactus-like vines

Mammillaria species have edible pulp (Martin et al 1987:88). Since there are so many species, further research would be required. (Craig, several editions).

nopal and tuna, cactus, *Opuntia ficus*

Pitaya, Pitahaya, *Hylocereus undatus*.

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 pruinosus*

Pitayo xoconostle, *Stenocereus stellatus*



Opuntia ficus, Nopal cactus

Other fruits (not in trees)

Pineapple, a terrestrial bromeliad, *Ananas comosus*.

Piñuela, *Bromelia pinguin*, motate (produces rubber-like sap, Rochin 1986)

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



Pineapple



Pitaya



Nuts and food that is considered a “nut”

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

Anacardium occidentale L., **cashew**, marañon.

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

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

Brosimum alicastrum, **Breadnut**, **ramon nut**.

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.



Marañon



Nuts, specifically on Palm trees

Cerpinus ceroliniana Walt. (Martin et al. 1987:83).

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

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



Coyol



Corozo

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)

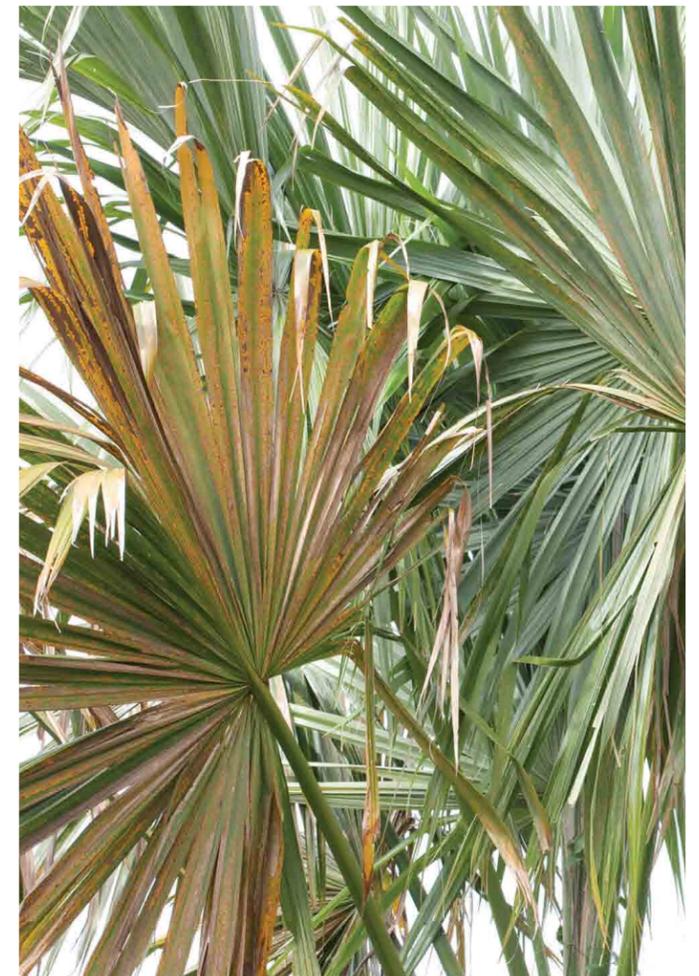
Palmito, ternera, *Euterpe precatoria* (Chízmar 2009:100-102)

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

Mexican Sabal palm,



Coconut



Guano plam

Cooking oil

We may have one theme for cooking oil and another for lubricant; and another theme for varnish.

Acrocomia aculeate

Corozo (cohune) palm oil

Chamadorea elegans

Gonolobus taylorianus (Chízmar 2009:107-110)

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

Zapatero, (Peten), **Negrilo** (Belize), *Simarouba glauca*, Paradise Tree, Bitterwood. Also used for medicine, and the oil also for soap.

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 phrynifolium (Chízmar 2009:60-62)

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

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* Booth lists *Xanthosoma violaceum* as eaten by the K'ekchi Maya, osh, macal, and surprisingly says “the only species in this genus that is used as food.” (1992:295). She does not indicate on this page what part of the plant she is speaking about.

Chayote, *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) Web sites list Sarsaparilla (*Smilax officinalis*) as an aphrodisiac.

Tubers of *Solanum cardiophyllum* and *S. ehrenbergii* are eaten in Jalisco, Mexico (Cuevas-Arias et al. 2008 :77).

Dioscorea convolvulacea Schldl. & Cham., barbasquillo, madre de maiz, could be considered either a root crop or a vegetable. *Dioscorea composita* Hemsl. is medicinal as is *D. floribunda* (Martin 1969:373). Many other species of *Dioscorea* are present in Guatemala and adjacent Mexico such as *D. bartlettii* and *D. spiculiflora* (<http://fm1.fieldmuseum.org>). Just be careful that the species you eat is not toxic.



camote



Camote, ichintal, yuca



Camote

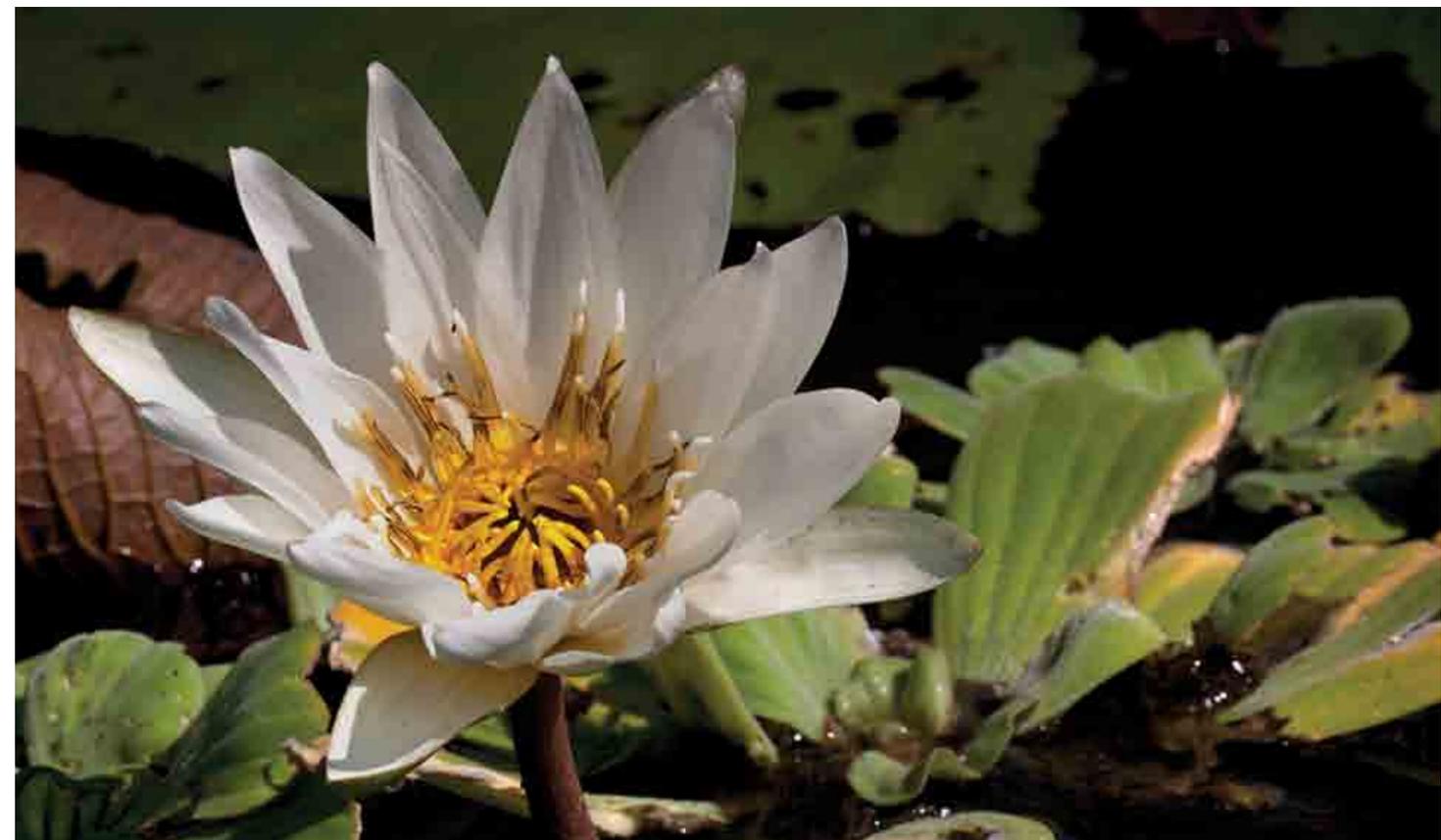
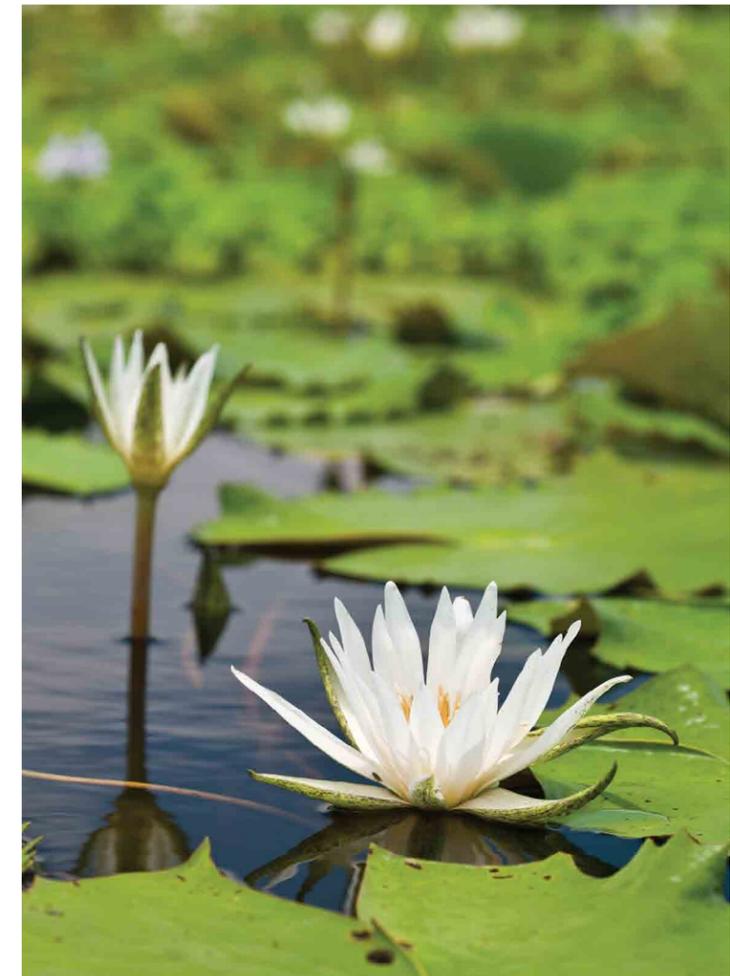
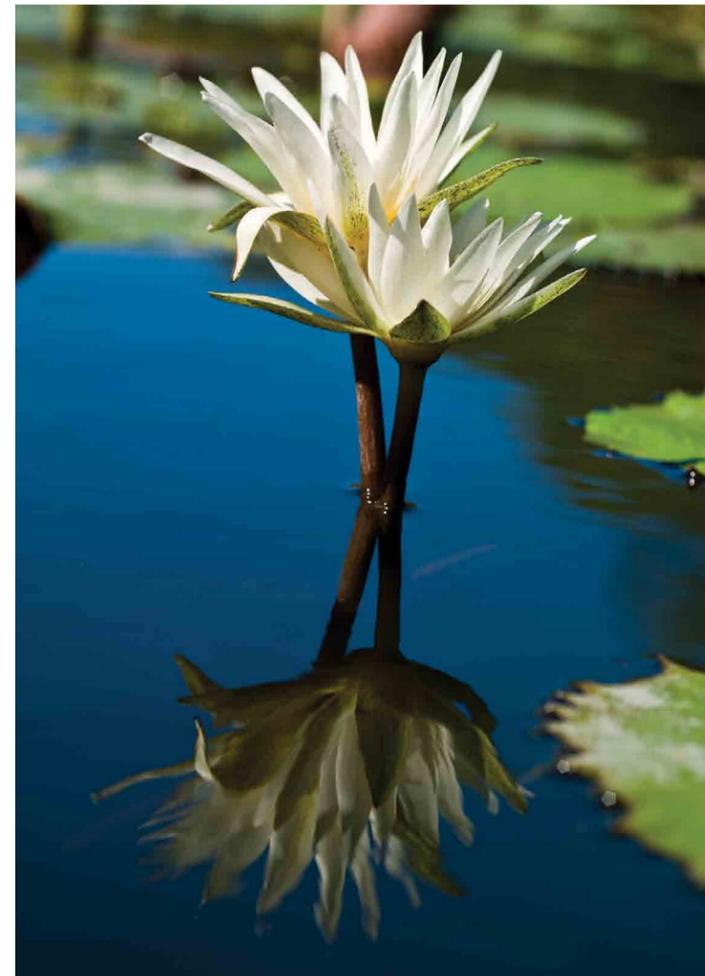
Water plants: rivers and lakes

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.

Bixa orellana, **Achiote, Annatto.**

Chenopodium ambrosioides, **Wormseed, Epazote,**

Chili pepper, *Capsicum species*

Crotalaria longirostrata Hook & Arn., **Chipilin,** Unique flower; Parts edible, part toxic (Morton 1994)

Cucurbita spp, Pumpkin seed

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). Also (MacVean 2003:90)

Enterolobium cyclocarpon, **Guanacaste**

Eryngium foetidum, Culantro, cilantro, samat, (Standley and Williams 1966; Chízmar 2009:40-41). *Coriandrum sativum* L. comes from Europe.

Guarumo, leaves also used for tobacco

Litsea glaucescens Kunth, **bay-leaves,** laurel silvestri.

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

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

Peumus boldo, **boldo.**

Philodendron pseudoradiatum (Duran 1994:244)

Achiote

Pimenta racemosa, **Allspice,** Pimenta gorda.

Piper auritum, **Hoja Santa;** *Piper amalago* also has interesting properties (Ratsch 2005:451). Be aware that *Piper auritum* may have carcinogenic chemicals as well (Atlas de las Plantas de la Medicina Tradicional Mexicana).

Polianthes tuberosa, **Flor de nardo,** (Schoenhals 1988:206). Also an additive to balche drink of Lacandon. Over the past 30 years I have noticed that most flowers and plants of the Lacandon area of Chiapas are misidentified by ethnographers. The first botanist who is trying to get things done correctly is Duran (1999). The first ethnographer who is working to correct past errors is Suzanne Cook. Once I have a copy of Duran's thesis and the monograph of Cook, I will be better able to translate Lacandon Maya more correctly.

Poliomintha longiflora (Lamiaceae). "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 ruderale, **Coriander.**

Porophyllum tagetoides

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).

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

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

Tagetes lucida Cav., **Pericon,** one of several species of marigold whose flowers are edible.

Tagetes minuta and *Tagetes elliptica*, **Marigold.**

Talauma Mexicana (Gomez 2008:84)

Tridax coronpifolia, *Castilleja lanatam*, **hierba de conejo.**

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.



Guarumo leaves



Pericon



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)

- *Bixa orellana*, **Achiote**.
- *Bourreria huanita*, **Popcorn flower**, palo de rosa, rosa Blanca, Esquinsucha, **esquinsuchil** (Guatemala); oreja de leon (Quezaltenango) (Standley and Williams (Gibson) 1970:132).
- *Calliandra anomala*, cabeza de angel, tlacoxochitl, tlacoxiloxochitl (Sahagun and Ratsch 2005:119, 501).
- *Calocarpum mammosum*, piztle (the seeds of (*Pouteria sapota*, mamey sapote)-
- *chile*
 - Chilchote, *Capsicum frutescens*
 - *chiltipiquin*,
 - *tonalchiles*
 - *chilpaelagua*
 - chile that is widely sold in Guatemalan markets and called “chile chocolate”
- *Chirantodendron pentadactylon*, flor de manitas, Canek, teonacaztli.
- *Cymbopetalum penduliflorum*, Guanacaste, ear flower, orejuela, Muc in K'ekchi Mayan, uei nacaztli in Nahuatl,
- *Magnolia mexicana* flowers, *yolloxochitl*, heart flower; possibly *Talauma mexicana* (Parker 2008:486).
- *Nicotiana* species, Tobacco juice (Ritual of the Bacabs, 35-37).
- *Pimenta dioica*, **allspice**, pimenta gorda.
- *Piper amalago*, *Mecaxochitl*, mecasuchiles, Higuillo de limón. String flower.
- *Piper auritum*, Hoja santa, root beer plant
- *Quararibea funebris*, **Molinillo**, Rosita de cacao, cacahuaxochitl
- *Tagetes lucida*, **Marigold**, **flor de muerto**
- *Vanilla planifolia*, **Vanilla**

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

- *Solandra* spp. Tecoaxochitl (Ratsch 2005:501).
- Teonanacatl, *Psilocybe mexicana* and other species of cactus (Ratsch 2005:501).



We experiment raising cacao and pataxte. Here are pataxte seeds sprouting in our garden. Pataxte pods harvested from the Costa Sur area of Guatemala.

Plants for drinks, beverages (not alcoholic)

While on the subject of cacao drinks, I add now a new selection on indigenous plants of Mesoamerica for drinks in general. Although the present research is not (yet) on recipes, it is worthwhile to begin to think about the Maya kitchen of thousands of years ago.

Plus, tea in particular and non-alcoholic drinks in general are healthy. If you have read-between-the-lines you will have noticed that one gist of the entire FLAAR interest in native plants is to improve the diet and health of the populations of southern Mexico, Guatemala, Belize, El Salvador, and Honduras.

For tea the plants I know the best are pimenta gorda. I drank this team (from leaves of the beautiful white-barked tree), for five years in Yaxha.

- Marañon, tea of leaves
- Marañon, drink from the soft fruit above the “nut”

We will be expanding this section as time and budget allows.

There is also a section on alcoholic beverages in preparation.

Flowers, sacred Pictured in Maya art, or featured in Myths

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

nikte' kisin, *Bouvardia longiflora* (Suzanne Cook, personal communication 2013, provided the Lacandon Maya name for this plant. The iconography I worked out already several years ago).

Flower of **ceiba** tree, various species

Aak' alyoom “night flower from which Kisin was born” <http://home.planet.nl/~roeli049/gloseng.pdf>, perhaps *Cestrum nocturnum* L (Suzanne Cook, personal communication).

Commelina elegans, suggested by Bolles as pach dza, or pac dza, dayflower, Hierba del Pollo (Jim Conrad, www.backyardnature.net).

Chipilin flowers: white petaled, red petaled, yellow petaled (Popol Vuh), *crotalaria longirostrata*, *Crotalaria guatemalensis*. This translation in the Popol Vuh needs to be rethought, as the ants were most likely carrying other flowers besides Chipilin (whose color range is not as wide as claimed in the translation).

Waterlily, *Nymphaea ampla*

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

Plumeria species, flor de Mayo, bak nikte'.

flores del nardo, *Polianthes tuberosa*, bäk-nikte' (Boot, after Bruce).

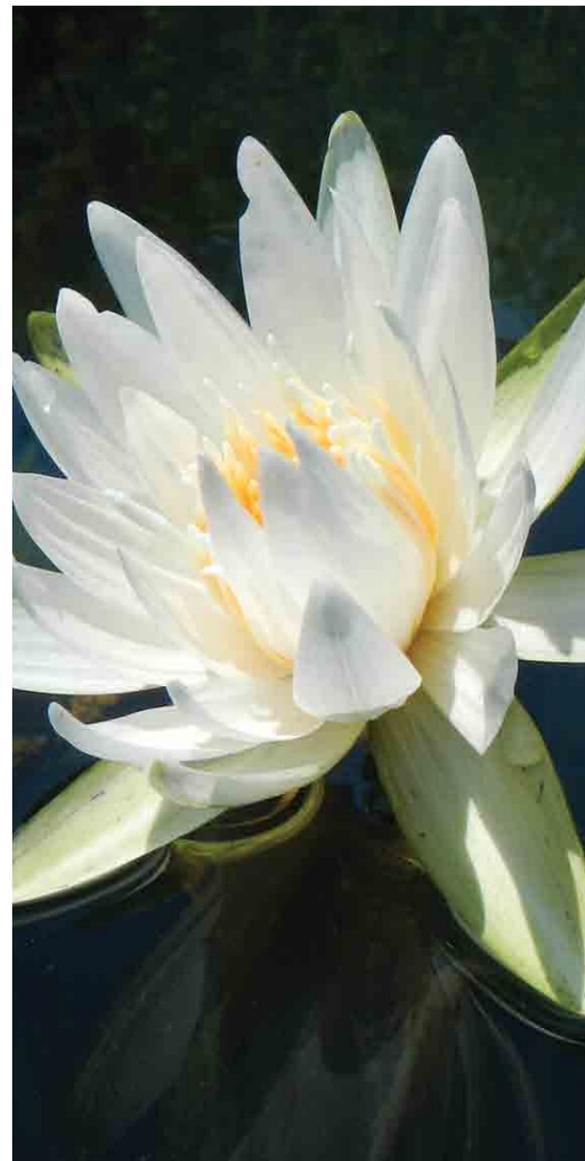
Amapola, *Pseudobombax ellipticum* (shares some features with *Pachira aquatica*).

flowers that attract hummingbirds

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

Squash flower(s), related to ballgame

Probably another ten species, plus or minus, will be added as we continue our research.



Waterlily



Pseudobombax ellipticum

I would like to point out, as politely as is possible, that many if not most of the identifications by J. Eric S. Thompson of sacred flowers which he mistakenly “identified” for various hieroglyphs are incorrect.

There are also other errors repeated all over the Internet (because 80% of the web sites simply copy-and-paste plagiarize what they find elsewhere). The most common mistakes are with Flor de Mayo, Nikte, flor de nardo, and four-petaled flowers (for the Kin hieroglyph). Flor de Mayo is neither nardo nor the model for the Kin calendrical glyph!

The identifications by Charles Zidar, Missouri Botanical Garden, St Louis, Missouri, tend to be more reliable than most epigraphers, iconographers, or field archaeologists (his background as a botanist helps).

I can recognize which identifications in the literature are hopeless, which are correct, and which are close but perhaps need more clarification since already in the 1960's and 1970's I lived in Peten and in the 1970's through into the early 1990's I lectured on Maya civilization for tour groups to Maya sites throughout Mesoamerica. It is this 40+ year experience, in-situ, which allows me to write the present opus.

Another reason for the success of putting together the present opus is because I have a deep interest in flora and fauna, and even more, I enjoy sharing my findings with scholars, students, and the interested lay public.

Plus I enjoy letting the world know what a beautiful place is Guatemala, Honduras and other adjacent parts of Mesoamerica.



Pachira aquatica flower



Flowers, edible

Many flowers are used for medicine, such as manitas. Several other flowers are used for colorants. Other flowers are used as flavor, condiments, seasoning. Some flowers may have been used as drugs, though it was often the seed pod, leaf, or other part of the plant which was narcotic. You can see flowers in each of these theme groups. Below we list primarily flowers which are eaten as food.

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

Cecropia obtusifolia, **guarumo**, edible and nutritious

Pacaya, palm, *Chamaedorea pacaya*

Squash blossom, *Cucurbita pepo* (<http://ourgardengang.tripod.com/edibleflowers2.htm>).

Dahlia, Tzoloj, *Dahlia imperialis* (Nash and Williams 1976; Chízmar 2009:111-112)

Pito extranjero, *Erythrina fusca*.

Palo de pito, *Erythrina species*. Be aware that the seeds are toxic.

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

Loroco, *Fernaldia pandurata*

Guazuma ulmifolia

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

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

Pericon, one of several species of marigold (*Tagetes*) which is edible.

Many parts of the waterlily, *Nymphaea ampla*, are edible, but may have chemicals which are not recommended.

This list will grow, but realize that most flowers are poisonous to eat (<http://ourgardengang.tripod.com/edibleflowers2.htm>). Others which are "edible" may be poisonous if eaten in large quantities.



Izote flowers



Pacaya

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.



tigrillo flower

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

Guajilote, Candle tree, caiba, *Parmentiera edulis*, ribbed fruit looks vaguely like a thin cacao. Tree is related to morro or jicaro (calabash tree).

Cestrum racemosum (Chízmar 2009:302-303).

Clavellina, *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*

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*

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



Nicotiana rustica



Parmentiera edulis, Guajilote

Additional plants which need to be studied

Many species of Solanum and their relatives need to be studied to see which were utilized and in what manner.

Plants which are associated with myths

I would not rule out that some of the flowers of the plants listed below may also be sacred. Some are mentioned in myths, such as the Popol Vuh. (see appendix on plants of the Popol Vuh).

Beans

Bromelias

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 apetala*, Villar p. 45, 87 (Popol Vuh)

Jocote de jobo: *Spondias*

Jocote de mico: *Simarouba*

Jocote montero: *Spondias*

Oak trees, encinos, growing on the ballcourt area

Ocote, pitch pine, as torches, to light caves, etc

Rushes, tule

Sauco, *Sambucus Mexicana*

Squash, planted near the ballcourt, (Popol Vuh)

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



Morro

Trees with spines

that are replicated on
incense burners and cache vessels



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

Ceiba aesculifolia, **palo de lagarto**, lots of conical spines.

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

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

Pochote, *Cochlospermum vitifolium* (Willd.) Spreng., synonym
Bombax vitifolium, for Sayaxche area of Peten.

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). 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)

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)

Pito, palo de pito. Most pito trees also have spines. These spines are not
as perfectly conical as those of *Ceiba*, but these trees are nonetheless very
spiny. There are dozens of species in Guatemala, all with beautiful red flowers.



Ceiba pentandra

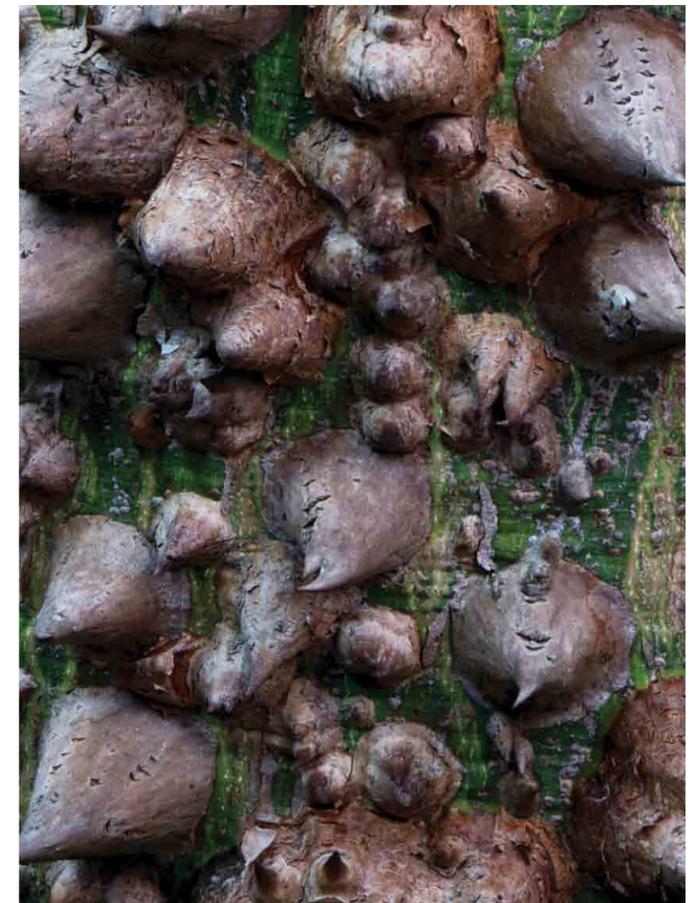


Ceiba flower

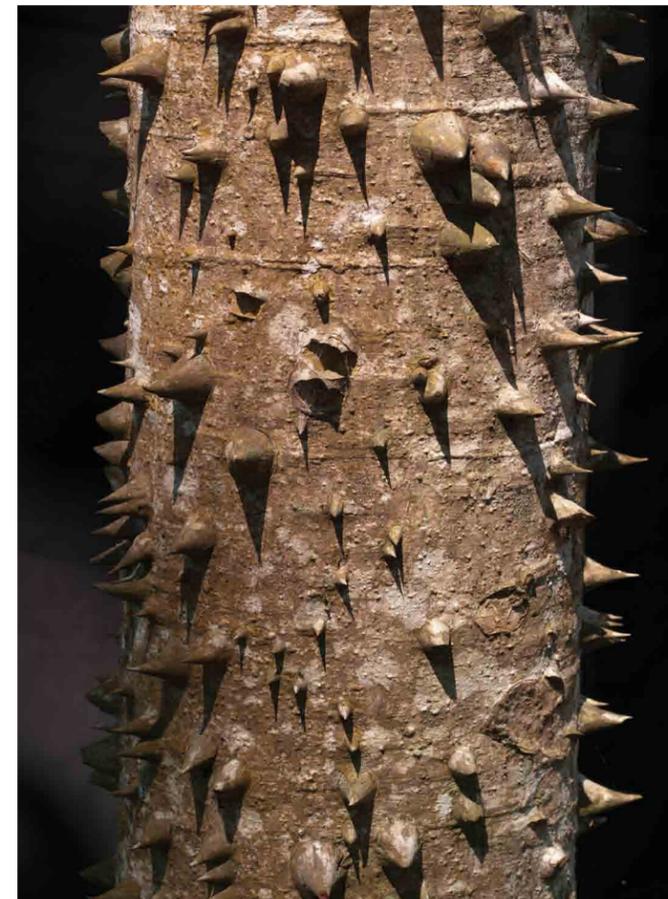
<i>Erythrina berteroa</i> , <i>Erythrina</i>	Pito; Miche; Machetillos	Alta Verapaz, Chimaltenango,	Trees are armed with	
<i>coralodendron</i>	(flowers); Coralillo; Tzinte (Coban)	Chiquimula, Escuintla, Guatemala, Huehuetenango, Jutiapa, Peten, Quetzaltenango, Retalhuleu, Santa Rosa, Sololá, Zacapa.	many stout spines.	
<i>Erythrina folkersii</i>	Coral Tree or Tiger Tree	Alta Verapaz, Izabal	Trunk and branches with stout spines	
<i>Erythrina fusca</i>	Pito extranjero	Escuintla, Izabal, Jutiapa, Suchitepéquez	Trunk with spines	Flower reminds me of <i>Pachira aquatica</i>
<i>Erythrina guatemalensis</i>	Pito; Tzintej	Alta Verapaz, Baja Verapaz	With short stout spines	
<i>Erythrina hondurensis</i>		Izabal	Spines	
<i>Erythrina macrophylla</i>	Pito, Machetillos (flowers); Miche; Ucun (Huehuetenango)	Alta Verapaz, Chimaltenango, El Progreso, Guatemala, Huehuetenango, Quetzaltenango, Quiche, San Marcos, Sololá, Sacatepéquez, Totonicapán y Zacapa	Yes, stout spines	
<i>Erythrina poeppigiana</i>	Pito extranjero			
<i>Erythrina standleyana</i>	Pito, Coama Wood, Tiger Wood	Huehuetenango, Petén	Yes, stout spines	



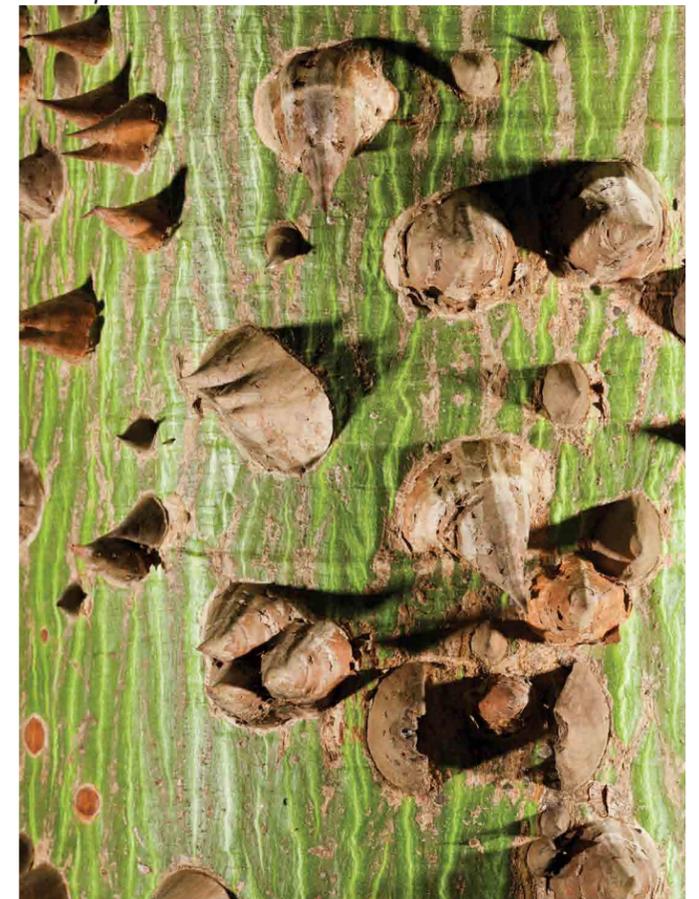
Pochote



Ceiba pentandra



Ceiba pentandra



Ceiba pentandra

Zanthoxylum caribaeum
Zanthoxylum culantrillo
Zanthoxylum elephantiasis (see naranjillo)
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. These spines are not as perfectly conical as those of Ceiba, but these trees are nonetheless very spiny. There are dozens of species in Guaemala, all with beautiful red flowers.



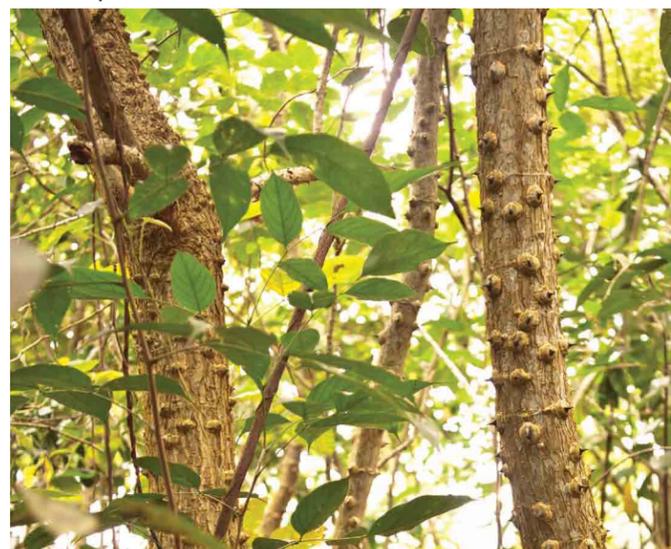
Palo de pito tree spine



Ceiba spines



Pochote



Pochote

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

- *Acrocomia Mexicana*, **Coyol** (Standley and Record 1936:79)
- *Acrocomia aculeata* (Balick 1990 and separately Chízmar 2009:66-70), Coyol,
- *Agave Sisal*, *Agave fourcroydes*, **agave**.
- *Anacardium occidentale* **Cashew nut wine** (Standley and Record 1936:43)
- *Arcacia angustifolia*, flavoring for pulque (Ratsch 2005:28).
- *Lonchocarpus violaceus* **Balche**, or *Lonchocarpus longistylus*, Pitter
- *Miconia argentea* (ambergiscaye.com), **White Maya Tree**.
- *Sambucus mexicana*, sauco, I suggest checking whether this was used to make an alcoholic beverage in pre-columbian times. Sauco alcoholic beverages are available today in specialty markets.
- *Smilax domingensis* as an ingredient for a fermented beverage was indicated by Suzanne Cook (personal communication 2013, citing Duran 1999).
- *Theobroma cacao*, **Cacao**

Chicha, fermented drink from maize. Chilate is used in the Achi Mayan area (<http://licoresbaranano.blogspot.com/search/label/LICORES%20DE%20GUATEMALA>). 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.



Agave



Cashew nut fruit flowers

Plants used (or usable) for drugs

There is a separate category for plants used for smoking. Some of the drugs listed below are smoked; others are ingested in other manners. We have a much longer list of plants used for medicine.

- *Banisteriopsis muricata*, a vine (Ratsch 2005:89).
- *Brugmansia* species. **Florifundia**, 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.
- *Calea zacatechichi* Schlechtendal, Aztec dream grass. Manuel Flores thesis is one source of info: 1977.
- *Calliandra anomala* (Ratsch 2005:118-119)
- *Cecropia obtusifolia*, **Guarumo**, smoked in Alta Verapaz, (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.
- **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.
- *Dorstenia contrajerva*, roots flavor tobacco Tico ethnobotanical dictionary as flavoring tobacco (on-line). Also (MacVean 2003:90),
- **Habin** (Peten), **Dogwood** (Belize), *Piscidia piscipula*; also fish poison.
- **Huevos de caballo** (horse's testicles), *Stemmadenia donnell-smithii*. Not one single book or web site on Maya use of plant substances for enlightenment lists or mentions this plant (at least not one of the main monographs on psychoactive plants of Aztec and Maya areas). I only include this plant on the list because Walfred Romero Chi, an archeologist at Yaxha, lists the flower pollen as being mixed with other plant substances (from other plants; not specified by him) and inhaled (YouTube video).
- *Acacia cornigera*, **Subin**, Ratsch (2005:28-29) lists two species of Acacia: *Acacia cornigera* and *Acacia angustifolia*. Subin is very common throughout Lowland Guatemala; the other species is not as well documented in the literature.



Nicotiana tabacum



Guarumo



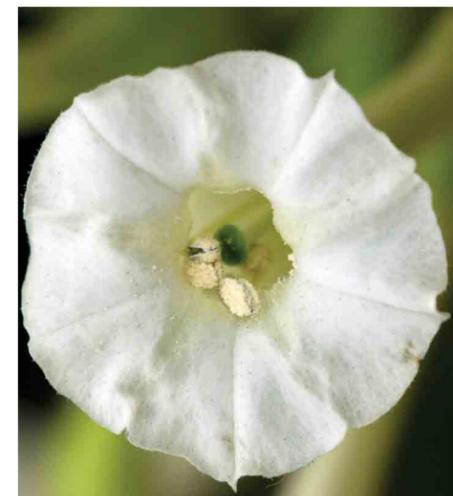
Brugmansia



passiflora



morning glory



Nicotiana rustica

- **Tobacco**, *Nicotiana tabacum*
- **Tree tobacco**, *Nicotiana glauca* Graham.
- **Tobaco de Montana**, *Solanum umbellatum*
- **Wild tobacco**, *Nicotiana rustica*
- **Wild tobacco**, *Solanum erianthum*, Ucuch, uk'uch, Ukuch xiu
- **Water lily**, *Nymphaea ampla*, probably more commonly used than given credit for. It is by no means necessarily only or exclusively the flower which was ingested, but since we do no experimentation with drug plants, we can't yet say explain what effects the seeds have. But it is actually the seed pod area of the flower in which the Maya were most interested.
- **Morning glory** (used in Central Mexico; not yet as well known for Maya). *Turbina corymbosa*, *Ipomoea* species grow along the highways of Escuintla and elsewhere throughout Mesoamerica, including at altitudes at least to 2000 meters.
- 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).
- *Pernettya furens* and/or *Pernettya parvifolia* (<http://shamanix.extra.hu/infected/schultes/book/g121-130.htm>)
Sinicuichi, *Heimia salicifolia*, Reko, Victor A (1926). "Sinicuichi". *La Revista Médica de Yucatan* 14: 22–27.
- *Quararibea funebris*, **Rosita de cacao**, also a major flavoring for cacao
- **Ipecac**, raicilla, *Cephaelis ipecacuanha*, induces vomiting.
- *Salvia divinorum*, known mainly for one area of Oaxaca. No evidence yet that this was used by the Maya.
- *Tanaecium octurnum* (Zidar, on-line). Does occur in Guatemala (Trees of Guatemala, Parker 2008: 86)

- *Typha latifolia*, cattail (Ratsch 2005:387) who gives a list of other tobacco substitutes.
- *Virola guatemalensis*, sangre (has a red sap). Synonym *Virola koschnyi* Warb.

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.

We do not focus on mushrooms since it is debated whether the appropriate mushroom was available to the Maya of the Peten lowlands in pre-Columbian times.

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

Tanaecium nocturnum, is a plant I have I am not familiar with, but it should be explored to see if it is also used as a chemical (<http://psychotropia.co>).

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 focus. We are interested in the iconography of sacred flowers and plants, and in utilitarian plants, plus which flowers were featured as hieroglyphs. We list drugs and smoking only because a list of utilitarian plants would be rather incomplete without these two categories.

Plants believed by local tradition to increase libido

We do not espouse, recommend, or agree with any specific plant which is claimed to increase interest in athletic interaction between a male and female. But many foods have over a thousand years of association with increased personal pleasure.

Also realize that many plants, seeds, roots, saps, and leaves used by ancient civilizations were toxic. Many of the plant parts have some chemicals which give the desired high, but may have other chemicals which will cause more high than your body can handle safely. As but one example, it is remarkable how many plants used two thousand years ago to eat, were also used as insecticide! So rather obviously our list is not intended to be a menu.

But, to learn about what ancient cultures used to increase libido (or which they believed might work!), in addition to cacao, you can find:

Acacia cornigera, **Subin**, mixed with ants (Anderson and Medina 2005:190), *Acacia farnesiana* (L.) Willd., *Acacia pharnesiana* is even more active.

Ananas conusus, **pineapple**, piña.

Carica papaya, **papaya**

Castilla elastica, **Rubber**, and I do NOT mean as a prophylactic!

Curcubita pepo, **Squash, pumpkin**, should be checked as a possible supplement.

Eryngium carline, Chichicahozton o hierba amarga de hojas aserradas.

Erythrina species, **Coral tree**,

Justica pectorialis

Licaria peckii, Sosni, Tz'otz ni, boil the bark; Tikal aguada.

Passiflora edulis, **passion fruit**, maracuya.

Persea Americana, **Avocado**, aguacate.

Pimenta dioica, allspice

Piqueria trinervia Cav., Family: Compositae

Piper auritum, hoja santa Mecaxochitl, acuyo (Rain 2004 :47), Xmak'ulan

Smilax officinalis, also has side effects, Sarsaparilla,

Smilax spinosa (Chízar 2009:295-296). Web sites list Sarsaparilla (*Smilax officinalis*) as an aphrodisiac. Suzanne Cook lists *Smilax domingensis* as an ingredient for a fermented beverage, citing Duran 1999.

Tomato, tomate, *Solanum lycopersicon*; or husk tomato, *Physalis ixocarpa*.

Damiana, *Turnera diffusa* or *Turnera aphrodisiaca*.

Vanilla planifolia, **Vanilla**, if cacao is an aphrodisiac, then vanilla flavored cocoa should really get things going, especially with an avocado appetizer and papaya desert.



Vanilla

Honey (now you know why a marriage celebration is called a HONEYmoon).

I am naturally curious about these foods, but I think that if you need supplements to get things going that is perhaps a hint that the union is not realistic. However since the Aztec emperor had more females in his harem than most Middle East rulers I can perhaps understand that he needed a bit of chemical assistance.

Details and discussion you can find on www.mexconnect.com/articles/2132-food-for-valentine-s-day-mexican-native-aphrodisiacs

[http://antorcha-op.org/images/ANTORCHA%20%20\[IV.-2\].pdf](http://antorcha-op.org/images/ANTORCHA%20%20[IV.-2].pdf) Gregorio Martin lists all medicinal plants usable by females in pre-Columbian Aztec culture; not limited or even focused on aphrodisiac plants. Nonetheless plants to increase libido are itemized as *Apetito venéreo*

For other countries, a good list is on www.goddessherself.com/plants.htm. The spelling is off for most entries but as a list it is more accessible (on the Internet) than that of Ratsch.

We do not recommend trying anything on this list which is not a traditional plant available in urban supermarket vegetable area.

We are preparing a tabulated list to suggest which plants are inadequate to be true aphrodisiacs (such as cacao, avocado, tomato and pineapple) and which are really significant drugs (which we can estimate, as we do not try them ourselves, but we are pretty good at estimating results).

And yes, cacao by itself is NOT an aphrodisiac unless you and your partner already want to interact and you are using anything as an excuse. Cacao may be what the Aztec emperor used to provide stamina for his exercise, but by itself I am not convinced whatsoever that cacao is an aphrodisiac whatsoever.

In any event, in addition to side-effects from plants to increase libido, be wary of personal illnesses that you can get infected with from your partner!

	FLAAR List	List from Ratsch	Aztec List (but for females only)
	<i>Acacia cornigera</i>	<i>Acacia cornigera</i>	
		<i>Agave americana</i>	
pineapple	<i>Ananas comosus</i>	<i>Ananas comosus</i>	
		<i>Argemone mexicana</i>	
Papaya	<i>Carica papaya</i>		
		<i>Cacalia cordifolia</i>	
Chili pepper		<i>Capsicum annum</i>	
rubber	<i>Castilla elastica</i>	<i>Castilla elastica</i>	

	FLAAR List	List from Ratsch	Aztec List (but for females only)
coconut		<i>Coco nucifera</i>	
		<i>Commelina coelestis</i>	
Squash (seeds),	<i>Curcubita pepo</i>	<i>Curcubita pepo</i>	
		<i>Cyperus articulatus</i>	<i>Cyperus articulatus</i>
	<i>Eryngium carline</i>	<i>Eryngium carline</i>	<i>Eryngium carline</i>
	<i>Erythrina species.</i>	<i>Erythrina americana</i>	
sunflower		<i>Helianthus annuus</i>	
Sweet potato, camote		<i>Ipomoea batatas</i>	
	<i>Ipomoea violacea</i>	<i>Ipomoea violacea</i>	
	<i>Justica pectorialis</i>		
	<i>Licaria peckii</i>	<i>Licaria peckii</i>	
Tres puntas	<i>Neurolaena lobata</i>		
	<i>Passiflora edulis</i>		
avocado	<i>Persea Americana</i>	<i>Persea americana</i>	<i>Persea americana</i>
Allspice, pimenta gorda		<i>Pimenta dioica</i>	<i>Pimenta dioica</i>
			<i>Piper amalago, mecaxochitl</i>
		<i>Piper angustifolium</i>	
	<i>Piper auritum</i>		<i>Piper auritum</i>
			<i>Piper sanctum</i>
	<i>Piqueria trinervia</i>		
		<i>Rivea corymbosa</i>	
	<i>Smilax sp.</i>	<i>Smilax sp.</i>	
		<i>Solandra brevicalyx</i>	
Tomato			
Unknown by this name today		<i>Tonallae alumna</i>	<i>Tonallae alumna</i>
		<i>Turbina corymbosa</i>	
	<i>Turnera diffusa</i>	<i>Turnera diffusa</i>	
Vanilla	<i>Vanilla planifolia</i>		<i>Vanilla planifolia</i>
Honey	<i>Honey</i>		



Castilla elastica



Plants or trees that are used to produce incense

- *Artemisia Mexicana* (Ratsch 2005: 73)
- *Bursera microphylla*, **Copal pom**.
- *Bursera simaruba*, **Palo-jiote**, muliche, indio desnudo.

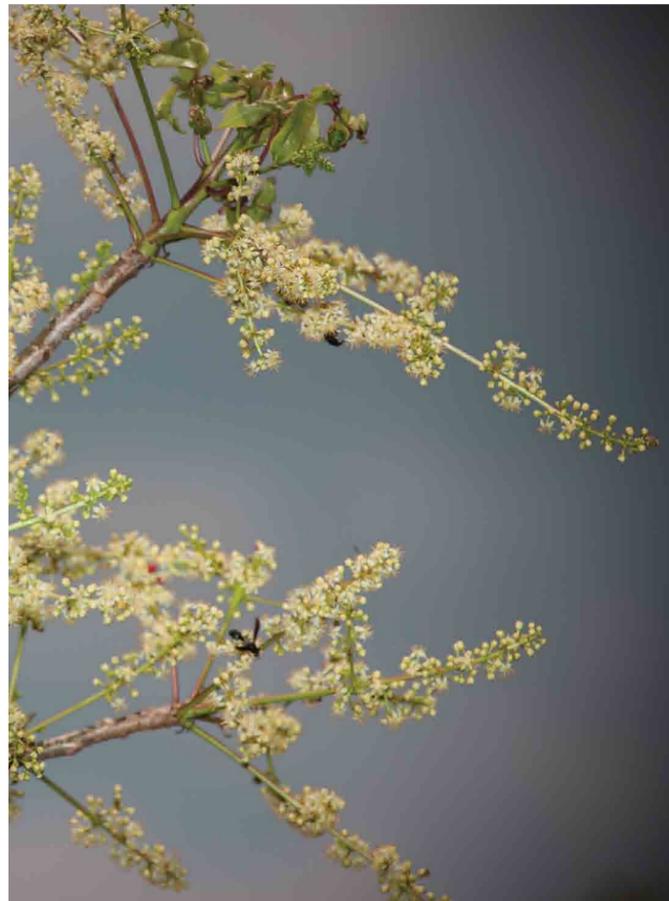
- *Calycophyllum candidissimum*, family Rubiaceae, madroño (Lorence 1999 and Cavallaro 2011:77)
- *Castilla elastica*, **Rubber, hule**.
- *Crotan sanguifluus*, **Croton** (cochineal croton) red tree sap (Popol Vuh),
- *Dahlia variabilis*,
- *Hymenaea courbaril* (Stross, UTexas course outline).
- *Liquidambar styraciflua*, **Liquidambar**, arbol de estoraque.
- *Manilkara achras*, chicle, chico zapote
- *Myroxylon* species, **Balsam**.
- *Pinus pseudostrobu*, *Pinus oocarpa*, pine **resin** as incense,
- *Protium copal*, **pom**, copal incense
- *Quercus* species, oak tree
- *Stevia eupatoria*; more often medicinal than incense
- *Tagetes erecta*, **marigold**, flor-de-muerto, **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).
- *Vanilla planifolia*

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

A latex of the stem of a plant, *Tanaecium nocturnum*, (hutkih in Lacandon Maya language) of the Bignonia Family is used as a vulcanizing agent for making rubber figures for the Lacandon Maya (Bruce 1974; Ratsch 1985:128; Psychotropia.com web site). I list this here as rubber is also used, to some degree, as an offering to the gods and could be considered a form of incense.



Copal pom



Bursera simaruba, Palo-jote



Plants used in divination (in addition to incense)

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

Bunchosia swartziana Griseb and *Bunchosia glandulosa* are used in ritual cleansing ceremonies by shamens in Yucatan (YucatanAdventure.com).

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

Plants smoked

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)

Other sources suggest they flavored their tobacco also with **Liquidambar**, *Liquidambar styraciflua* L.

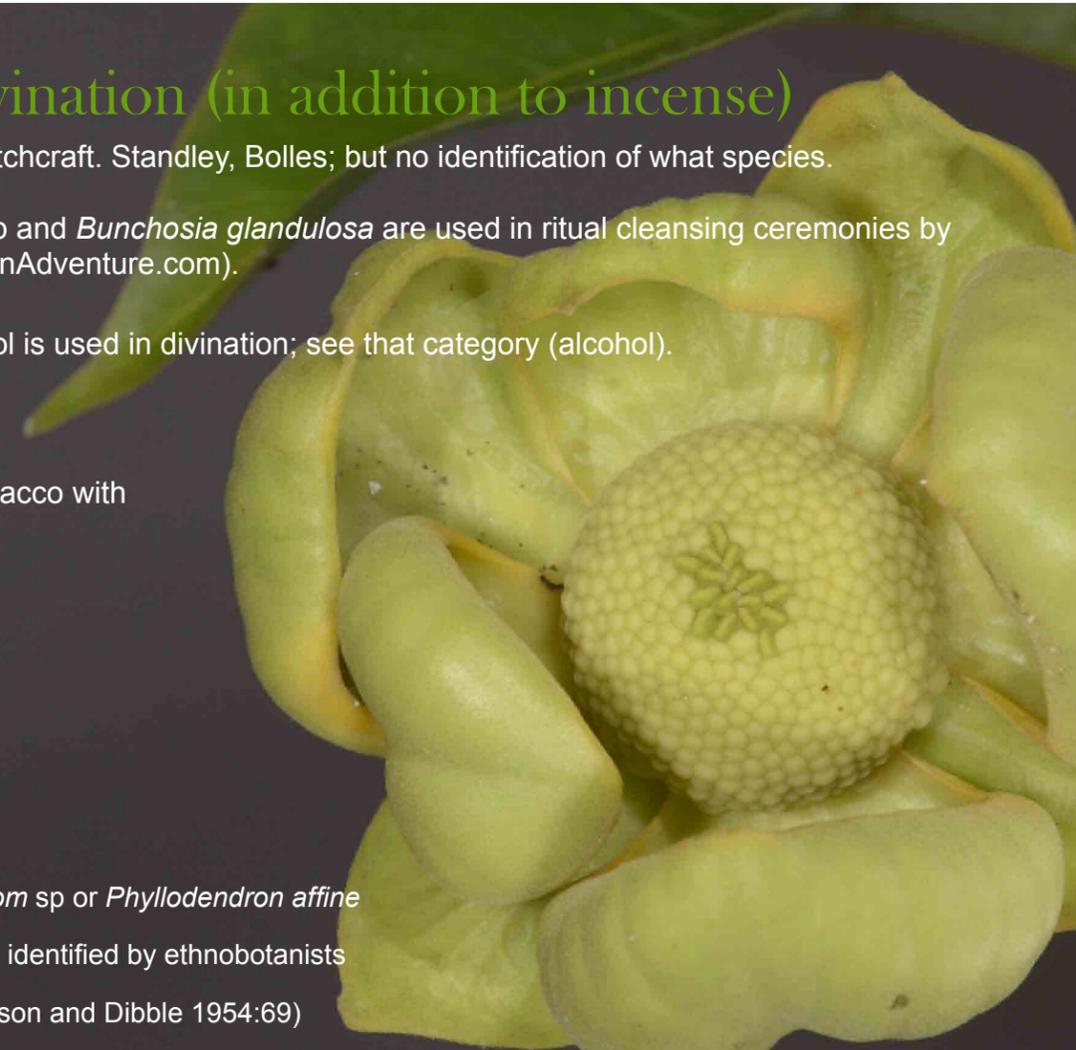
The list that I have harvested from a dozen sources is now available in this 11th edition. The citations will be in the eventual PDF; illustrations will be in our eventual web page on our www.Maya-ethnobotany.org. My interest in smoking is because at age 19, while a student at Harvard, I discovered a 9th century Maya vase showing a man smoking. He has a big smile on his face and is clearly very content. This vase is on exhibit in the archaeology museum of the Parque Nacional Tikal, El Peten, Guatemala.

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.” We are now at the 11th edition and by 2013 will have a further update.

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 usage, are, to some degree, more “incense.”



Amapola (written as mapola by Parker, Trees of Guaemala, 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).

Byrsonima crassifolia, **Nance** tree leaves are used to wrap tobacco to make cigars.

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

Diphysa carthagenensis Jacq., wood being "possibly" used in Jocotan area (Chiquimula) for tobacco pipes (Parker 2008:455). Parker rarely cites a single statement directly (in her thousand pages). She only lists books and articles at the end of each chapter...

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

Dipteryx odorata (Aubl.) Willd. Is listed as an additive for tobacco and snuff (Ratsch 2005:828). If a tree has the name "odorata" you can understand why. Naturally the question is whether the Classic Maya used either of these *Dipteryx* species. Parker lists four species for Guatemala (2008:455-456).

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

Heimia salcfolia, **Sinicuichi**, Reko, Victor A (1926). "Sinicuichi". *La Revista Médica de Yucatan* **14**: 22-27.

Liquidambar styraciflua L., **Liquidamber**,. is used to flavor tobacco (Trees in the Life of the Maya World, p. 145). However this was primarily among the Aztec of Central Mexico.

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

Tobacco, *Nicotiana tabacum*

Wild tobacco, *Nicotiana rustica*



pinus



Incense



Guarumo

Pimenta dioica, **Allspice leaves**, Thompson p. 109

Piper auritum Kunth, hoja santa, a common spice in Guatemala

zapote leaves, probably *Pouteria sapote*, Maya History and Religion, Thompson p. 109

guayaba fruit tree leaves to wrap tobacco, *Psidium guajava*, Fuentes y Guzman as quoted by Thompson page 109.

Quararibea funebris, Rosita de cacao

http://toptropicals.com/html/toptropicals/plant_wk/quararibea.htm

Pericon, marigold, *Tagetes lucida*, flor de muerto (seller of cigars for Maximon said there were seven ingredients, one of which was pericon). Pericón is also used by the Huichol (Sierra, "Plantas, Ofrendas y Rituales en el Centro de México")

Turbina corymbosa, **Morning glory**,

Other plants associated with Tobacco Use

Merremia umbellata (L.) Hallier, family Convolvulaceae, the vine is used to hold tobacco to hang for drying (Standley and Williams 1970:75).



Incense

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.

Trees that produce blood-red sap

At least one blood red sap is a major feature in the Popol Vuh. I thus suggest that all trees which produce a blood-red sap are worth further study, since fake blood could have been of interest during some ceremonies. Of course the Maya also had achiote available to make things look bloody.

Below are the “blood” trees listed in the indeed of Trees of Guatemala (Parker 2008: 1028).

Sangre

(Parker 2008: 576), *Compsonera sprucei*

578, *Virola koschnyi*; other authors list as synonym for *Virola guatemalensis*.

Sangre de chucho

692, *Bocconia arborea*,

Sangre de drago

271, *Croton draco* Schltl. Other species of *Croton* also have red sap.

474, *Pterocarpus officinalis*. This is the most probable tree for the virgin’s heart sacrifice of the Popol Vuh.

Pterocarpus hayesii Hemsl I am estimating is a synonym for *Pterocarpus officinalis* (Jacq). Both carry the popular name palo de sangre or palo de drago. It is very common in Mesoamerica for many totally different species to have the same identical local name.

I am estimating these are not the same tree as *Virola koschnyi* Warb.

Virola koschnyi Warb., synonym for *Virola guatemalensis*. But not in Parker’s index under any sangre de drago (listed under sangre alone and drago alone!). Nonetheless, listed by other authors as sangre de drago. Seeds used to flavor cacao.

Sangre de perro

271, same as one of the plants known as sangre de drago, *Croton draco* Schltl.

350, *Vismia camparaguey*

Sangre de Toro

693, *Bocconia frutescens*

733, *Ruprechtia costata*

llora sangre

271, *Croton draco* Schltl, sangre de drago

274, *Croton xalapensis* Kunth, (Parker 2008:274); Uphof 1968 for cleaning teeth)

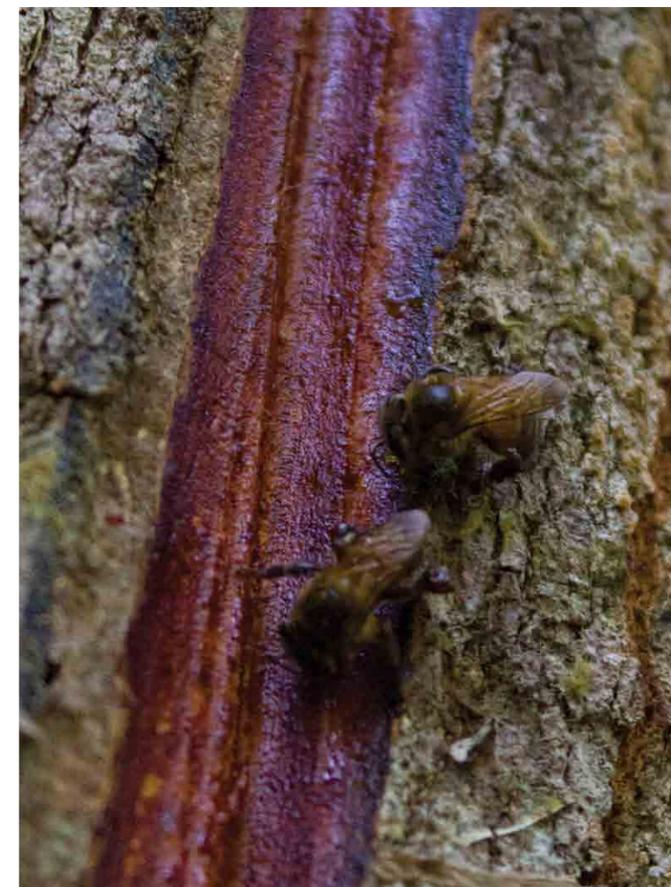
414, *Swartzia cubensis*.

471, *Piscidia grandifolia*, palo de zope, zopilote (vulture). Related to *Piscidia piscipula*, Habin, dogwood, May Bush, with narcotic aspects.

692, *Bocconia arborea*,



palo de sangre



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 informative monographs are by.

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



Cassia grandis

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. We would really enjoy doing a project on medicinal plants of the Maya together with a medical-botanist.

For Guatemala there are two editions of an excellent monograph on medicinal plants authored and/or edited by medical-botanist Armando Caceres. He is also author and co-author of scores of helpful articles in peer-reviewed journals.

Astianthus viminalis (Jardin ethnobotanico, Oaxaca)

Bourreria huanita, **Esquisuchil**

Byrsonima crassifolia HBK., **nance**, edible fruit

Caesalpinia pulcherrima

Calophyllum brasiliense árbol de leche, Santa Maria

Cassia alata, **candle bush**.

Cassia grandis, pulp has purgative properties (Fieldiana botany, vol. 5 page 116).



Candle Bush

Cesrum nocturnum, night-blooming Jasmine, huele de noche (very common in Guatemalan gardens). (Ratsch 2005:162-163). Leaves toxic.

Chiranthodendron pentadactylon, **Canak**, arbol de las manitas

Ceiba aesculifolia, **pochote**

Dialium guianense, **Wild Tamarind**

Erythrina fusca, Pito extranjero,

Gliricidia sepium, **Madre de cacao**

Guaiacum sanctum, **Guayacan**

Guazuma tomentosa

Guazuma ulmifolia, **Cualote**

Haematoxylum campechianum, **Logwood**, palo de Campeche, also makes dye

Hymenaea courbaril, **Guapinol**.

Liquidambar styraciflua L., **Liquidambar**.

Magnolia, several species, but very limited in the eco-systems in Guatemala.

Malmea depressa, root

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

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

Momordica charantia (may not be pre-Columbian), Sorosi, fruit of a vine, **Cerasee**, pods orange or yellow; Izabal.

Nectandra species, family Lauraceae, palo oloroso

Passiflora foetida (Wikipedia)

Piper auritum Kunth, hoja santa, a common spice in Guatemala

Pithecolobium dulce (Jardin ethnobotanico, Oaxaco)

Psidium guajava, **Guava**, **Guayaba**, Guayava; also spelled (or misspelled) *Psidium guayava*)



Cestrum nocturnum, night-bloom

Rhoeo discolor

Sambucus Mexicana, Sauco,

Simarouba glauca, Zapatero (Peten), Negrito (Belize), Paradise Tree, Bitterwood

Stemmadenia donnel smithii (Rose) Woodson, Huevos de caballo, common in Izabal and Peten and elsewhere in Maya area of Mesoamerica. Flowers during late April.

Stevia eupatoria

Tradescantia spathacea

Urera baccifera, chichicaste



Manita tree canak



Guayava *Psidium guajava*



Passiflora



Ceiba aesculifolia flower

Plants to produce colorants (dye)

The Maya used color for ceramics, murals, clothing material, and cosmetics. Color was also used as an ingredient in food, such as achiote to color cacao red. Below most of the colors are for dye for cotton for clothing. Two thousand years ago the dye would also have been used for fabrics from other plants such as maguey.

We spent eight days in the Lake Atitlan area studying plants for dye, so for this umpteenth edition we have been able to add many new plants. We cite other authors only when we have not found the plant ourselves, or when a citation would be helpful. But the goal of this list is not to collect citations; the goal of our project is to find, photograph, and make available high-resolution digital images of utilitarian plants of the Maya.

In a future edition we will do our best to divide colorants into colorants for food (sauco, *Sambucus* species), colorants for clothing (cotton, bark paper cloth, etc), and colorants for both food and clothing (achiote). In the meantime, for the 13th edition (May-June 2014) we list the plants as generic colorants. Some are also tannins.

By far the best book on colorants of the Maya is by Olga Reiche, 2014, "Plantas Tintoreas." We will update our list when we do more comparisons with her many years of careful research.

Achiote, *Bixa orellana*; actually there are at least two species or variants in Alta Verapaz. Achiote is grown and used as a dye for cotton in San Juan de Laguna, Lake Atitlan.

Aloe, sabila is not an indigenous plant, so should not be included.

Acacia farnesiana (L.) Willd., widely elsewhere in Guatemala and common in lower Motagua Valley. Known in British Honduras as "cuntich" (Maya) and "cashaw"; "cankilizche," "subinche" (Yucatan, Maya); "aroma," "huizache" (Campeche); "quisache" (Chiapas); "espino ruco" (Salvador). The shrub, usually called "espino blanco," is abundant or dominant over large areas of Guatemala, particularly in the lower Motagua Valley, some parts of the Oriente, and in Quiche and Huehuetenango. It is more or less distinctive in habit, and conspicuous because of the abundant white spines. (Standley and Steyermark 1946:9).

Ilamo bark, *Alnus jorullensis* or *Alnus acuminata*. Used as a dye for cotton in San Juan de Laguna, Lake Atitlan.

Malanga, *Alocasa* species (Mendez 2008:75).

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

Apoplanesia paniculata Presl., **Madre de flecha**. The Maya names of Yucatan are "kiik-che" and "chulul." The latter signifies "bow," and the wood is said to have been used commonly among the Mayas for making bows. The name given the tree in Zacapa evidently alludes to a similar use there. Apparently the same use was spread into remote regions, for in western Mexico the tree is often called "palo de arco." The bark is reported to yield a yellow dye. The tree is abundant about Zacapa, where at the end of the rainy season the trees are conspicuous for a few days because of their dense masses of white flowers (Standley and Steyermark 1946:165).

Arrabidaea species (Standley & Dahlgren 1931:353)

Chilca, *Bacchalis salicifolia* (Mendez 2008:75).

Achiote, *Bixa orellana*; actually there are at least two species or variants in Alta Verapaz. Achiote is grown and used as a dye for cotton in San Juan de Laguna, Lake Atitlan.

Nance, *Byrsonima crassifolia*, occasionally grown and used as a dye for cotton in San Juan de Laguna, Lake Atitlan.

Chipilin, *Crotalaria longirostrata*, grown and used as a dye for cotton in San Juan de Laguna, Lake Atitlan.

Caesalpinia coriaria (Jacq.) Willd. (Standley and Steyermark 1946:99).

Caesalpinia vesicaria L. (Standley and Steyermark 1946:104).

Caesalpinia violacea (Mill.) Standl. (Standley and Steyermark 1946:104).

Cassia Tora L., frijolillo, seeds are used as a mordant to dye cloth blue (Standley and Steyermark 1946:129-130).

Cedrela mexicana, **Cedro** (Mendez 2008:75).

Fustic, mora, *Maclura tinctoria* (L.) D. Don ex Steud., synonym is *Chlorophora tinctoria*, dye; wood utilitarian.

Diphysa floribunda Peyritsch, Palo Amarillo, Canquixte, Qu'ix-c'an-te (Standley and Steyermark 1946:245; Ajxup Itzep 2010). A caserio of Sacatepequez is named after this tree, Guachipilin.

Palo de pito, coral tree, Tzite, *Erythrina corallodendron* and/or *Erythrina berteroana*. Another species is *Erythrina Americana* (Ratsch 2005:234 and Mendez 2008:75). Pito is grown and used as a dye for cotton in San Juan de Laguna, Lake Atitlan. There are many many different species of *Erythrina* growing throughout much of Guatemala.

Eupatorium albicaule Schultz Bip. Old Woman's Walking-stick. Soscha, Xoltexnuc (Maya), Putunin. Tine-cordel (Honduras)...In Honduras the plant is employed for imparting a green dye to twine, cloth, and other articles (Standley and Record 1936:398; Standley & Dahlgren 1931:384-385).

Eysenhardtia adenostylis Baill. (Standley and Steyermark 1946:259).

Dalea nutans (Cav.) Willd. Called "escoba colorada" in Yucatan, and the Maya name is reported as "mucuyche." The fruits exude a yellow juice when crushed between the fingers. The roots with lime are reported to yield a red dye, and a yellow coloring substance also is extracted from them. Bunches of the stems and branches are much used about the houses as rough brooms or brushes, hence the common name "escobilla" applied to this plant as well as to other members of the genus. *D. nutans* occurs in great abundance in central Guatemala, often forming a dense growth in cornfields (Standley and Steyermark 1946:214).

Diospyros digyna, **Black zapote**,

Genipa caruto, Jagua (Standley & Dahlgren 1931:367). Another *Genipa* species is arayol.

Genista tinctoria, (Parker 2008: 447)

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

Guazuma ulmifolia

Haematoxylon Brasileto Karst., **Palo de Brazil**. Dry rocky brushy hillsides, 200-1,200 meters; Zacapa; Chiquimula; El Progreso; Baja Verapaz; Guatemala (Fiscal); Huehuetenango (region of Santa Ana Huista). Western Mexico. Usually a shrub of 2-3 meters, sometimes a tree as much as 9 meters high, the stout branches often tortuous and armed with long hard spines as much as 2 cm. long, the trunk crooked and deeply fluted, branching from near the base, the bark grayish or medium brown. The shrub is abundant on the dry hills and plains through the lower Motagua Valley, especially in the region between El Rancho and Salama, where it is easy to recognize because of the deeply fluted trunk and the abundance of persistent characteristic pods, unlike those of any other member of the Leguminosae (Standley and Steyermark 1946:138).

Haematoxylum campechianum, **Palo de tinta, Palo de Campeche**, logwood. Common alongside rivers, lakes, and any moist area of Peten and elsewhere in the warm Lowlands.

Pericon, *Hypericum perforatum*, grown and used as a dye for cotton in San Juan de Laguna, Lake Atitlan.

Indigo, *Indigofera suffruticosa* (plus several other potential species).

Indigofera Thibaudiana DC.

Indigofera tinctoria L.

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

Justicia tinctoria, **Sacatinta**, grown and used as a dye for cotton in San Juan de Laguna, Lake Atitlan.

Leonurus cardiaca, **Cola de leon** (Mendez 2008:75).

Lonchocarpus rugosus Benth. Called "canasin" (Maya) and "black cabbage-bark" in British Honduras; "cantzin," "canansin" (Yucatan, Maya); "masicaran," "masicaron" (Honduras); "chapulaltapa" (Salvador) (Standley and Steyermark 1946:283).

Mucuna argyrophylla Standl. Ojo de venado; Ojo de toro; Ojo de caballo; Ojo de buey. A vine. This or one of the other species gives a very permanent and black dye. Combined with the scale insect called "aijshi" and alum, it affords a superior black gloss used by the Indians of Rabinal for decorating their famous jicaras or cups made from the fruits of *Crescentia* (Standley and Steyermark 1946:302).

Mucuna Sloanei Fawc. & Rendle (Standley and Steyermark 1946:302).

Tobacco; grown and used as a dye for cotton in San Juan de Laguna, Lake Atitlan.

Persea Americana, **Avocado**, grown and used as a dye for cotton in San Juan de Laguna, Lake Atitlan.



Phytolacca icosandra, **Jaboncillo**, Be aware that several unrelated plants are called jaboncillo.

Pouteria sapota, **Mamey zapote**, synonyms: *Achras mammosa*, *Lucuma mammosa*, and I estimate that what Mendez (2008:75) calls *Pouteria mammosa* should really be *Pouteria sapota*. This fruit tree has multiple uses for the Maya, past and present.

Psidium guajava, L. **Guayaba** (Mendez 2008:75, Morton 1987).

Punica granatum **Granada** (Mendez 2008:75).

Quercus species, **Encino**. This tree grows at altitudes above Lake Atitlan and is widely known locally to be used as a dye.

Rhizophora mangle, (**Red Mangrove**, mangle, dye).

Simarouba glauca, **Zapatero** (Peten), **Negrito** (Belize), Paradise Tree, Bitterwood. Also used for medicine, and the oil also for soap. The comment on colorants is from Joshi and Joshi page 7.

Tagetes erecta, **Flor de Muerto**, **marigold**. This flower has multiple uses in Maya culture.

Lundell adds another six:

Syckingia salvadorensis (standl.) Standl. Chacahuante, chactemuch, palo colorado. Also spelled Sickingia (Standley and Record 1936:391).

Indigofera suffruticosa Mill. Chob, añil

Morinda yucatanensis Greenm. Xhoyoc, bejuco piñoncillo

Caesalpinia platyloba Wats. Chacte

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

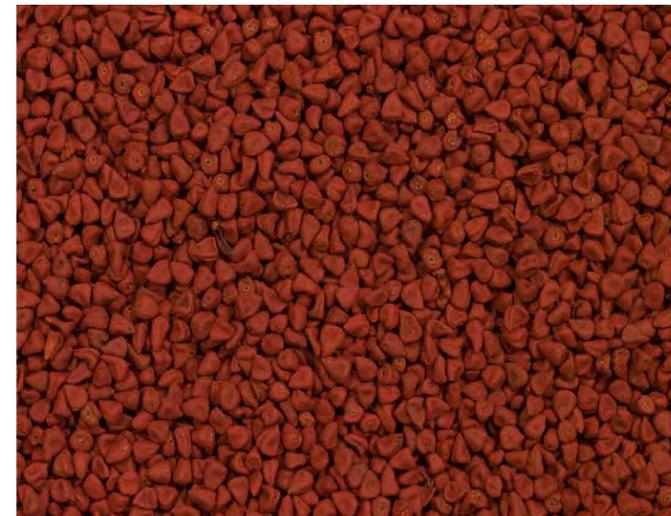
Additional colorants are listed in the recent monograph by Houston et al. (2009:1003-1009) on ancient Maya color. Their list is helpful, but provides no photographs of the actual plants. Nonetheless the amount of weeks in a library and/or on the Internet to prepare their list is impressive.

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. An excellent source of knowledge of Maya plants which produce colorants is the new book in press by Olga Reiche.

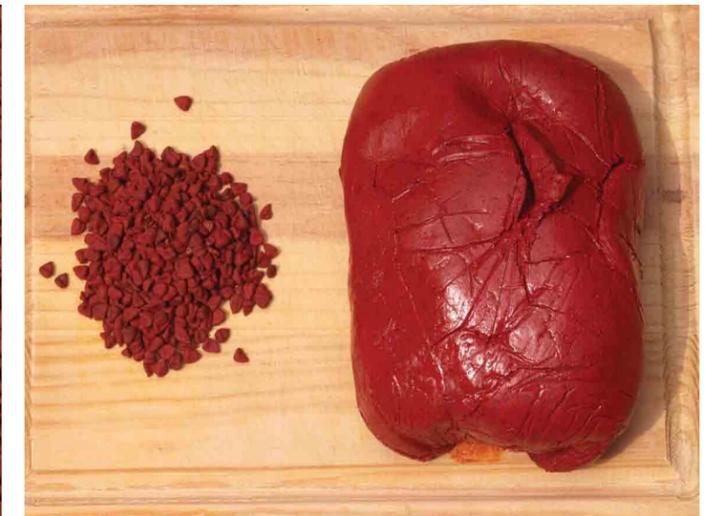
What is worth noting is that no one single monograph lists all the colorants; for example, the informative book by Manuel Mendez, based on field work in San Juan la Laguna, misses nance, which we found being used by the oldest and largest of the eco-plant dye associations in the town. The founders of this association are pictured frequently in his booklet. Finally, in April 2014, a monograph on Maya area colorants finally appeared.

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 record a recipe for each plant, 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 for colors for weaving (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 in Na Bolom, San Cristobal de las Casas, Chiapas, Mexico.

Nij, 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 cochinita on a cactus but the varnish one is much larger. It is called nij 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.



Achiote



Achiote



Cochinilla



Mamey



Nance



Anona

Plants used to make ink

This is a new category, for the January 2013 edition. We will add more plants as we distinguish between plant dye for textiles (for clothing) and plant colorants for ink.

Acacia Farnesiana (L.) Willd., (Standley and Steyermark 1946:9).

Plant substances for cosmetics

See also separate section on medicinal plants, and on colorants. We are developing an additional theme section on perfumes (below). Since I do not use cosmetics or perfumes I am not an expert in whether to list both in one theme, or separate them; so I will have them provisionally as two separate themes.

Charcoal, for black

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

Plants (usually flowers) used for perfume

This is a new category for the January 2013 edition. We have updated this for the June 2014 edition. We will add more flowers to this list as time and funding allows. For example, most of the saps and resins used for incense can sometimes be used as perfume. We are interested in natural perfumes (used or usable by Mayan people of Mesoamerica), not manufactured chemicals.

For the category I use the word perfume to start with, but I also mean any plant (usually the flower) which has a fragrant enough aroma so if you walk near the plant you can already notice the aroma. For example, if we are 10 to 15 meters from some magnolia trees in the forests of the Nebaj-Chajul-El-Quiche area (Finca La Perla) we can notice there are magnolia trees in flower (these are rare species of native magnolia; not the other magnolia species planted for their giant flowers).

Brugmansia and huelle de noche are both plants whose aroma is easily noticed within 5 meters of the plant. If you put your nose up to the actual flower you may receive more chemicals than you really ought to be asking for. So we do not recommend trying this, especially not with most plants of the family Solanaceae.

I would also investigate most of the flavorings for cacao, flavorings for tobacco, such as *Quararibea funebris*, pericon (*Tagetes lucida*, a marigold but tiny flower and very different appearance than flor de Muerto kind of marigold), and other plants.

palo de pito *erythrina*

Acacia Farnesiana (L.) Willd., (Standley and Steyermark 1946:9), now known as *Vachellia farnesiana*.

Hymenaea courbaril, **Guapinol**, should be studied as a potential perfume.

Linaloe is unclear whether it is native or originally brought in, because today the main source is India. But it is potentially originally from Mexico.

Magnolia, several species. We are actively searching for *Magnolia* and *Talauma* species in Guatemala. These trees are near extinction and can be found only in extremely remote areas.

Plumeria species, flor de Mayo (and many other local names, such as fangipani); two are well known: *Plumeria rubra* and *Plumeria alba*.

Polianthes tuberosa, Flor de Nardo, one of the more fragrant flowers of Guatemala. We grow it in the FLAAR ethnobotanical garden. Main habitat in Guatemala is Costa Sur, where it is cultivated (not wild).

Turbina corymbosa and synonym *Rivea corymbosa*, known as ololiuqui among the Aztec; family Convolvaceae, looks like a morning glory to some degree.

Vanilla planifolia

A web site which lists plants with nice fragrance from around the world is <http://faq.gardenweb.com/faq/lists/fragrant/2004062551022245.html>.

Plants for decoration (necklace beads and comparable)

Erythrina, various species.

Ormosia, various species.

Macromeria guatemalensis I. M. Johnston, Itamo real (San Marcos); te de monte (Huehuetenango) (Gibson in Standley and Williams 1970: 153-155).

Rhynchosia pyramidalis

nipple fruit, bright orange fruit which looks like cow's udders, is sold as Christmas decoration in Guatemala.

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

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.

agave, especially in areas where these plants grow.

Maguey, *Furcraea species*

Several other plants can also produce thread or cloth.



Cotton

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 2008:928).

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: 887).

Desmoncus quasillarus, stalks used to make baskets (Palenque area)

Vogl et al. 2002: 637

Desmoncus orthocanthos Mart., bayal, baskets, even walls of buildings are made with this remarkable palm vine plant.

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)

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

Philodendron, *Philodendron sp.*, roots used for baskets; even 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

Belotia campbellii Sprangue. Moho

Plants for other utilitarian use

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

Bottle gourd, *Lagenaria siceraria*

Croton xalapensis Kunth, (Parker 2008:274); Uphof 1968 for cleaning teeth)

Curatella americana, leaves used for sandpaper (Lundell 1938)

Dalea nutans (Cav.) Willd. Called "escoba colorada" in Yucatan (Standley and Steyermark 1946:214).

Escoba palm, *Cryosophila argentea*, common in Peten; easily to identify due to medium size and lower trunk covered in spines. Escoba is the Spanish name for broom.

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



Nance Fruit

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)

Cotton-like fiber from *Ceiba*, for pillows

Ochroma pyramidale, balsa

Typha angustifolia

Thrinax (chit) are all mentioned by Lundell 1938.

Arthrostylidium pillieri and *Arthrostylidium spinosum* are used for fish spears (Lundell 1938)

Utilitarian Use: Tanning

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

Rhizophora mangle L. (*tapche*, red mangrove),

Curatella americana L. (*saha*), also (Standley and Steyermark 1946:71).

Pithecolobium albicans (Kunth) Benth. (*chimay*),

Albizzia lundellii Standl.

I would add (for tanning)

Acacia Farnesiana (L.) Willd., (Standley and Steyermark 1946:9).

Caesalpinia coriaria (Jacq.) Willd. (Standley and Steyermark 1946:99).

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

Bocconia arborea (Parker 2008:692)

Pithecolobium dulce (Roxb.) Benth. (Standley and Steyermark 1946:73).

Parker (2008:442) spells the genus *Pithecellobium*, and says *P. tonduzii* is used to tan leather in Huehuetenango.

Utilitarian use: soap

I have seen comments on about four main plants that can produce soap: one is the **Soap tree**, *Sapindus saponaria*. As I did more research, I found additional plants which can be used by local people to produce soap.

Cassia grandis, ashes of the wood used for making soap (Fieldiana botany, vol. 5 page116). This statement copied by Parker 2008:401. Cassia is also used to flavor cacao.

Ceiba pentandra, seeds are edible; oil may be used to burn in lamps; seeds also may be used to make soap (Walter de Gruyter, encyclopedia of biology).

Chlorogalum species is another possible plant to produce soap.

Guazuma ulmifolia has more uses than I ever imagined. One use is as soap.

Ipomoea murucoides Roem. & Schult. Although in same genus as morning glory vines, this is a tree. It is common and conspicuous in the central region, especially about Antigua, where it is often planted for living fence posts or for hedges. It is more abundant in the west, and is conspicuous on the arid hills about Sacapulas in Quiche*. The trees are conspicuous because of their white trunks and branches, which look as if they had been used as roosting places by birds. The abundant large white flowers are very handsome (Standley and Williams 1970:43). They give the following local names: Siete

camisas; tonche; tutumuzco; tutumuste; siete pellejos; tutumuscuavo; palo blanco; siete capas; tutumuscuago; tutumuzcual.

Jatropha curcas, **physic nut**, oil for soap and other uses. Toxic as food. One of several hosts for the cochinita insect which is used for varnish-like substance (MacVean 2003:66)

During Christmas week 2012, the weavers of San Juan la Laguna, Lake Atitlan, told me they used **jaboncillo**, *Phytolacca icosandra*, as soap many decades ago. Today they use this large bush as a source of dye for coloring their cotton weaving.

Sapindus saponaria, **Soap tree**.

Solanum mammosum, **Nipple fruit**, Cow's Udders; poisonous but has potential use as soap. The whole fruit is used as Christmas decoration in Guatemala City. A close relative of this plant, with no nipple fruit, is a weed in several parts of Guatemala, especially Peten.

Sterculia apetala, **Castaño**. It is interesting that three of the plants used to make soap are also usable as a spice for cacao.

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,
- Jacquinia,
- Serjania,
- Salmea

Plants to produce Insecticide

Annona species (Michael 2000:129)

Lonchocarpus castilloi (OFI-CATIE 668)

Magnolia should also be checked to see if any species in Guatemala can be used as an insecticide. Cano et al suggest *Magnolia dealbata* of Mexico has this potential.

Tobacco

The number of Mesoamerican plant species used for insecticide is quite large. We will provide more coverage of this in future editions.

Plant materials used in constructing houses, (Palms)

Asterogyne martiana

Lancetillo, *Astrocaryum mexicanum*

Copernicia argentata

Corozo, cohune, *Attalea cohune*, thatch palms. Also look at *Orbignya cohune* (MacVean 2003:106-107).

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



Guano Palm

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.

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.

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

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

Bucut, *Cassia grandis* (OFI-CATIE: 439); also soap, and medicine.

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*

Fustic, *Maclura tinctoria* (L.) D. Don ex Steud. dye; wood utilitarian, synonym is *Chlorophora tinctoria*,

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. Narcotic.

Haematoxylum campechianum L., **palo de tinto**, **palo de Campeche**. Local people speak of "tinto blanco" and "tinto rojo" trees. I am still trying to fully understand whether this is a different bark color or variety or local mishmash. Do not confuse with the tree of identical trunk form, palo de Brazil, *Haematoxylum brasiletto* H. Karst. The palo de Brazil grows in the absolute driest part of Guatemala (Rio Motagua, CA9, Km 45 through about 90-ish). Palo de Campeche grows in wet parts of the country and alongside streams and lakes.

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).

Matlisguate, roble de savana *Tabebuia rosea*
(also a pretty flower)

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



Madre de cacao



Palo blanco

Plants which can produce Varnish

This is a new category which we hope to expand during the coming year. The best known varnish among the Maya comes from a scale insect which is grown (domesticated) in Rabinal.

Another source of varnish is *Hymenaea courbaril*, **Guapinol** (www.conabio.gob.mx web site).

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

The genus *Diphysa* seems extremely interesting. There are many species, with edible fruits and other utilitarian uses.

Plants with attractive flowers

Many native plants simply have attractive flowers. Although the FLAAR Report is primarily interested in helping local people improve their health by encouraging them to raise more local fruits, vegetables, nuts, edible leaves, and edible roots, as a professional photographer and also fine art photographer I will admit that I also like to see, and photograph, nice flowers. I bet the gardens of many Classic Maya had at least some of these flowers in their gardens.

Here are a few (a list by Ilena Garcia, staff biologist at FLAAR Reports):

Asclepias curassavica, Hierba de cantil

Aristolochia grandiflora, Matamoscas

Epiphyllum thomasianum,
Reina de baile o galan de noche

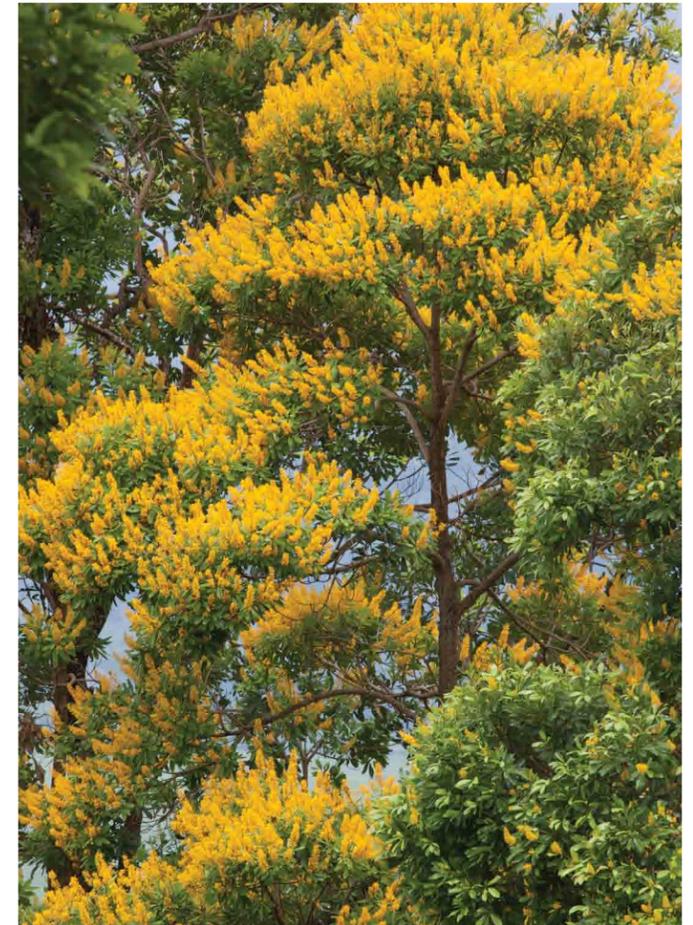
Pachystachys lutea, Camaron amarillo

Petrea volubilis, Capitan lila

Tristerix tetrandus, Quintral del alamo

Vochysia guatemalensis, San Juan

Of course many of the flowers of utilitarian plants are also gorgeous, such as the flowers of Zapoton (*Pachira aquatica*) and scores more.



Vochysia guatemalensis



Zapoton (*Pachira aquatica*) 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, *Castilla elastica*, but that is not the rubber tree used for tires and other products today).



Banana flower

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. Presently (2012), Ana Lucia Armas and Alejandra del Valle are working with Sofia Monzon to prepare photographs of plants for a major photo exhibit at the Missouri Botanical Garden.

In our St Louis office Cami and Gustavo worked as a video team in 2011, so a total of six people are working on botanical and zoological studies at FLAAR (plus a support staff of office manager, office assistants, etc).

PDFs in past years 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 in summer 2012, especially the layout of the photographs, is the graphic design work of Josue Daniel Mazariegos Ochoa. Ilena Garcia has also worked on the production of this summer 2012 edition of this PDF.

Biological research in past years 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.

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).

We thank the Museo Popol Vuh for providing us access to the several hundred books of the flora and fauna section of the FLAAR Library in Guatemala. We had loaned this to the museum about 20 years ago. But since we are working full time on flora and fauna we needed these books available also weekends and nights during the week. Since no university library is open these hours, we felt it was more realistic to move this segment of the library back to our offices. Students have the biology library of Universidad del Valle and others, plus any student doing a dissertation could consult with us as well.



Cojoba arborea, Cola de mico

The FLAAR Library on Maya archaeology, epigraphy, iconography, and anthropology remains on loan to the Museo Popol Vuh at the Universidad Francisco Marroquin (as it has been on loan now for several decades). We do not intend to ask for this back at the present time since it is being used by the museum curator, staff, and visiting students and scholars.

Although this is now the 11th edition over two years, 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.

The appendices and bibliography of this 11th edition is being put into a separate PDF since many e-mail systems are not able to receive PDFs over 5 MB in file size. So we are issuing two versions of this 11th edition:

- One as a single pdf (at full file size, over 5 MB in file size)
- Another version as two PDFs (to make each PDF more easy to send as an attachment).

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 wrote 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 rationale 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. But in the meantime, the list of categories based on my research the last many years has resulted in a list of categories that should be of use to scholars and students for many years.

My list is not stagnant either: I have added new categories every year as I come face to face with new plants out in the field, or in a monograph or botanical article.



Dr. Nicholas Hellmuth

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	
	Flowers for earrings	
	Additional flowers	
		ritual
Beverage plants	Plants produce alcohol	
	Plants for drugs	beverage
	incense	
	Medicinal plants	
Dye plants	Colorants	medicine
Fiber plants	Clothing (fibers etc)	dye
cordage	basketry, ropes	fiber
Misc. useful plants	Other utilitarian use	
thatching materials	Construction: palms	
timbers	Construction: other plants	
		construction
For dugouts		
decorations		
Shade trees, ornamentals		
		fuel
		production
		ornamental
		poison
		forage
		tannin
		gum
		latex
	Introduced plants	

Appendix B

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 tinctoria</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 guatimalensis</i> o <i>I. suffruticosa</i>	O
Añil (denso)	En forma De polvo	<i>Indigofera guatimalensis</i> o <i>I. suffruticosa</i>	O
Añil (mediano)	En forma De polvo	<i>Indigofera guatimalensis</i> o <i>I. suffruticosa</i>	O

Añil (pálido)	En forma De polvo	<i>Indigofera guatimalensis</i> o <i>I. suffruticosa</i>	O
Añil (muy pálido)	En forma de polvo	<i>Indigofera guatimalensis</i> o <i>I. suffruticosa</i>	O
Añil (denso)	Polvo	<i>Indigofera guatimalensis</i> o <i>I. suffruticosa</i>	O
Con Palo de mora	Corazón	<i>Chlorophora tinctoria</i>	Al
Añil (mediano)	Polvo	<i>Indigofera guatimalensis</i> o <i>I. suffruticosa</i>	O
Con Palo de mora	Corazón	<i>Chlorophora tinctoria</i>	Al
Añil (palido)	Polvo	<i>Indigofera guatimalensis</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 tani-no)	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 tronco	<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>	
	Insecto	<i>Dactylopius coccus</i>	Cu
Con Conchinilla			
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+ Chlorophora tinctoria</i>	
Con palo de mora	Corazón de tronco		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	<i>I.guatemalensis</i>	Fe
	Corazon de tronco	<i>Gliricidia sepium</i>	

Palo de Campeche	Corazon de tronco	<i>Heamatoxylon campechianun</i>	Sn
Palo de Campeche	Corazon de tronco	<i>Heamatoxylon campechianun</i>	Cu
Palo de Campeche	Corazon de tronco	<i>Heamatoxylon campechianun</i>	Fe
Palo de Campeche	Corazon de tronco	<i>Heamatoxylon campechianun</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

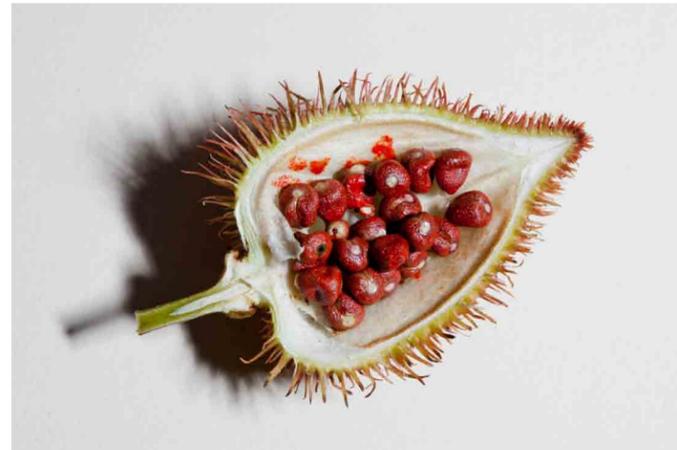
Cochinilla	Insecto	<i>Dactylopius coccus</i>	Fe
Cochinilla	Insecto	<i>Dactylopius coccus</i>	Fe
Cochinilla	Insecto	<i>Dactylopius coccus</i>	Chi
Nance con cochinilla	Corteza Insecto	<i>Byrsonima crassifolia</i>	Al
Nance con cochinilla	Corteza Insecto	<i>Byrsonima crassifolia</i>	Al
Cochinilla con palo 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 S. macrophylla</i>	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=alumnio Cu=Cobre Sn=Estaño
Fe = Hierro Chi = Chitano O = Hidrosulfito con Soda Caustica

Appendix D

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 12th 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.

We are also updating our list of colorants based on the many years of work of Olga Reiche. Her book is now available (2014 onward).

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, cochinitilla			
<i>Diospyros digyna</i>	Zapote negro		✓	✓

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>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, 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 y 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	✓	✓	

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>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.

Maya Ethnobotany

Complete Inventory:

Fruits, nuts, root crops, grains, construction materials,
utilitarian uses, sacred plants, sacred flowers



If the file size is too large it is hard to send this PDF as an attachment, so we have the bibliography as a separate PDF.

The bibliography can be downloaded, at no cost, from www.maya-ethnobotany.org.

The bibliography is in two sections: monographs, and articles. Articles often have no photographs. Monographs tend to have the most photographs. We will be issuing a new edition with the articles and monographs in merged alphabetical order later this year. But already you can download the full PDF with everything (but still in two sections within the PDF).



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