



ASOCIACION
FLAAR
MESOAMERICA

May 2010

NATURAL DYES

**Used in Mesoamerica
since prehispanic age**



Bonampak Mural
Photo: A. Cajas

Author: Cristina Guirola/ Editor: Antonieta Cajas
Graphic desing: Silvia Herrera and Priscila Sandoval



Please note that:

This report has restricted permission to any other website or organization.

Likewise, may have been updated if you've found a version from another site, notice that may be an outdated version.

To get a legitimate version we suggest you get it from www.maya-archaeology.org, www.digital-photography.org or our new site in 3D technology for cultural heritage that offers 3D scanning of ethno-botanical and ethno-zoology www.3d-scanners-3d-software-reviews.org.

If you're an educator in any college or university, whether you're an official in any scientific society, museum, botanical garden, zoo or comparable, and wants to distribute copies of this to your staff or students, please just let us know so that can authorize the distribution.

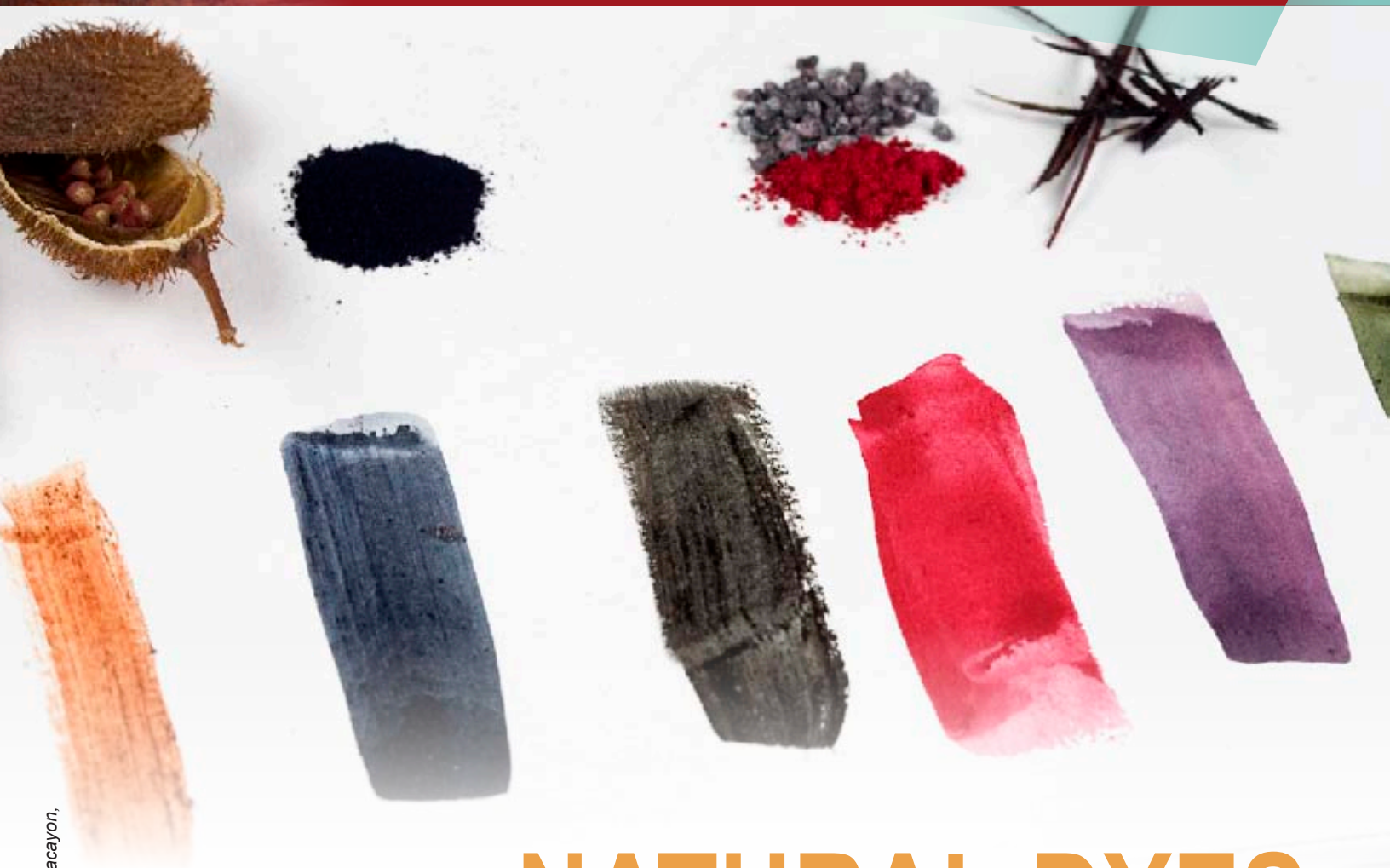
If your museum, university, college, botanical gardens, zoos want to receive all FLAAR reports in the future (compared to a subscription format), there will be no charge if you arrange a discharge system for their institution (currently available only for museums, universities, and comparable).

There is no cost for distributing this report, but it is preferable that the system is authorized by FLAAR publications. It is noteworthy that we have five web designers and programmers in-house as part of our staff.

If you find any errors or permission in this report, or if you know any pre-Columbian society that we missed, please let us know to consider it. Write to FrontDesk@FLAAR.org

Table of Contents

Importance of dyeing plants	2
Dyeing plants used in Pre-Hispanic times	3
Plants used during the colony	6
Plants used in our time	7
Final comments	9
References	10



NATURAL DYES

used in Mesoamerica since prehispanic age

Plants have become a useful resource for human beings through thousands of years; they can be vital because they represent our main source of food. Also, plants have become an important part in other aspects in the everyday life of all cultures in the world; they are used for religious, ceremonial motifs; and also as funerary, sanctuary, dying elements, etc.

This report makes a brief introduction to the use of some species of dyeing plants in Mesoamerica, and other plants that were introduced since the Spanish arrived; finally, it is discussed how plants have been used since Pre-Hispanic times until our contemporary time.



Importance of dyeing plants

Since ancient times, the use of natural substances for the dyeing production has transfer all spheres of the Mesoamerican world. Through the pass of centuries, some cave paintings of different civilizations like Olmecs, Mayas, Aztecs, Teotihuacans, etc., have survived. It can be also appreciated in countless artistic pieces, like the diversity of mural paintings, in the dichromic and polychromic vessels, the figurines and textile fragments that evidence the use of colorants and dyes in ceremonial objects and in the use as clothing of elite characters. Besides this evidence, there is still a gap of information, and this corresponds to the use in everyday life, in the elite and the common people of the different civilizations in Mesoamerica (Ivic & Berger, 2008: 101).

The plants for dye where used in different contexts, but since they are perishable materials, they did not survive a great amount of time, and is because of this that is really hard to find archaeological evidence of this sort. Some investigators have argued that the first evidence of the use of dyes where among the human groups, using the pigments as body painting, which was associated to a ritual purpose, and as an environmental adaptation, because it was probably used as a bug repellent (Ivic & Berger, 2008: 101).

When the Spaniards came to the American continent, they were really surprised to see the diversity and richness that could be found of natural resources. In this case, there is the specific importance of the dyeing plants, which became like luxury items of very high price, and at its highest commercialization point –in the colonial period-, they were only exceeded by the gold and silver that was also found in the American continent. There is also evidence of the interest that had the Spanish among the dyeing techniques that the indigenous peoples used, and the detailed registry that they made of such techniques. Unfortunately, in some parts of Mesoamerica there is still a lack of information about this topic (Ivic & Berger; 2008: 102).



Some colors were obtained from plants, clays and minerals. Urn Highland Maya. Photographed with permission of the Museo Popol Vuh, Guatemala. Photo by Nicholas Hellmuth, FLAAR archive.



*The Mayan murals show the color palette used in textiles and other artifacts.
Bonampak Mural, Photo by A. Cajas.*

Actually, some techniques still survive that are used in the coloring of several artifacts, mainly textiles. There is still knowledge about the proper plants that can be used for the extraction and use for dyes. In this report there are included some plants that are of Mesoamerican origin and others species that were introduced and brought from the old continent (Europe).

Dyeing plants used in Pre-Hispanic times

The coloring dyes used were varied. The most common colors that were used were red, blue, yellow and green –and several tonalities of these colors-. These dyes can be found in several parts of the plant (depending of its species), in the roots, stem, flowers, seeds, etc. It is hard to obtain colorants in a direct way from nature, because in most cases you have to mix them or combined them with other colorants, and most times you have to take into account the immediate principles of the plants (Rossignon, 1859).

During the Pre-Hispanic time (2000 B.C. – 1525 A.D.), the dyeing colorants were extracted from plants that were used and combined in several elements, that were part of diverse artistic representations in the cultural groups of Mesoamerica (Cabezas; 2005: 14-16).

Plants used in mural painting: The Maya artists of the Classic period have a chromatic palette of more than 30 different colors that were used in the creation of several murals, especially during the Classic and Postclassic periods. Among the most fascinating colors that they used is the use of green and blue. The fabrication of these two colorings represents the most outstanding technical contributions made by the Mayas to the world of traditional painting (Magaloni, 2001: 176, 178).



The main characteristic of these tonalities are the artificial pigments, made by man, transforming the natural elements. The Mayas took advantage of the absorbing characteristics of the white clay, called in Maya yucatec sak tu'lum, which mineral name is attapulgite and saponite, to add on them the blue dye that produces the indigo plant, called in Maya ch'oh (Table No. 1). This is, the Maya blues and greens are pigments with an inorganic base, the attapulgite clay, on which there is an organic compound with color, that is generally the indigo (Magaloni, 2001: 178).



During the prehispanic era dyes were extracted from plants and combined with other elements. The indigo was extracted from the plant Indigofera guatemalensis, and was exploited during the colonial period. Photo by Nicholas Hellmuth and Eduardo Sacayón, FLAAR Mesoamerica, copyright 2010.

To obtain the blue indigo colorant, they probably used the same technique that they used for the dyeing of textiles. For the dyeing of textiles there is the "indigo flore", which is used to dye the wool or cotton. The process consists in immersing the fibers in a pot with water and the colorant; heated down during an hour moving it constantly. This same procedure it's done to fix the blue coloring in the palygorskite clay, and that is how it's done the blue Maya. The secret is in the stability with the acids, according to Magaloni (2001: 178-179), is the heating of the pigment at a moderate temperature (167-302°F) during several days.

To make a more dark color out of the blue colorant, or to create a green Maya color, the old technicians used different organic dyes combining them with indigo, or mixing blue Maya with different minerals. Ralph Roys said that if you mix the indigo with the bark of chukum (Table No. 1), you get a darker tone, almost black; the same result can be seen with the ek or "palo tinta" (Table No. 1) (Masteche, 1996: 20), where you get dark tones like black, purple and blue (Magaloni, 2001: 179-180).

Other organic dye of a yellow color, that could been used to mix the indigo blue to make the green Maya, is the extract of the root's tree call in Tzeltal kanté (Table No. 1), used recently by Lacandonés to make yellow pigments in combination with lime (Magaloni, 2001: 180). And you can also find the elaboration of a red pigment with the red wood of chanté (Table No. 1), that according to Sahagún,



you can also obtain a black color with the resin of certain trees (Magaloni, 2001: 186-187).

The dyeing colors in codex: The colors that they used where red, blue, green, black, white, yellow, orange, brown and purple in different mixtures and tonalities. The pigments where obtained by minerals, plants (stem, leaves, seeds, fruits), insects (like the cochinita or woodlouse –*Dactylopius coccus*–), and animals, like the sea clam (*Purpura patula*), that was obtained in the Gulf Coast of Mexico. To mix the pigments, they used oil named “axi”, “axin” or “aje”, which was obtained by the insect *Coccus axin*, which were raised and cultivated for that purpose. These insects were boiled, to obtain the oil from their body, that was used like a polish or as a base for pigments (Walcott, 1940: 31-35).

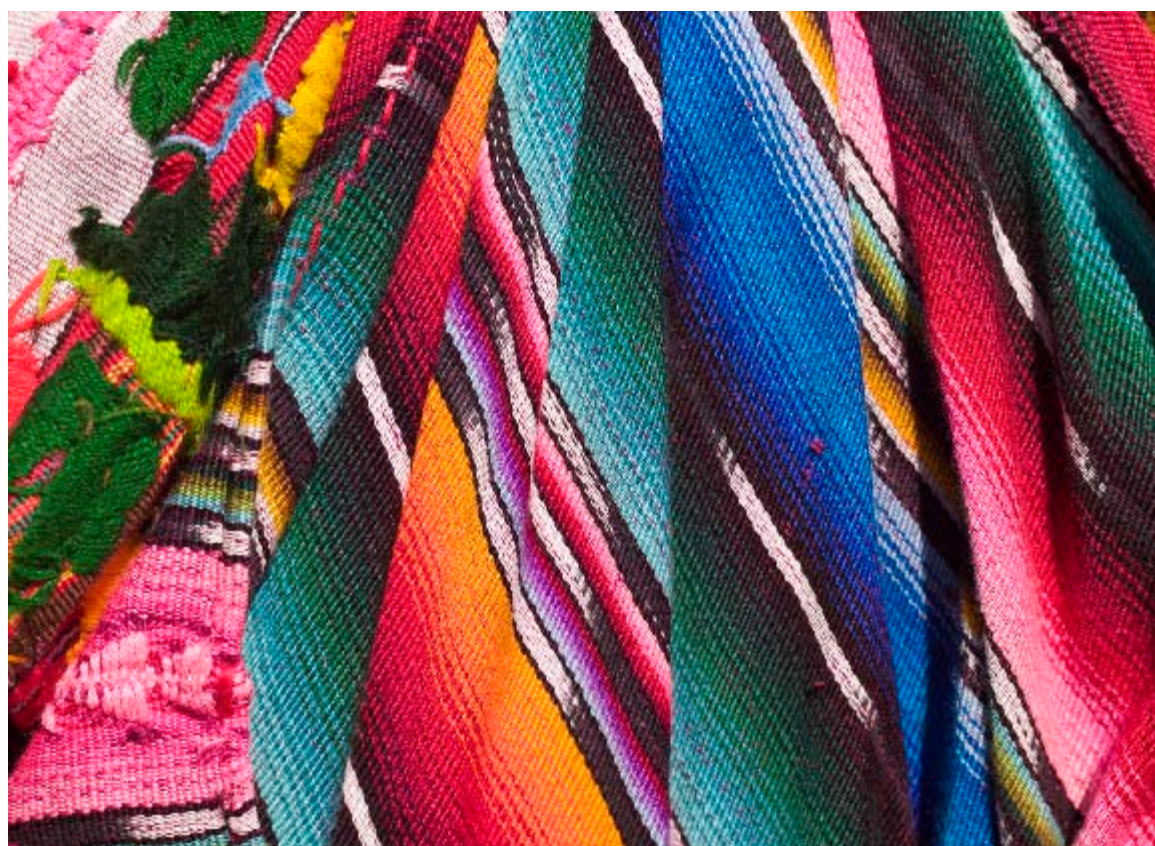
Other uses: There can be found other uses in the Pre-Hispanic evidence; one of them can be appreciated in the murals of different sites, like the famous murals of Bonampak, where you can appreciate a wide variety of textile representations. Depending on the type of clothing that the characters are wearing, you can appreciate the division of social classes. From that point on,

an analysis can be made about the type of fibers and natural pigments that they used to dye those textiles (Uriarte, 2003: 19).



The vegetable dyes are also used to decorate some polychrome vessels, especially in the Maya Lowlands (Houston, 1999: 610-611). Besides of the iconographic information that the murals and vessels can provided, there are also several findings of textiles found in funerary contexts, from which you can obtain analysis about the types of pigments that were used to dye those materials. This type of evidence has been found in Lamanai, Belize; in the tomb of the Sun God of Altun Ha, Belize; and in a tomb of Río Azul, Guatemala. This evidence is dated for the Early Classic period. There has been also found fragments of cotton in the cave of Chiptic, Chiapas, and fragments of textiles from the sacred cenote of Chichén Itzá, Mexico (Ivic & Berger, 2008: 117-118).

Among the most common plants used since this epoch, we can find the indigo or “Jiquilete”; its dyeing components were used to make texts and drawings on the codex, in the dyeing of fabrics, and they were used in some ritual activities; beside that, they were used for the ornamental coloring of certain ceramic pieces, and for stelas and temples (Cabezas, 2005: 117-118).



Currently most used colors in textiles and food are artificial. Some regions have attempted to rescue and assessing the use of natural dyes to give color to the cotton threads. Photo by Nicholas Hellmuth FLAAR Mesoamerica, copyright 2010.



Plants used during the colony

The colonial period corresponds since the Spaniards arrived (1524), until 1821. During that time, the dyeing plants were still used by the indigenous peoples, and also by the Spaniards, who gave great importance to the discovery of different species and varieties that were used in America like a source of an economic income, and also, the Spanish people consider those plants to have a great importance because most of the species found here were unfamiliar in the old continent.

For that reason, the Spaniards took those species to Europe, and among them were the dyeing plants; also, several materials from the old continent were imported to America, like fibers to dye and other techniques for dyeing, that were mixed or replaced the local techniques that indigenous peoples were using.

Plants used on textiles: One of the most important species of dyeing plants was the indigo. As mentioned before, this plant was a strong source of economic income during the XVII and XVIII centuries. The areas of major production were the Major's office or "Alcaldía Mayor" of San Salvador and San Vicente, and the Governor's office of Nicaragua. In the territory of what is known today as Guatemala, the most important regions where indigo was produced are located in the actual departments of Escuintla, Santa Rosa, Chiquimula, and Zacapa (Cabezas, 2005: 118).



Plants used in the kitchen: There are several plants that are used for cooking to give the food certain colors and also flavor. One of them is the annatto (Table No. 2), which produces a red coloring in the food, and is also known as a spice, to give flavor to the food. But there are also other species of plants that are less known, like the Matlalxochitl (Table No. 2), which in Mexico, according to Castelló (1996: 66), knew the religious agustinas recolectas, order that has been renowned in 1837 by their "particular candy and alfeniques"; they used to dye the candy of a lilac color, adding the juice of the matlalxochitl petals, smash them with water and some lemon juice, and in the same way, they dyed the granulated sugar to decorated the candy.

This plant produces a blue tone, which was used to color small tablets and the "jamoncillo" of milk (alkaline), which was nearly done with a little mold of plate. They used to smash several petals with a little bit of clear water, and once it was strain, they mixed it with the "jamoncillo", and made engraved candy with soaked moldings made of wood. The flowers

were cultivated in flowerpots and where taking care by the own nuns. It is most likely that the indigenous woman showed the nuns the use of this colorant of Pre-Hispanic origin, which became a perfect mixture among the cultures (Castelló; 1996: 66).



*The achiote (annatto) was used since prehispanic times, and it is still used to give the red color to traditional meals.
Photos E. Sacayón FLAAR Mesoamerica, copyright 2010.*





Plants used in our time

In Europe, during the XIX century, the industrialization of textiles acquired enormous quantities of dyes that were easily available. This situation triggered the invention of synthetic dyes. In many indigenous regions, the creation of such dyes and the previous incursion of mercerized thread to these markets, replaced partially or in a total way the use of local dyeing; although the dyeing substances prevailed. At the same time, the synthetic colors made a variety of colors with the creation of native weaving, especially because although they had a variety of colors, the techniques to fix them were not so effective. The difficulty of fixing the colors of the dyes consisted that the indigenous textiles were made of vegetable fibers like cotton or maguey, which are not similar to the dyes that were available (Ivic & Berger, 2008: 102-103).

Taking this into account, there are a few examples presented here of ethnic groups of Guatemala, that use some dyeing plants in their communities.

Tz'utujil population: In this case, the information provided comes from the San Juan de la Laguna population, in Sololá. The women of this town use several techniques of dyeing, to make a variety of crafts, which are in sale in different sectors of the market (Ivic & Berger, 2008: 110).

The textiles are dyed with natural pigments that have found an important space in the market that is especially for the tourist sector. The natural dyes are not used by any local textile of local use, and are reserved completely to make the textiles used for sale for the national and foreign visitors. Among the most popular products we can find bags, purses, hammocks, scarves, etc. Besides that, local groups like Lema' (Local cooperative of tz'utujil women that are dedicated to this labor), that are in constant innovation of new lines of production (Ivic & Berger, 2008: 112-113).

The plants that are used by these women are mainly cultivated in San Juan la Laguna, although there are other plants that are obtained in regional markets and others that can be only found according to the season of the year. Among those plants we can mention the alder, oak, coral tree, muicle, sweet marigold, chipilín, marigold, annatto, coconut, curcuma, guava, carrot, cinnamon, and there is also report of the use of one kind of pepper (Ivic & Berger, 2008: 114) (Table No. 3).

Mam population: Since the massive introduction of the artificial dyes, the natural dyes have fallen into disuse. Only some local mam elders, ancient shepherds and sharp observers of the manifestations of nature, can still remember the use of the fruits of sakatint (Table No. 3), to dye threads in a blue color; also the xq'anich' plant (Table No. 3), to color the metate or mat threads, and also used in the confection of morrales (or bags) to dye them in a yellow color. From the fruits of the t-xnoq'chej (Table No. 3), the people extract a black-blue dye, to dye the mat fibers.



Some say that the xq'an wi' (Table No. 3), can be used in the confection of rigging, to dye it in a yellow color (Hosting, et al. 1998: 161). The knowledge that some people have about the bark of certain trees for the dyeing process is very limited. In C. Chiquirichapa they can recall the used of the alder's bark (Table No. 3), so they could dye the sheep's wool (Hosting, et al. 1998: 161).

According to recent investigations, there is information about the recent use of jiquilete (or indigo) in Guatemala and El Salvador. "In Guatemala, there is about 50 country persons that lived in the communities of Barillas (Yula, Chancolín and Espíritu de Ixcán), in Huehuetenango, and seven in Playa Grande (Kaibil Balam, Flor del Norte, Xalbal, etc.). In Quiché they started cultivating indigo. In El Salvador, there are several projects that have more time of life since they restarted; this is why they have better economic incomes by now. El Salvador has exported indigo to Turkey, Switzerland, Germany, France and Japan; and plans to include England, Canada, US, Mexico, Netherlands, Colombia and Guatemala. Also, is a finish product (Batres, et al. 2005)



Some plants need to go through several processes for the dye washed out or for use as mordants.
Right: Olga Reiche director of Indigo Arts & Textiles Guatemala showing an extraction process of dyeing.
You can contact Indigo Art and Textiles Guatemala communicate by telephone (502) 7888-7487 or email:
indigoartestextiles@gmail.com

Photos: Eduardo Sacayón FLAAR Mesoamerica, copyright 2010.



Curry root.



Curcuma (not hispanic origin).



Avocado seeds.



Cochineal and natural fibers are used to extract the dye
Photos in Guatemala Indigo Textile Art by Nicholas Hellmuth and E. Sacayón, FLAAR Mesoamerica, copyright 2010.



Final comments

It is evident that in Mesoamerica there are innumerable natural resources that have been used since the Pre-Hispanic epoch, and with the Spanish arrival there was a combination of knowledge for the extraction and use of these resources. In the case of the natural colorants, there are several techniques that are still used thanks to the knowledge transmitted in oral tradition, and other techniques that were introduced in Guatemala from the other continents.

Since the introduction of several elements of organic origin, many projects in Guatemala have been created for the communitarian development, so the people can use several techniques to cultivate, techniques in the elaboration of tools and textiles that combined practices of ancestral origin. Through various integral studies, these projects can recover the knowledge and ancestral practices, so they can contribute in some way to the strength of the identity of the indigenous towns, and also reduce the levels of contamination in several communities by implementing methods or production that are less invasive. There is a big quantity of export products that are made by community groups, generally found at fare price stores.

Table No. 1. Plants used since the Pre-Hispanic age.

Common name	Cientific Name	Family
Indigo, añil, ch'oh	<i>Indigofera tinctoria</i> Linn.	Fabaceae
Chukum	<i>Pithecollobium albicans</i> Benth.	Fabaceae
Palo tinta	<i>Haematoxylon campechianum</i> L.	Fabaceae
kanté	<i>Diphyssa robinoidea</i> (Mill.) M. Sousa	Fabaceae
Chanté	<i>Gliricidia sepium</i> (Jacq.) Standl.	Fabaceae

Table No. 2. Plants used during the colonial period.

Common name	Cientific Name	Familiy
Annatto	<i>Bixa orellana</i> L.	Bixaceae
Matlalxochitl	<i>Commelina coelestis</i> Willd.	Commelinaceae

Table No. 3. Plants used in the present.

Common Name	Cientific Name	Family	Plant Origin
Alder	<i>Alnus jorullensis</i> Kunth in H.B.K.	Betulaceae	From Mexico to South America.
Oak	<i>Quercus</i> sp.	Fagaceae	Mundial distribution.
Coral tree	<i>Erythrina</i> sp.	Fabaceae	Several regions of Guatemala..
Sweet marigold	<i>Tagetes lucida</i> L.	Asteraceae	América.
Chipilín	<i>Crotolaria guatemalensis</i> Benth. Ex. Oerst.	Fabaceae	América.



Nombre común	Nombre científico	Familia	Origen de la planta
Marigold	<i>Tagetes erecta</i> L.	Asteraceae	Lowlands and highlands of Guatemala
Annato	<i>Bixa orellana</i> L.	Bixaceae	From Mexico to south America.
Coconut	<i>Cocos nucifera</i> L.	Arecaceae	Probably native of the Pacific Islands
Cúrcuma	<i>Curcuma longa</i> L.	Zingiberaceae	Asiatic South East
Guava	<i>Psidium guajava</i> L.	Mirtaceae	América.
Carrot	<i>Daucus carota</i> L.	Apiaceae	Center of Asian and Mediterranean
Cinnamon	<i>Cinnamomum zeylanicum</i> Blume.	Lauraceae	Sri Lanka.
Black pepper	<i>Piper nigrum</i> L.	Piperaceae	India
Sakatint, sacatinta	<i>Justicia tinctoria</i> (Oerst.) D. Gibson	Acanthaceae	Ostuncalco, San Miguel Sigüila, Quetzaltenango (Guatemala)
xq'anich', xq'an wi', Barba de león	<i>Cascuta jalapensis</i>	Convolvulaceae	Concepción Chiquirichapa, Cajolá, Quetzaltenango (Guatemala)
t-xnoq'chej, black-berry	<i>Rubus trilobus</i> Seringe in DC.	Rosaceae	Concepción Chiquirichapa, Huitán, Cabricán, Quetzaltenango (Guatemala)
Alder, Q'antze	<i>Alnus</i> sp.	Betulaceae	Huehuetenango, Quetzaltenango (Guatemala)

REFERENCES:

BATRES Carlos, Lucrecia DE BATRES Marlen GARNICA Ramiro MARTÍNEZ Raquel VALLE

SF. *Las Evidencias de la Industria del Añil en la Cuenca Copan-Ch'orti'*. Simposio de Investigaciones Arqueológicas en Guatemala. Museo Nacional de Arqueología y Etnología, Guatemala

http://www.famsi.org/reports/03101es/53batres_batres/53batres_batres.pdf

CABEZAS, Horacio

2005 *Unidad geográfica-cultural, Flora Mesoamericana*; Mesoamérica. Universidad Mesoamericana. Guatemala. Pp: 14-16; 117-118.

CASTELLÓ YTURBIDE, Teresa

1996 *Las huellas de una flor. El pulque azul*; Revista arqueología mexicana, Mayas de Campeche, vol. III, no. 18. Raíces, S.A. México. Pp: 64-66.



HOSTNIG, RAINER; Rosanna HOSTNIG; y Luis VÁSQUEZ V.

1998 *Tintes vegetales*; Etnobotánica Mam. Proyecto de educación Bilingüe Intercultural Maya. Ministerio de Asuntos Exteriores del Gobierno de Austria. Comisión Diocesana para misiones y ayuda al desarrollo, Austria. Instituto para la Cooperación Internacional. Guatemala. Pp: 161-279.

HOUSTON, Stephen D.

1999 *Arte cerámico de las tierras bajas del norte*; Historia General de Guatemala, Tomo I, Época Precolombina. Asociación de Amigos del País, Fundación para la cultura y el desarrollo. Guatemala. Pp: 607-614.

ICOM

2003 *Red list, Latin America*. ICOM.
<http://icom.museum/redlist/LatinAmerica/spanish/page01.htm>

IVIC DE MONTERROSO, Matilde & Mónica BERGER DE WHITE

2008 *El arte sale de las casas: los tintes naturales en San Juan la Laguna, Sololá*; Ciencia y técnica maya. Editores: Matilde Ivic de Monterroso e Iván Azurdiaq Bravo. Fundación Solar. Guatemala. Pp: 101-133.

KUXAN Suum

S.F. *Astronomos mayas*. Path to the center of the universe. <http://www.kuxansuum.net/page11.php>

LOMBARDO DE RUIZ, Sonia

2001 *Los estilos en la pintura mural maya*; Pintura mural Prehispánica en México: área maya. Editores: Beatriz de la Fuente y Leticia Staines Cicero. Universidad Nacional Autónoma de México, Instituto de investigaciones estéticas. México. Pp: 85-154.

MAGALONI, Diana

2001 *Materiales y técnicas de la pintura mural maya*; La pintura mural prehispánica en México: Área Maya. Editado por B. de la Fuente. Universidad Nacional Autónoma de México. Instituto de Investigaciones Estéticas. México. Pp: 155-198.

MASTECHE, Guadalupe

1996 *El tejido en el México Antiguo*; Revista Arqueología Mexicana, Indumentaria Prehispánica. Raíces, S.A. México. Pp: 17-25.

ROSSIGNON, Julio

1859 *Manual del Cultivo del añil y del Nopal, ó sea Extracción del Indigo, Educación y Cosecha de la Cochinilla. Extracción de los principios colorantes de varias plantas tinctoriales*. Paris, Librería de Rosa y Bouret.
<http://books.google.com/books?id=BZUUAAYAAJ&printsec=titlepage&hl=es>