Palobobo Balo Guabita Cansaboca

Trees
of Panama
and the Neotropics

5

ADRENDO BIOMUSEO

Trees of Panama and the Neotropics 5th edition

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TREES OF PANAMA

Eryhtrina fusca
Fabaceae family

The PALO BOBO tree

The palo bobo tree

This tree belongs to the bean family. It reaches a maximum height of 20 meters, with a thorny trunk that can reach a diameter of 100 centimeters.

Within the genus, it is the species with the most extensive distribution: it is found in America, Madagascar, Oceania, Africa, Polynesia and Asia. In America, we find it from Honduras and Guatemala to Bolivia and Brazil. It grows at low elevations, in dry or humid forests, and is common in open areas and along riverbanks.

The leaves fall at the beginning of the dry season and are replaced in the rainy season. They are compound, with only three leaflets, and present small glands at the base of each **petiolule**. The flowers are very showy, bright orange in color, with one larger, hanging petal; they are visited by insects, hummingbirds and other birds. The fruits are legumes 19 to 30 centimeters in length, with constrictions between the seeds, and open to release their dark brown seeds.

"Tree -cabulary"

Alcaloid: organic compound containing nitrogen, alkaline by nature, present in certain plants and which produces effects on our perception. The best-known are morphine, cocaine and nicotine. Today, many of these substances are obtained by chemical synthesis.

Living fences: Fences made from trees or shrubs which tend to regenerate easily, so that their size can be controlled without killing the plant. This helps to avoid having to replace the fence posts of "dead fences", which rot in contact with the ground. Living fences also provide shade and forage for animals.

Constriction: said of the effect of squeezing, and of obstructed areas. Petiolule: small petiole which joins the leaflets to the rachis of compound leaves.

Petiolule: small petiole which joins the leaflets to the rachis of compound leaves.

What it's used for

The wood is lightweight and not very resistant, therefore not suitable for milling. The most important use throughout the world is as a shade tree for coffee and cacao, especially in humid areas. It is also used as support for the black pepper vine.

It is also used in **living fences**, though not as commonly, and has demonstrated certain value as forage. As with other legumes, it could possibly be a nitrogen fixer.

In Guatemala, people use the flowers as food; in Malaysia, the young leaves are consumed as vegetables, and plasters are made from the bark for skin lesions; and in Panama, it was used as varbascum for capturing fish. This is possibly due to the fact that the seeds contain several **alkaloids**, the most common one being erythraline.

It is commonly used as an ornamental plant because of the beautiful color of its flowers.

Erythrina fusca: *The scientific name of the genus "Erythrina" comes from the Greek "erythros", which means red, because most of the species in this genus have red flowers and seeds. The species name "fusca" comes from the Latin word "fusca", which means dark, perhaps because of its dark brown seeds.*

Tree of four continents: *The seeds of several species of Erythrina are commonly collected on beaches, and are known as coral beans because many are red. The seeds of the palo bobo can float and survive more than a year in sea water. It would appear that this is how they have colonized almost every continent, as in the story of the sailing bathtub toys we saw in the second edition of this series.*

Seeds

Cultivation

How to collect the seeds: Collect the pods shortly before they open, letting them dry in the sun so that they open and release the seeds. A kilo contains approximately 2,500 seeds.

How to germinate them: They do not require treatment. Between 65% and 90% of the fresh seeds germinate. They can be stored after they dry, and in cold temperatures maintain their viability for several years.

Where to plant them: They prefer humid climates with an annual minimum precipitation of 1,200 millimeters, but they are resistant to drought. They tolerate infertile soils and flooding.

In Panama, the Native Species Reforestation Project (PRORENA) of the Smithsonian has planted palo bobo trees in the provinces of Chiriquí, Los Santos, Panamá and Coclé. Between 87% and 90% have survived, and at 5 years are between 7 and 10 meters tall in areas with fertile soil. In less fertile soils, they have reached a height of 2 to 3 meters. They can also be reproduced by cuttings. If used for shade, they should be pruned yearly; if used as support for pepper plants, they are pruned every six months.

Seedling

more info

Cordero, J. and DH. Boshier (ed.) Árboles de Centroamérica. Available online, URL: http://herbaria.plants.ox.ac.uk/adc/downloads/capitulos_especies_y_anexos/erythrina_fusca.pdf

Center for Tropical Forest Science. Árboles, arbustos y palmas de Panamá. Available online: http://ctfs.arnarb.harvard.edu/webatlas/maintreeatlas.php

GRUPO REY

Backyard scientists

In the lab

Do you think that biologists only work in the deep jungle, under the sea in coral reefs or in laboratories full of bottles and strange machines? If you already tried making a backyard observatory and birds and other inhabitants have discovered it, we invite you to try being a scientist, even in the smallest yard on the planet.

Ask questions. Someone who attentively observes what is going on around them tends to ask questions. But not all questions are easy to answer with an experiment. The best questions begin with how, how much, which, where, does it prefer, what would be the effect of....? The most difficult questions to answer begin with why.

Once you have chosen a question that can be answered by a backyard experiment, you need to make a supposition or hypothesis about the answer. Imagine a consequence if your hypothesis were correct, and from there you will get the idea for the experiment. Follow these examples:

What would happen if we set out only large seeds? We can suppose that only birds with large beaks and squirrels would come. Put out large seeds only, observe, take notes for two weeks, then analyze.

What would be the effect of the site where we lay out the food? We can suppose that fewer animals will come if it is in an unprotected area. Put out two feeders: one in an unprotected area and the other in an area protected by branches or a roof. Observe, take notes, compare.

Now, you can play at being a backyard scientist.

Scientists play a game that never ends: the search for truth. After observing and finding an interesting pattern, they shout "Eureka!" and try to explain what they observed, formulating a supposition or hypothesis (from the Greek "hipo" = underneath or sub, and "thesis" = position). That is where the never-ending game begins: they predict something that should happen if the hypothesis is correct, and they entertain themselves inventing experiments to put the hypothesis to test. If the result of the experiment is not what they predicted, it shows that the hypothesis is false and a new hypothesis needs to be formulated. But what a lot of people don't realize is that if the result turns out as predicted, that doesn't prove anything. It's just "evidence in favor". With many evidences in favor, the hypotheses are accepted as the closest thing to the truth, and when almost everyone accepts it, it becomes a theory. But they can still continue being put to the test.

The never-ending story

Have you ever seen drops falling from the tip of a leaf?

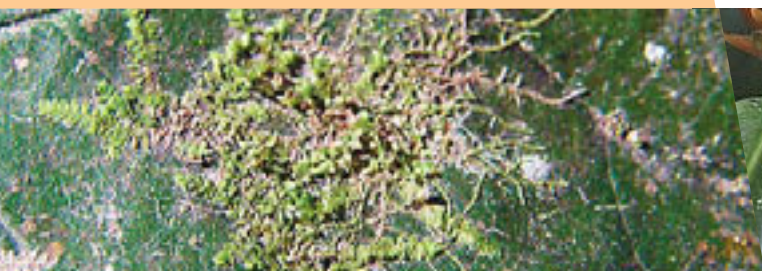
The Swedish botanist J. Jungner observed that in the forests of Cameroon, most of the plants in the shade had leaves that ended in a long point. Fewer algae and epiphyllous mosses (also from the Greek "epi" = above, and "phyllos" = leaf) grew on these leaves. In 1891, he formulated the hypothesis that this was an adaptation of these plants to better drain surface water from the leaf, thereby avoiding the bothersome epiphylles that make photosynthesis more difficult.

Two years later, another botanist carried out an experiment in Java: he cut the tips off of certain leaves and compared the time it took for the leaf surfaces to dry with and without points. His results supported the hypothesis of Jungner. But in 1914, a third botanist, F. Shreve, repeated the experiment in Jamaica and did not find any difference. This proved that the hypothesis was false, and it could be said that the story ended there. But that wasn't the case: more than 50 years later, two U.S. botanists invalidated Shreve's experiment. In their opinion, the plants he used did not represent good examples of "dripping points".

In 1985, a fifth botanist, H. Ellenberg, travelled throughout South America and recorded many species with dripping points in the warm, humid forests, but not in the cool, humid forests of mountainous areas or further south. What distinguished these areas from each other was the temperature, and this led to the proposal of a new theory: the combination of humidity, shade and heat causes the leaf tips to develop more quickly than the laminate, and longer points are formed. Ellenberg supported his hypothesis with an experiment in which the same type of coffee plant cultivated in lowlands developed leaves with points, but not when cultivated in the mountains.

The idea is still being put to test. The most recent experiment for which we can find references is from 2007!

This "pointed" controversy continues more than 100 years later...



TREES OF PANAMA

Gliricidia sepium
Fabaceae Family

the BALO tree

Living fence of Balo trees

The balo tree

Fruit

Flowers

Trunk

Fruit

The balo belongs to the bean family, and is common in Central America and very valuable because of its multiple uses. It reaches a maximum height of 20 meters, usually with several trunks of between 5 and 30 centimeters diameter.

The species, originally from the Pacific slope of Mexico and Central America, has been cultivated for centuries and is **naturalized** in the Antilles and northern Colombia and Venezuela.

Its leaves are compound, alternating, up to 35 centimeters in size, with 6 to 24 leaflets of 4 centimeters each. They fall off in the dry season and are replaced after the tree blossoms at the beginning of the rainy season.

The flowers are pink, purple or white and are grouped in clusters 15 centimeters long with 30 to 100 flowerets, which offer a banquet of nectar for bees and butterflies. The fruits are flattened pods 10 to 15 centimeters long, yellowish in color upon maturity and which open explosively to shoot 3 to 10 seeds up to 25 meters away.

"Tree -cabulary"

Green fertilizer: Leaf litter left on the ground so that it can decompose and fertilize the soil.

Agroforestry: agriculture that incorporates the use and conservation of trees.

Naturalized: said of species introduced to a new region where they adapt and reproduce naturally.

Ruminant: said of mammals that eat vegetables, lack incisive teeth in the upper jaw, and have a compound stomach with four cavities, such as cows, camels and deer.

What it's used for

The balo tree has many uses: wood, forage, fences, firewood and **agroforestry**.

The wood is olive brown in color, heavy and hard. Although it is difficult to work with, it polishes nicely and is resistant to termites and funguses. Since the tree is small, it is not commonly used to obtain commercial boards, but is appropriate for tool handles, floors, posts, parts of boats and smaller pieces of furniture.

The firewood is of excellent quality and is a common byproduct of trees used as living fences and for shade.

The leaves have a high nutritional value and it is recommended that they form 20-40% of the diet of **ruminants**. However, they can be somewhat toxic for pigs, horses, rabbits and chickens. The ground leaves, bark, seeds and roots are mixed with corn and used as rat poison. It is important as a species for improving soils, because its leaves are an excellent **green fertilizer** and the roots have nodules containing nitrogen-fixing bacteria.

It is also used as shade for cacao, and is valued as an ornamental tree because of its flowers.

Gliricidia sepium: *The scientific name of the genus "Gliricidia" comes from the Latin "gliris" (a type of mouse) and "cacidi" (to kill), and refers to the fact that it can be toxic to field mice. The species name "sepium" comes from the Latin word "sepe" (fence of living shrubs, hedges).*

Mother of cacao: *This species was used as a shade tree for cacao from the time of the Aztecs, who knew it as "cacahuanantl", which means mother of cacao. It is also used as support for the cultivation of vanilla (a climbing orchid) and pepper vines.*

Seeds

Cultivation

How to collect the seeds: Collect the pods shortly before they open and place them in the sun to make them open and release the seeds. A kilo contains approximately 7,000 seeds.

How to germinate them: They do not require treatment and up to 100% of the fresh seeds germinate. The seeds can be stored; once dry and stored at cold temperatures, they remain viable for several years.

Where to plant them: This is a rapid growth species that tolerates a variety of soils, and although it prefers dry climates, it tolerates humid climates very well.

In Panama, the Native Species Reforestation Project (PRORENA) of the Smithsonian has planted balo trees in the provinces of Chiriqui, Los Santos, Panamá and Coclé. From 98% to 100% of the trees have survived, and at 5 years measure 10 meters in areas with fertile soils, but only 4 meters in poor soils.

The saplings are planted a meter apart for forage production. The distance is greater for firewood or wood production, and even greater when they are intended as shade for cacao or coffee.

Seedling

more info

J. Parrota 1992. Gliricidia sepium (Jacq.) Walp. Gliricidia, mother of cacao. SO-ITF-SM-50. New Orleans, LA: US Department of Agriculture Forest Service, Southern Forest Experiment Station.

Cordero, J. and DH. Boshier (ed.) Árboles de Centroamérica. Available online, URL: http://herbaria.plants.ox.ac.uk/adc/downloads/capitulos_especies_y_anexos/gliricidia_sepium.pdf

Center for Tropical Forest Science. Árboles, arbustos y palmas de Panamá. Available online: http://ctfs.arnarb.harvard.edu/webatlas/maintreeatlas.php

In the lab

Have you ever made a necklace out of macaroni? Perhaps you have made crafts with recycled objects to help reduce the amount of trash on the planet. We invite you to make art with natural objects that come from trees. You will need certain materials such as a hot glue gun, and white or shoe glue. As you try making different decorations for your house or yourself, you may need thread, ribbons, popsicle sticks, poster board and paints. Your imagination is the only limit to what you can make. Here are a few ideas:

If you are making a collage for a picture, small seeds, dry leaves or pieces of bark provide a beautiful texture for soils, mountains or cultivated fields.

There are fruits which look like the petals of a flower when they open, and are used for floral arrangements. Examples are the capsules of the Panama and cedro amargo trees.

If you want to make dolls, you can make the head from a calabash or coconut, with a nose of espavé, whiskers of cocobolo and eyes of corotú. Then, all it will need is hair or a hat.

The veins of leaves have beautiful patterns. You can use them as stamps for making pictures, or on your t-shirts. You only need to paint them, press them down and wait for the resulting image to dry.

If you want to make necklaces or earrings with seeds, you might need an adult to help you make the tiny holes to put the thread or wire through.

Here's another idea for some old-fashioned ecological toys: in the interior of the country, they used the bark of the jobo tree to make boats that really float, and with the fruit of the tronador they made wheels for toy carts. Toys like these reduce the need for tons of plastic and are a good excuse for a trip to the park.

How are new species discovered? First, they must be observed, samples must be collected and they need to be compared with all of the species described within the group to which they belong. If an identical species isn't found, an article has to be written for a scientific journal describing its characteristics and referring to a sample that is stored in a herbarium or museum for future comparisons. The person who describes it will baptize it with a scientific name. The system for scientific names, as we know it today, was developed by Carl Linnaeus, a Swedish naturalist of the 18th century. He proposed the hierarchical classification into kingdom, class, order, genus and species. He also unified the way we name species with a "binomial nomenclature", that is, a name beginning with a capital letter for the genus, followed by a name in lower-case letters for the species. It is very similar to the names of people, except that the surname comes first and the given name last, and both have to be of Latin or Greek origin.

Scientist "scientificum"

Have you ever wondered what those fancy names are good for?

Juan Perez de la Riestra, a wealthy businessman from Panama City, inherited a farm from his grandfather. Thinking to take advantage of an economic benefit granted to reforesters, he decided to plant trees. He wanted to plant something different. What could he plant? He remembered a small box of shiny purple wood that his grandfather had given his grandmother on their wedding day. His grandfather had made it himself from the wood of a nazarene tree on his farm, and it was a beautiful treasure. That was the tree that Juan would plant.

He asked a friend from the interior of the country who knew about trees if he could sell him a couple of thousand nazarene tree seedlings. And so it was.

Three years later, talking with the oldest laborer on his farm, he told him the story of the wooden box and why he had decided to plant this particular type of tree. The old man replied, "Look, boss, I have to tell you this before it's too late. The type of nazarene tree you planted isn't the kind your grandfather used to make the box, which is a type of nazarene tree known around here as "jacaranda". The trees your friend sold you are known as nazarenes because of the color of their flowers; the one from here, that the box was made of, is called a nazarene because of the color of the wood…and you can't find them anymore."

What a shock! Juan didn't cry because he was afraid to in front of the old man, and when he arrived home he went on the internet to look for information. Then he went to a library and that's where he finally realized that in Panama, there are three species of trees called "nazarenes"; one is Peltogyne purpurea, with heavy, purple wood that is very resistant; the other two are Jacaranda copaia and Jacaranda caucana, both with purple flowers but wood that is white, lightweight and not very resistant. The species J. caucana is a slightly smaller tree with fruits that have a curlier border than the other. There had been a major mix-up.

Chane is not the same as Jane, they say…

Jacaranda caucana

Jacaranda copaia

Peltogyne purpurea

TREES OF PANAMA

Inga punctata
Fabaceae family

The GUABITA CANSABOCA tree

The guabita cansaboca tree

This tree of the bean family is from the same genus as the guava. It reaches a height of 20 meters and a diameter of 60 centimeters, with a short trunk and broad, dense crown.

It is a native tree from Mexico to Bolivia and the Brazilian Amazon. It grows in secondary forests, along highways and in gallery forests. It prefers humid to very humid climates.

The leaves are compound. They measure from 8 to 24 centimeters and have 4 to 6 leaflets with a pronounced pair of round glands at the base of the petiole. Many ants feed on the nectar that is secreted by these glands and protect the plant from herbivores. The flowers are light green and aromatic, and are pollinated by butterflies, moths and hummingbirds. The fruit is a hanging pod that is yellowish-green in color upon maturation and does not open on its own. It contains from 7 to 10 seeds that are covered by a sweet, moist, white **pilose** tissue that is very appetizing to humans, birds, squirrels and monkeys.

"Tree -cabulary"

Aril: covering, almost always fleshy, around certain seeds; may or may not have vivid colors.

Pilose: with many hairs or similar to hairs.

Thinning: action of removing plants that are too close together.

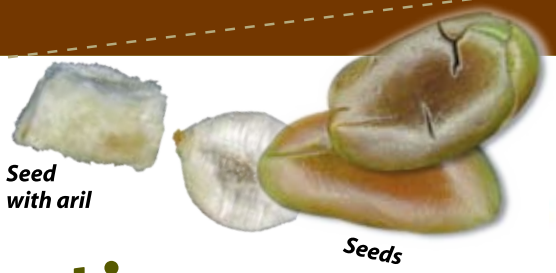
What it's used for

Its main use is as firewood, since it has high caloric value and regenerates easily. The tissue covering the seed (aril) is eaten in the same manner as with other species of the same genus, such as the guava. It is also used for fence posts and as mulch, that is, the leaf litter is used to cover the ground around crops to protect them from erosion, conserve moisture, control weeds and, as it slowly decomposes, to release nutrients. It is also a nitrogen-fixing species.

Together with other species of the same genus, it is used as shade for coffee plants in association with plantain trees and hardwood trees, and as shade for cacao. It is also planted together with yucca or manioc. The ants associated with the *Inga sp.* species act as a natural enemy of predators of cultivated plants.

Inga punctata: *The scientific name of the genus "Inga" comes from the aboriginal name "tupi-guarani" for this species. The species name punctata refers to the spots on the glands at the base of the leaflets.*

A romantic tree? *The Panamanian singer/composer Aniel Mejia was perhaps inspired by peasant children, who spend hours in the branches of this tree eating its fruit, when he composed the song that goes: "She is my sweet guabita cansaboca, her delicious kisses stir me, and whenever they end I want more."*



Seed with aril

Seeds

Cultivation

How to collect the seeds: Guabita seeds must be collected from the tree and conserved in the fruit, opening them just before planting. Cleaning them can be a very tasty task! A kilogram contains approximately 2,400 seeds. They cannot be stored, since they die as soon as they lose moisture.

How to germinate them: They do not require treatment and approximately 87% of the seeds germinate. They can be planted directly into bags or containers.

Where to plant them: The species does not tolerate poor or acidic soils. In Panama, the Native Species Reforestation Project (PRORENA) of the Smithsonian has planted guabita cansaboca trees in the provinces of Chiriquí, Los Santos, Panamá and Coclé. In very humid zones with fertile soil, 87% of the trees have survived and measure 8 meters in height at five years; in drier areas with poor soils, only 53% of the trees have survived, reaching a height of 2.4 meters.

Studies in Costa Rica indicate that even though coffee plants give less fruit per hectare under the shade of the Inga species, their productive life is extended to as much as 20 years.

Seedling

more info

Cordero, J. and DH. Boshier (ed.) Árboles de Centroamérica. Available online, URL: http://herbaria.plants.ox.ac.uk/adc/downloads/capitulos_especies_y_anexos/inga_punctata.pdf

Center for Tropical Forest Science. Árboles, arbustos y palmas de Panamá. Available online: http://ctfs.arnarb.harvard.edu/webatlas/maintreeatlas.php

GRUPO REY

Homemade ethnobotany?

In the lab

Do you dare try being an ethnobotanist in your own home? Or perhaps you would prefer to do it with your classmates. Of course, when you discover the things made from trees, it will be very difficult to find out the name of each species and where it's from. However, read these tips on how to find out how many trees there are in your house or school that you never would have guessed:

Everything made from wood comes from a tree, shrub or vine. Different characteristics of wood make it useful for different uses. So you can assume that objects with different uses come from different trees: furniture, platters, kitchen utensil handles, mortars, matches, toothpicks, cutting boards, tool handles, door frames, picture frames, doors, chopsticks, pencils, musical instruments, etc.

Observe the differences in weight, hardness, color and veins. This can provide you with another clue that they come from different species.

Ask adults if they know what kind of wood the objects are made of. Maybe you'll be lucky and they can give you a lot of information (name of tree, carpenter, furniture shop, antique!).

Go to the refrigerator and check to see if there are fruits that come from trees, such as: oranges, cacao, lemons, apples, etc. Don't forget to check the jams and jellies!

Now, go to the yard or garden. How many different trees or shrubs are there?

It's not necessary to know the names. If you don't know them, assign a number to each type of tree that is obviously different and write down the reasons you consider it different next to the number. When you have a certain amount, write us at (asautu@biomuseopanama.org) to find out if the ethnobotanist of our story, Salomyn, is right, and it turns out that we are still living in trees.

Our ancestors in Africa came down from the trees and evolved into modern humans. However, our relationship to the forest and plants is still very close. So much so, that each civilization developed thanks to the domestication of some plant that provided us with abundant food, such as rice, corn or wheat.

The indigenous groups of America have had a long time to discover the uses of our plants. Colonists had less time, but have also learned. Scientists that study the plants used by different peoples are known as ethnobotanists (from the Greek, "etnos"=people or race, and "botane"=herb).

A forest in your house

Have you ever made a tree house?

Salomón Aguilar is a botanist. Since he is the son of a peasant farmer from Panama's central mountain region, he learned to observe plants from an early age. His work is to study the relationship of peasant farmers to the plants of the forest.

Salomón did a survey, talked for many hours and collected samples of the plants used in the community of Las Pavas, located near the Panama Canal; in 1992 it had 247 inhabitants and no electricity or drinking water. The first settlers arrived in Las Pavas some 70 years ago. How much had they learned about the neighboring forest and its resources?

A lot, it turns out. The houses were like a forest that had been transformed into roofs, floors, walls, beams, furniture, platters, spoons, tools, water jugs, mortars, baskets, toys, tea, oil… and outside there was the fence, the yoke for animals and firewood. The community knew about, used, and knew where to find 119 different species. Most were trees (108), but they also used grasses, shrubs, vines and reeds. They used 70 different species for the construction of housing, 40 for firewood and 27 for fences. They could choose from several options for each use.

The people of the community did not cultivate any of the species. However, they protected the young plants of 15 of these species when they cleared fields for cattle or crops. Five of the species that the community cared for are in this series: guayacán, roble, espavé, cedro espino and amarillo.

Salomón says we still live in trees…

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*Cifras de enero del 2009 a la fecha

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