

## The Ceiba Tree:

by Catherine L. Woodward

The Ceiba Foundation for Tropical Conservation (pronounced "SAY-ba") derives its name from *Ceiba pentandra*, a majestic tropical tree and appropriate symbol for the complex biological interactions and human connections with the environment that drive our work. The giant limbs of the Ceiba's umbrella-shaped crown are laden with epiphytes (aerial plants) and provide a home for countless species of animals. Birds feed and nest in the tree's high perches, mammals use the enormous limbs as aerial highways, frogs raise their tadpoles in the tiny pools that collect in bromeliads, and insects reach the peak of their diversity in the canopy of giant trees like the Ceiba.

The ancient Maya of Central America believed that a great Ceiba tree stood at the center of the earth, connecting the terrestrial world to the spirit-world above. The long thick vines hanging down from its spreading limbs provided a connection to the heavens for the souls that ascended them. Even today, these grand trees are regularly spared when forests are cut -- it is a common event to see lone, isolated Ceiba trees proudly spreading their shady branches high above a pasture or agricultural field, a relic of the great forests that were once there.

### Botanical Description

The genus *Ceiba* consists of 10 species of large tropical trees in the family *Malvaceae* (formerly in the *Bombacaceae*), which also includes the "baobab" trees of Africa (genus *Adansonia*). Ceiba trees are typically emergent, meaning their large umbrella-shaped canopies emerge above the forest canopy. They are thus among the tallest trees in the tropical forest reaching as high as 60 m in rainforests of the Amazon. Their thick columnar trunks often have large buttresses. Young trunks and branches are armed with thick conical spines, and are often green due to photosynthetic pigments. The leaves are alternate and palmately compound, with 5-8 entire-margined leaflets. The radially symmetrical flowers can be rather small and inconspicuous (e.g., ~3 cm in *Ceiba pentandra*) to large (>12 cm) and showy. They are usually white, pinkish-white or red, and leathery. The flowers have 5 stamens fused into a tube at the base. *Ceiba* fruits are large ellipsoid capsules up to 20 cm long, with 5 woody valves that split open to reveal abundant fluff, or *kapok*, in which the many small black-brown seeds are embedded. The kapok fibers are not attached to the seeds. The fibers are 1.5 - 3 cm long and are covered with a waxy substance that aids in their water-repellancy.

### Ecology

Ceiba trees grow in both wet evergreen and dry semi-deciduous tropical forests. *Ceiba pentandra* is native throughout the American tropics, from Mexico through Central America and south to Peru, Bolivia and Brazil, as well as in West Africa. All other members of the genus only occur in the neotropics. *Ceiba trichistandra* is found in drier forests of the Pacific coast of Ecuador and Peru. *Ceiba pentandra* has been transported to other regions of the tropics by humans and is even planted in warm temperate zones as a novelty tree.

Ceiba flowers open in the evening and are pollinated by pollen- and nectar-feeding bats. Their kapok-surrounded seeds are adapted for dispersal by wind. Ceiba trees may flower as little as once every 5 years, especially in wetter forests. Flowering is more frequent on forest edges or in drier sites. The

trees lose their leaves in the dry season, a condition termed "drought-deciduousness". Flowering and fruiting takes place when the tree is leafless and this is believed to be an adaptation that facilitates both mammal-pollination and wind-dispersal. Dispersal by water may also occur; the fruits float indefinitely owing to the water-repellant kapok fibers. This may explain how *Ceiba* reached Africa from South America where the genus is believed to have originated.

*Ceiba* trees are self-compatible, meaning they can self-pollinate to produce viable seeds. Pollination takes place at night, and fertilization following deposition of pollen on the stigma is dependent on suitable temperatures (~20 °C), otherwise the flowers will fall before fertilization takes place. Many animals visit remnant flowers the morning after they open to scavenge leftover nectar and perhaps flower parts.

*Ceiba* trees grow fast in high light conditions and thus acts as a "pioneers", colonizing cleared areas if a seed source is nearby. Many are adapted to dry conditions and are able to store water in the cortical cells of their trunk. At times this gives the trunk a swollen or bulging appearance. A tall columnar trunk topped by an umbrella-shaped crown is characteristic of isolated *Ceiba* trees in tropical pastures, and is a telltale sign that they are relicts from a past when shadier conditions prevailed. *Ceibas* that recolonize open areas after they have been cleared tend to have a shorter, bushier, "open-grown" form.

In lowland rainforests, the spreading crown and large branches of *Ceiba* trees are often heavily laden with a diverse community of epiphytes. These aerial plants in turn provide a home for countless animal species, such as insects, frogs and snakes. Birds such as Toucans, Araçaris, flycatchers and trogons and larger omnivorous arboreal mammals such as White-faced Capuchin monkeys feed off of these smaller animals. A *Ceiba* tree is thus the focal point for a complex ecological community living out its existence high in the forest canopy!

## Uses

*Ceibas* have had a long commercial history. During the 1940s the fluff, or kapok, that surrounds the seeds was harvested commercially for stuffing life preservers, seat cushions, mattresses and saddles. Being lighter than cotton, buoyant and resistant to saturation by water, it made excellent filler for life preservers. Until the middle of the 1900's, nearly every stuffed life preserver and upholstered automobile seat was filled with kapok fibers. The tree was cultivated in large plantations in Southeast Asia, not only for its kapok, but also for pulpwood. As modern materials fell more in favor, demand for kapok fluff has fallen, and the *Ceiba* fruits are no longer harvested commercially.

While the wood of *Ceiba* is soft and light, and thus not suitable for furniture, it has been used commercially for pulpwood and plywood. The low desirability of the wood however, may have been the *Ceiba*'s saving grace and one of the reason one still sees these giant trees gracing the tropical agricultural landscape. Unfortunately, in Costa Rica today, relict *Ceiba pentandra* trees are now being rapidly cut down for the production of pallets!

Indigenous peoples traditionally prized the *Ceiba* for constructing enormous dugout canoes out of the tree's large and cylindrical trunk. The construction process normally takes months to complete, and may involve over a dozen men's labor. For many villages nestled in the forests of the tropical lowlands, these giant canoes provide the only connection to their neighbors and the rest of the world, as they are plied on the winding waterways of the rainforest.

The seeds of *Ceiba* are rich in oil (20%) and protein (26%). The edible oil can also be used for soap and lighting while the "seed-cake" leftover after pressing for oil can be used to feed livestock.

### Ceiba Photos

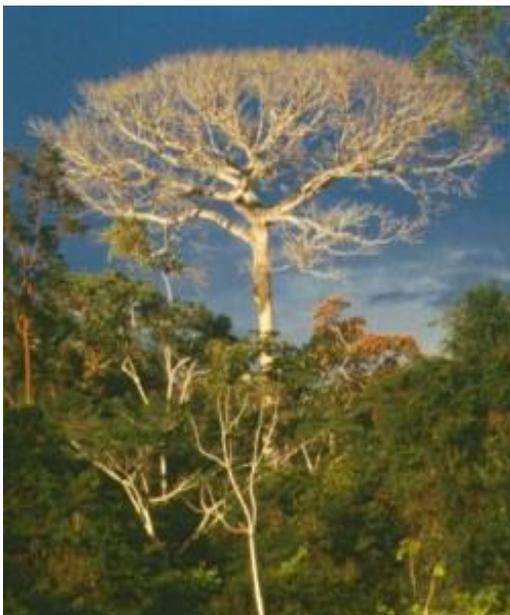
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Left: A leafless but majestic *Ceiba trichistandra* in dry forest of Manabí province, Ecuador. Photo by J. Meisel.



Right: The boles of *Ceiba* trees are often tinted green by chlorophyll pigments that allow the tree's trunk to photosynthesize! This is another *C. trichistandra* in Ecuador. Photo by J. Meisel.



Left: This glorious *Ceiba pentandra* graces the shore of the Napo River in Ecuador. Note it has lost its leaves during the dry season. Photo by J. Meisel.



Right: A somewhat dried-out fruit of *C. pentandra* plus some sections of a fruit with kapok surrounding the seeds. Found at Tiputini Biodiversity Station, Napo Province, Ecuador. Photo by J. Meisel.



Left: Expanded kapok fluff from the same fruit above. One wedge-shaped segment of the fruit is visible behind and left of the kapok. Photo by C. Woodward.



Left: These are the showy flowers of a *Ceiba insignis* tree in Peru. Photo by A. Gentry. Source: Missouri Botanical Garden

Right: The giant buttresses of this *C. pentandra* tree make the base of this tree more than 12 feet across! Napo Province, Ecuador. Photo by C. Woodward



## References and Links

Gentry, Alwyn. Woody Plants of Northwest South America.

Janzen, Daniel H. 1983. Costa Rican Natural History. The University of Chicago Press.

McDade, Lucinda A., Kamaljit S. Bawa, Henry A. Hespenheide and Gary S. Hartshorn 1994. La Selva: Ecology and Natural History of a Neotropical Rain Forest.

Photos of Ceiba species at the [Missouri Botanical Garden](http://www.mobot.org) website.

Seed source: [www.tropilab.com/ceiba-pen.html](http://www.tropilab.com/ceiba-pen.html)

[La Ceiba: El Arbol Solitario de Los Potreros](http://www.tropilab.com/ceiba-pen.html)