

Trees in the landscape, Part 4:

Bombax ceiba

Donald R. Hodel and Paul R. Weissich

BOMBAX CEIBA, COMMONLY known as the red silk-cotton tree, is a large, briefly deciduous tree occurring in warm monsoon forests in southern Asia. Easily one of the world's most spectacular flowering trees, it is famous for its large, showy, six-inch flowers with thick, waxy, red petals that densely clothe leafless branch tips in late winter and early spring.

Because of its potentially large size in Hawaii, *Bombax ceiba* is best used there as a park tree, shade tree, specimen, and flowering accent for larger open spaces. It would fulfill these same uses in California and the Desert Southwest and, because it grows to

lesser dimensions there, could also find use as a street tree. Wherever it is grown, though, it is sure to attract attention and be a much admired, if not spectacular, show-stopping addition to any landscape where it is adapted.

Taxonomy and history

Synonyms: *Bombax malabaricum* DC., *Gosampinus malabarica* (DC.) Merrill,

Salmalia malabarica (DC.) Schott & Endl.

Common Names: red silk-cotton tree, silk-cotton tree, red cotton tree, kapok.

Etymology: The genus name *Bombax* is likely derived from the Greek *bombyx*, referring to things of silk or cotton, and alludes to the abundant,

Easily one of the world's most spectacular flowering trees...

Figure 1. (Left) *Bombax ceiba* can become a large tree in Hawaii, as here in the parking lot of Foster Botanical Garden, Honolulu.

Figure 2. (Center) *Bombax ceiba* has leaves for most of the year and makes a fine shade tree (Los Angeles County Arboretum and Botanic Garden, Arcadia, California).

Figure 3. (Left) The same *Bombax ceiba* in Figure 2 is briefly deciduous in later winter and spring and erupts into a riot of large, showy red flowers.

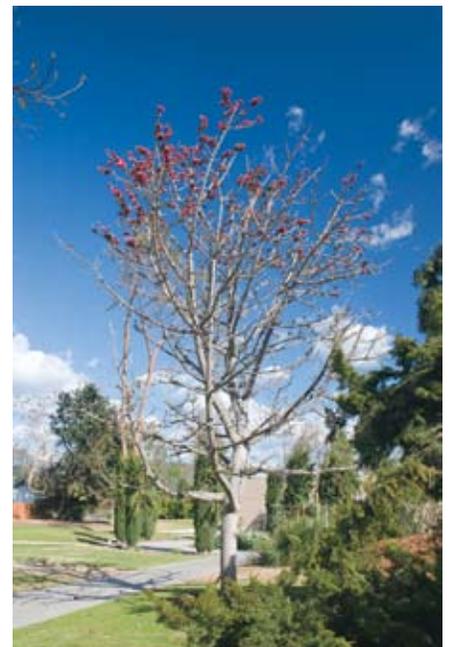
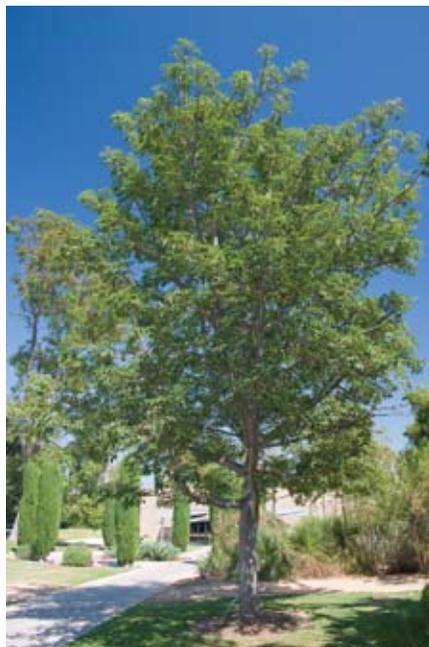




Figure 4. (Left) Branches of *Bombax ceiba* are typically arranged in distinct, uniform, and mostly symmetrical whorls or tiers (Los Angeles County Arboretum and Botanic Garden, Arcadia, California).

Figure 5. (Center) Branches of *Bombax ceiba* are typically arranged in distinct, uniform, and mostly symmetrical whorls or tiers (Foster Botanical Garden, Honolulu, Hawaii).

Figure 6. (Right) Co-author Paul Weissich provides scale for the trunk of *Bombax ceiba* which is typically impressive, straight, with buttresses, and often stout (Foster Botanical Garden, Honolulu, Hawaii).

silk-like or cottony fibers in the fruits. The specific epithet or species name *ceiba* is a Spanish derivative of a Taino or other Arawakan (South American indigenous languages) name used for a group of large, tropical trees related to *Bombax*, many of which produce kapok or silk-cotton in their fruits.

History: The great Swedish botanist, physician, and zoologist Carl Linnaeus (1707-1778), who laid the foundations of the modern biological scheme of binomial nomenclature and is considered the father of modern taxonomy, described and named this species in 1753 in his seminal work *Species Plantarum*.

Description

The description is from several sources (Barwick 2004, Brown 2011, *Flora of China* 2011, McCann 1959, Menninger 1962, Neal 1965, Staples and Herbst 2005) and from cultivated trees at The Los Angeles County Arboretum and Botanic Garden in Arcadia, California and in Honolulu, Hawaii.

Habit/Conformation: medium to large, long-lived, briefly deciduous during the flowering period in late winter to early spring, mostly tropical, frequently spiny tree, 40 to 130 feet tall, 15-60 feet wide (Figs. 1-3), canopy mostly upright and broadly columnar to rounded, moderately open, mostly symmetrically and regularly branched, typically with distinctly and uniformly spaced whorls or tiers of spreading to upward-pointing branches (Figs. 4-5) giving the tree the appearance of a giant candelabrum, older trees less regularly branched.

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Figure 7. (Upper left) Bark of *Bombax ceiba* is smooth and greenish gray on young trees (Los Angeles County Arboretum and Botanic Garden, Arcadia, California).



Figure 8. (Upper center) Bark of *Bombax ceiba* becomes rough and checked on older trees (Foster Botanical Garden, Honolulu, Hawaii).

Trunk: impressive, straight, often stout, 1-5 feet in diameter (Fig. 6), often short and thick on cultivated specimens in open sites but a straight, symmetrical bole 50-125 feet to the first branch on forest specimens growing under favorable conditions; invariably buttressed at the base on large specimens (Fig. 6), the buttresses extending up the trunk for 15-25 feet.

Bark: smooth and greenish gray on young trees (Fig. 7), becoming rough, checked, with irregular vertical fissures and gray-white to silver-gray, greenish gray, or brown (Fig. 8), typically with sharp, straight, stout, tan to brown, conical prickles to 0.5 inch long, these sometimes enveloped by expanding bark.

Leaves: palmately compound, to 24 inches long (Fig. 9); petiole 4-8 inches long; leaflets 3-7, digitately arranged, 3-10 × 0.6-3 inches, oblong to oblong lanceolate, leaflet stalks 0.6-1.6 inches long, tip pointed, glabrous (without hairs or other coverings).

Flowers: solitary but densely placed near branch tips, conspicuous and very showy (Figs. 10-12), 4-7 × 4-7 inches (Fig. 13); calyx cup-shaped, 3-5-lobed, 0.8-1 inch long, outer or lower surface glabrous, inner or upper surface densely covered with yellowish silky hairs; petals 3.1-4 × 1.4-2.2 inches, recurved, dull to bright red, less frequently orange-red, orange, or rarely white, thick, fleshy, waxy, satiny, densely covered with short,

soft hairs; stamens yellowish but red tinged toward the tips, anthers black, in 2 whorls, outer whorl divided into 5 bundles of 9-20 each, inner whorl of 10-15 surrounding the style, less than half as long but reaching rim of recurved petals, about three-quarters as long as style (Fig. 14); style exceeding stamens, red, 5-lobed tip; late winter to spring when tree is leafless.

Fruits: a capsule, 4-6 × 1.8-2 inches (Fig. 15), ovoid, pointed, longitudinally ribbed, densely covered with grayish white hairs, splitting open along 5 seams to reveal white, cottony, silky material (Fig. 16); seeds small, black or brown, embedded in cottony material (Fig 17); late spring to summer.

Distribution and ecology

Red silk-cotton tree is widespread from India to Sri Lanka, Nepal, Bhutan, Bangladesh, Myanmar, Thailand, Laos, Cambodia, Vietnam, southern China, Malaysia, Indonesia, Papua New Guinea, northern Australia, and the Philippines. However, its exact origin is unclear because it has been so widely cultivated for centuries in many warm, seasonally dry and humid areas in southern Asia. Its natural habitat, though, is likely hot, humid, seasonally dry, mostly lowland, tropical moist, deciduous monsoon forests in river valleys and hillsides to about 3,700 feet elevation. The climate is warm-humid tropical with

Figure 9. (Lower center) Leaves of *Bombax ceiba* are palmately compound and to 24 inches long (Los Angeles County Arboretum and Botanic Garden, Arcadia, California).

Figure 10. (Lower right) *Bombax ceiba* flowers towards the tips of leafless branches in late winter and spring (Los Angeles County Arboretum and Botanic Garden, Arcadia, California).





Figure 11. (Upper left) Flowers of *Bombax ceiba* are solitary but typically densely placed near branch tips (Los Angeles County Arboretum and Botanic Garden, Arcadia, California).



Figure 12. (Upper right) Flowers of *Bombax ceiba* are densely placed, large, and showy (Los Angeles County Arboretum and Botanic Garden, Arcadia, California).

a mostly distinct summer maximum rainfall pattern. Mean annual rainfall is variable throughout the region and ranges from 30 to 175 inches (Mub 2007). Growth and development are best in areas where rainfall is more evenly distributed throughout the year. Humidity is usually always high. Mean maximum temperatures for the warmest months range from about 85 to 95 F with maximums ranging from 100 to 122 F. Mean minimum temperatures in the coolest months range from 50 to 75 F with minimums ranging from 36 to 63 F (Mub 2007). Frosts are rare but occur at the higher altitudes and latitudes of its distribution.

Soils are also variable and range from clays and clay loams to sandy alluvium.

Figure 13. (Lower left) Flowers of *Bombax ceiba* are large, up to seven inches across (Los Angeles County Arboretum and Botanic Garden, Arcadia, California).



However, red silk-cotton trees do best and tend to become gregarious on deep sandy, well drained loams on alluvium near rivers and streams (Mub 2007). It sometimes occurs on heavier but well drained soils on slopes.

Propagation and growth rate

Red silk-cotton tree is primarily propagated from seeds but cuttings, air layers, and grafting are also possible. Sow seeds immediately after collection by scattering over a pre-moistened, clean, disease-free (pasteurized), well drained seed or potting mix and cover with about one-eighth inch of the medium. Keep evenly moist at a temperature of 70 to 80 F and protect from wind, dryness, and extreme cold and heat. Transplant into individual containers when seedlings are sufficiently large to be handled easily. Grow seedlings in light shade but acclimate to full sun quickly.

A moderately growing species, red silk-cotton tree can attain about 60 feet in height with a trunk four to five feet in diameter in 40 years in Hawaii and about 40 feet in height with a trunk about 18 inches in diameter in 30 years in southern California's Mediterranean climate. A tree in the parking lot of Foster Botanical Garden in Honolulu and grown from a young seedling collected in the Philippines

in 1968 is now about 60 feet tall and wide and has a trunk about five feet in diameter. Two trees received by the Los Angeles County Arboretum and Botanic Garden in Arcadia, California in 1979, which originated as scion material grafted on to *Ceiba speciosa* (formerly *Chorisia speciosa*), are now 30 to 40 feet tall, spread for 25 to 35

Figure 14. (Lower right) Stamens of *Bombax ceiba* are yellowish with reddish tinged tips and clustered in bundles (Los Angeles County Arboretum and Botanic Garden, Arcadia, California).





Figure 15. (Left) Fruits of *Bombax ceiba* are a pointed, longitudinally ribbed capsule (Foster Botanical Garden, Honolulu, Hawaii).



Figure 16. (Center) Fruits of *Bombax ceiba* split open along five seams to reveal white, cottony, silky material (Foster Botanical Garden, Honolulu, Hawaii).



Figure 17. (Right) Seeds of *Bombax ceiba* are small, black or brown, and embedded in the cottony material (Foster Botanical Garden, Honolulu, Hawaii).

feet, and have trunks 15 to 18 inches in diameter.

Brown (2011) reports that the red silk-cotton tree in Florida flowers when about eight to ten feet tall from seed and can grow to 30 feet tall in five years in tropical areas. In India, the red silk-cotton tree grows to about 20 feet tall with a trunk about four inches in diameter after five years, to 32 feet tall and seven inches in diameter after 10 years, to 50 feet tall and 11 inches in diameter after 20 years, and 61 feet tall and 13 inches in diameter after 30 years (Mub 2011).

Environmental tolerances

Little is known about the environmental tolerances of the red silk-cotton tree; thus, we need to extrapolate information from its native habitat and the one place where it grows in southern California. It is not listed in *Sunset* (Brenzel 1995) but appears adapted to *Sunset* Zones 18 through 24 in southern California and perhaps Zone 13 (low desert) in southwestern California, eastern Arizona, and extreme southern Nevada. In northern California hard freezes and/or lack of summer heat might restrict growth but it should be evaluated in Zones 15 through 17 in the Bay Area. It might also perform adequately for many years in Zone 12 in Arizona, gaining sufficient size before a hard freeze, like the one of 2011, seriously damages or even kills it. Much of this area in the southwestern United States falls

within USDA Zones 9 to 11. It is likely to excel in most places in Hawaii and perhaps might have the potential to become weedy there if grown in wetter areas.

Despite its tropical origins, the red silk-cotton tree is amazingly cold tolerant, and has withstood temperatures in the middle 20s F with little or no damage in the December 1990 and January 2007 freezes in southern California. However, it might be intolerant of lower temperatures and this extreme cold will likely limit where it can be grown successfully. Its moderate growth rate, though, might result in relatively slow recovery during the growing season if damage does occur. Menninger (1962) reports that it is hardy to at least 20 F.

Although largely undocumented, the red silk-cotton tree, once established, might tolerate extended periods with little or no water, a notion extrapolated from its natural monsoon forest habitat where little or no rain falls for several months. A fairly tough and rugged species, it appears to tolerate some harsh conditions, including heat, wind, smog, aridity, and restricted root space. Brown (2011) reported that the red silk-cotton tree has low salt tolerance but in the Philippines co-author Weissich observed large specimens growing well only a few feet from the edge of Manila Bay where their roots were likely in contact with sea water. Although mostly not particular about soils or

fertilizers, a well drained soil is best for optimal growth.

A long, warm to hot growing season is likely best for the red silk-cotton tree and if planted in frost-free but cooler coastal areas, situating the tree on the south or west side of a building or other structure that could trap and collect heat in the day and release at night might enhance performance. There is no information about how the red silk-cotton tree would perform in turf grass or groundcovers where it might be over-irrigated and -fertilized but one of the trees at the Los Angeles County Arboretum and Botanic Garden in Arcadia, California is growing adequately in turf grass. Perhaps, through judicious, measured applications of fertilizers and irrigation, growth could actually be retarded without losing quality.

Uses

Because of its eventual large size, width, and trunk diameter in Hawaii, the red silk-cotton tree needs to be carefully placed in the urban forest and landscape. Some appropriate uses in Hawaii include park tree, shade tree, specimen, and flowering accent for larger open spaces. It is too large for street tree use in Hawaii although it might be suitable for a wide (at least 10 feet) median. It would fit these same uses in southern California and, because of its slower growth rate and smaller size, could, in some instances, find use as a street

tree although there might be some issues with flower litter (see below). For street-tree use in southern California minimum parkway width and cutout size are probably six feet and trees must have lower branches removed to raise the canopy for vehicular and pedestrian clearance. Maintaining an elevated canopy also allows the handsome trunk and symmetrical branching habit to be easily admired and appreciated. An unusually prickly trunk might pose a hazard to unwary passersby. The incredible late winter to early spring floral display make the red silk-cotton tree an eye-catching and show-stopping specimen or accent in the landscape.

Pruning/management

The red silk-cotton tree has a strong tendency for straight, upright, single-leader growth and retention of lower branches and likely needs little training and pruning in the nursery and landscape. Even if the leader is broken, it will readily form a new leader and continue upright growth. Provide adequate space in the nursery and retain lower branches to encourage maximum trunk caliper. Because of strong, straight, upright growth and symmetrical, whorled, spreading branches, staking is probably mostly unnecessary if trees are given adequate space. Nursery trees might only need light pruning to reduce canopy density and, when nearing readiness for sale, to remove lower branches to

elevate the canopy if desired. Once in the landscape only judicious thinning out to reduce canopy density might be necessary. Trees would benefit from regular irrigation and fertilizer until established, especially during the growing season, but once established appear to perform adequately in turf or non-turf areas with occasional irrigation and no fertilizer. However, regular irrigation might be critical in hot interior valleys and the low desert.

Problems/litter

The red silk-cotton tree is largely free of serious problems. Its wood might not be prone to breakage, even in high winds; although a small sample, the two trees in Arcadia, California, an area hard hit by the great wind storm of November 30-December 1, 2011, had little or no branch breakage. Mature trees can produce an abundance of flowers and subsequent fruits. Petals are large and fleshy and, because they drop abundantly during the intense flowering period, might be an unacceptable nuisance along streets, sidewalks, and other paved areas that people frequent. Similarly, the large leaves drop during a very short period in mid-winter and might be particularly annoying for a short time. Although fruits have yet to form in California, likely because of an absent pollinator, and they generally remain on the tree, they can be problematic because of the vast

amounts of white, cottony material that, once liberated from the fruits (Fig. 18), floats through the air and litters the landscape for some distance (Fig. 19).

Pests and diseases

Little or no information is available on the subject but the red silk-cotton tree appears free of serious pests and diseases.

Weed/invasive species risk

Little is known of the weed/ invasive species risk of the red silk-cotton tree but it is likely not a threat in California and the Desert Southwest. It might be a threat in Hawaii, especially in wetter areas.

Availability

Despite its many attributes and popularity in other parts of the world, the red silk-cotton tree is unknown in the nursery industries in California, Arizona, Nevada, and Hawaii. However, it is easily propagated by seeds, which can be procured from trees in Hawaii (which see below) or from mail-order suppliers.

Trees in California and Hawaii

Only two specimens of the red silk-cotton tree are known in California, both at the Los Angeles County Arboretum and Botanic Garden in Arcadia. In December they drop their leaves and put forth their incredible floral display from February into April (Figs. 2-3). The largest tree in Hawaii, an orange-flowered form brought by co-author Paul Weissich from the Philippines in 1968, is in the parking lot of Foster Botanical Garden in Honolulu and always prompts interest when in flower in January and February (Fig. 1). Another tree in Hawaii of unknown age is along Leahi St. at the Queen Kapiolani Rose Garden in Kapiolani Park in Honolulu (Figs. 20-21). It is about 40 feet tall and wide and has a short trunk about three feet in diameter that branches into a double leader about 10 feet above the ground. Several specimens near the entrance to Hoomaluhia Botanical

Figure 18. (Left) Fruits of *Bombax ceiba* contain vast amounts of white, cottony material that, once liberated, float through the air (Foster Botanical Garden, Honolulu, Hawaii).

Figure 19. (Center) The white cottony material contained in the fruits of *Bombax ceiba* can litter the landscape for some distance (Foster Botanical Garden, Honolulu, Hawaii).



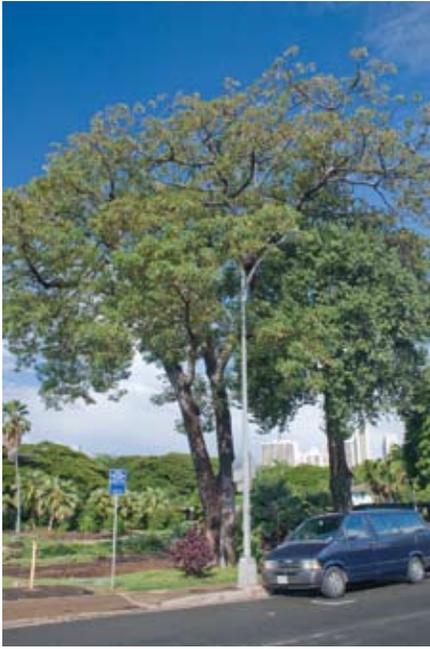


Figure 20. (Left) This *Bombax ceiba* at Queen Kapiolani Rose Garden in Kapiolani Park, Honolulu, Hawaii is about 40 feet tall and wide and has a short trunk about three feet in diameter that branches into a double leader about 10 feet above the ground.



Figure 21. (Center) Co-author Paul Weissich provides scale for the same tree in Figure 16 that is now devoid of leaves in late March and bears numerous fruits.

Garden in Kaneohe and accessioned in 1986 are about 50 feet tall, spread for 45 feet, and have trunks nearly two feet in diameter. Staples and Herbst (2005) report that a red silk-cotton tree is at The Queens Medical Center in Honolulu but we have not seen it.

Notes

Bombax and related genera, including *Adansonia*, *Cavanillesia*, *Ceiba*, *Chiranthodendron*, *Durio* (durian), *Fremontodendron* (California native flannel bush), *Pachira*, and *Pseudobombax*, among others, comprise about 25 to 30 genera and 250 species of mostly tropical trees with large, showy flowers, some of them of rather large habit that were once included in the Bombacaceae. However, recent research has shown that the Bombacaceae is not that distinct from the Malvaceae and is mostly now treated as a subfamily of this latter, widely circumscribed family.

Leaves of the red silk-cotton tree turn yellow and fall in December and

January. About the same time the dark brown buds are forming and enlarging and they open from February to April on the leafless tree. Individual flowers are short lived, about five to seven days, but, because flowers mature at various times, the most intense flowering period can last for a month with sporadic flowering preceding and following this intense period (Brown 2011). The ground beneath flowering tree is typically littered with flowers and can attract squirrels, deer, and other mammals that feed upon the floral litter. When flowering heavily with no leaves the tree is particularly striking and can be seen from a great distance as a red blaze against the blue sky. New leaves emerge when flowering is finished, and fruits complete development rapidly, split open, and release the cottony material with embedded seeds prior to or after the tree has completely renewed its leafy canopy.

Squirrels and other animals eat the fleshy petals (Menninger 1962). Flow-

ers of the red silk-cotton tree secrete nectar. Barwick (2004) and Mub (2007) note that the fleshy petals and heavy nectar are attractive to birds, squirrels, and bees, all of which may act as pollinators. However, fruits have yet to form on the red silk-cotton tree in California although the trees have been flowering for many years.

Widely planted and highly revered from India to southern China, the red silk-cotton tree has many uses. Known as the *semal* tree in India, a gummy secretion is obtained from the bark and sold as *semal* gum for medicinal use. The cottony fibers in the fruits are a substitute for kapok and used to stuff mattresses, pillows, and cushions although they are inferior to that of true kapok, *Ceiba pentandra*. The fleshy sepals and perhaps petals of young flowers are cooked and eaten as a vegetable. The soft wood has been employed for matches and tea boxes while the fibrous inner bark makes suitable cordage. All parts of the tree, including roots, bark, flowers, and fruits, have local medicinal/ethnobotanical uses to treat a variety of ailments (Ecosensorium 2011). The tree is so highly revered that, according to Chinese historical records, the King of Nam Yuet, Chiu To, gave one to the emperor of the Han Dynasty in the 2nd century B. C.

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Susan Eubank, librarian, and James E. Henrich, botanist, both at the Los Angeles County Arboretum and Botanic Garden in Arcadia provided information about the *Bombax ceiba* in The Arboretum. Matt Ritter, author and botany professor at California Polytechnic State University at San Luis Obispo; Ken Greby, an unusually knowledgeable arborist; Angela Liu, consulting arborist; and James E. Henrich critically reviewed the manuscript and offered valuable suggestions.

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Paul R. Weissich, director emeritus of the Honolulu Botanical Gardens, author, and landscape consultant, is a Living Treasure of Hawaii who envisioned and developed the Honolulu Botanical Gardens system into one of the premier tropical botanical gardens in the world. For over 50 years he has been bringing the incredible and magnificent world of plants to the people of Hawaii.

Photos by D. R. Hodel

Literature Cited

- Barwick, M. 2004. *Tropical and Subtropical Trees*. Timber Press, Portland, OR.
- Brown, S. H. 2011. *Bombax ceiba*. Univ. Florida Fact Sheet, IFAS Extension, Lee County, Southwest Florida.
- Ecosensorium. 2011. *Bombax ceiba* or *semal* tree. On-line: <http://www.ecosensorium.org/2011/02/bombax-ceiba-or-semal-tree.html>. Accessed: June 6, 2011.
- Flora of China*. 2011. *Bombax ceiba*. On-line: http://www.efloras.org/flora-taxon.aspx?flora_id=2&taxon_id=242420835. Accessed: June 20, 2011.
- McCann, C. 1959. *100 Beautiful Trees of India*. D. B. Taraporevala Sons & Co., Bombay, India.
- Menninger, E. A. 1962. *Flowering Trees of the World*. Hearthsides Press, Inc., New York, NY.
- Mub, U. 2007. A brief introduction to *semal* (*Bombax ceiba* Linn.). Rajendra K. C., Georg-August University, Goettingen, Germany.
- Neal, M. C. 1965. *In Gardens of Hawaii*. B. P. Bishop Mus. Special Pub. 50. Bishop Museum Press, Honolulu, HI.
- Staples, G. W. and D. R. Herbst. 2005. *A Tropical Garden Flora*. Bishop Museum Press, Honolulu, HI.

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