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The Palm Flora of Finca La Selva

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Finca La Selva is a biological field station owned and maintained by the Organization for Tropical Studies, a consortium of 27 educational institutions in the United States and Costa Rica. La Selva is located in the Atlantic lowlands of northeastern Costa Rica (10°26'N; 84°00'W) at an elevation of 40-150 m. Annual precipitation averages about 4,000 mm (157 in), and mean daily temperature is 24° C (75° F). Since it was established in 1968, La Selva has been one of the world's most active centers of research and education in tropical biology. The biological reserve at La Selva comprises an area of 1,366 ha (3,500 acres) and supports a wide diversity of habitats. Most of the land area (71%) is primary tropical wet forest. Other areas include swamp forest, treeless swamps, and secondary forest in various phases of regrowth. Over 1,500 vascular plant species have been catalogued, compared with an estimated 12,000 in all of Costa Rica (which is the size of West Virginia). Almost one third of the plant species are trees (440 species at present count). The rain forest at La Selva also supports an extremely diverse fauna, including over 50 species of snakes and 388 species of birds.

One of the most striking characteristics of the rain forest here is the tremendous diversity and abundance of palms, making La Selva one of the richest areas in the world for this family. Thirty-one species of palms are found, most of which can be seen in an hour's walk along one of the well maintained trails. The palm flora of La Selva contains representatives of 16 genera and 6 major groups (Moore 1973;

see Table 1). The largest genera are *Geonoma* with 7 species, *Bactris* with 5 species and *Chamaedorea* with 4 species. Most of the palm species that occur at La Selva are restricted to Central America; as many as 8 species are probably endemic to Costa Rica and southern Nicaragua, according to Standley (1937). The type specimens of *Geonoma ferruginea* and *G. longevaginata* were collected in the Sarapiquí region of Costa Rica where La Selva is located (Wessels Boer 1968). For these palms, and for hundreds of plant and animal species, the La Selva reserve is probably the only protected habitat in their geographic range.

Palms are found everywhere on the property, and occupy understory, subcanopy and canopy positions. While some species are found in second-growth forest, all of the species (except one cultivated species) occur in the undisturbed old-growth forest. Furthermore, all of the species have shade-tolerant seedlings. Few of the palms actually reach the highest level of the forest canopy. *Euterpe macrospadix* is the tallest species and may actually emerge above the level of the canopy. The smallest palm in Costa Rica, *Reinhardtia simplex* (see Fig. 2C), also occurs here. This dwarf palm produces flowers when only 30 cm high.

Most of the taller palms are found just below the canopy at about 15-20 m. The most common subcanopy palm is *Welfia georgii*, whose distinctive maroon-red new leaves contrast with the deep green forest background. *W. georgii* reaches densities up to 54 stems per hectare, and, by some estimates is the second most abundant tree

Table 1. Palm species at La Selva according to major groups (Moore 1973).*

Arecoid	
<i>Euterpe macrospadix</i>	Oerst. (C)
<i>Prestoea decurrens</i>	(H. A. Wendl.) H. E. Moore (U/SC)
<i>Reinhardtia gracilis</i>	(H. A. Wendl.) var. <i>rostrata</i> (Burret) H. E. Moore (U)
<i>R. simplex</i>	(H. A. Wendl.) Burret (U)
Chamaedoreoid	
<i>Chamaedorea exorrhiza</i>	H. A. Wendl. ex Guillain (U)
<i>C. warscewiczianus</i>	H. A. Wendl. (U)
<i>C. geomiformis</i>	H. A. Wendl. (U)
<i>C. sp. nov.</i>	fide H. E. Moore (U)
<i>Synechanthus warscewiczianus</i>	H. A. Wendl. (U)
Cocosoid	
<i>Astrocaryum alatum</i>	Loomis (U)
<i>A. standleyanum</i>	L. H. Bailey (SC)
<i>Bactris gasipaes</i>	H.B.K. (C)
<i>B. longiseta</i>	H. A. Wendl. ex Hemsl. (U)
<i>B. porschiana</i>	Burret (U)
<i>B. wendlandiana</i>	Burret (U)
<i>B. sp. nov.</i>	fide H. E. Moore (U)
<i>Desmoncus costaricensis</i>	(O. Ktze.) Burret (L)
Coryphoid	
<i>Cryosophila albida</i>	Bartlett (U)
Geonomoid	
<i>Asterogyne martiana</i>	H. A. Wendl. ex Burret (U)
<i>Calyptrogyne sarapiquensis</i>	H. A. Wendl. ex Burret (U)
<i>Geonoma congesta</i>	H. A. Wendl. ex Spruce (U)
<i>G. cuneata</i>	H. A. Wendl. ex Spruce (U)
<i>G. deversa</i>	(Poit.) Kunth (U)
<i>G. ferruginea</i>	H. A. Wendl. ex Spruce (U)
<i>G. interrupta</i>	(Ruiz & Pavon) Mart. (U)
<i>G. longevaginata</i>	H. A. Wendl. ex Spruce (U)
<i>G. oxycarpa</i>	Mart. (U)
<i>Pholidostachys pulchra</i>	H. A. Wendl. ex Burret (U)
<i>Welfia georgii</i>	H. A. Wendl. ex Burret (SC)
Iriarteoid	
<i>Iriartea gigantea</i>	H. A. Wendl. ex Burret (SC)
<i>Socratea durissima</i>	(Oerst.) H. A. Wendl. (SC)

* C, canopy; SC, subcanopy; U, understory; L, liana.

in many areas of La Selva (Hartshorn 1972). The stilt palms *Socratea durissima* (Fig. 1D) and *Iriartea gigantea* are

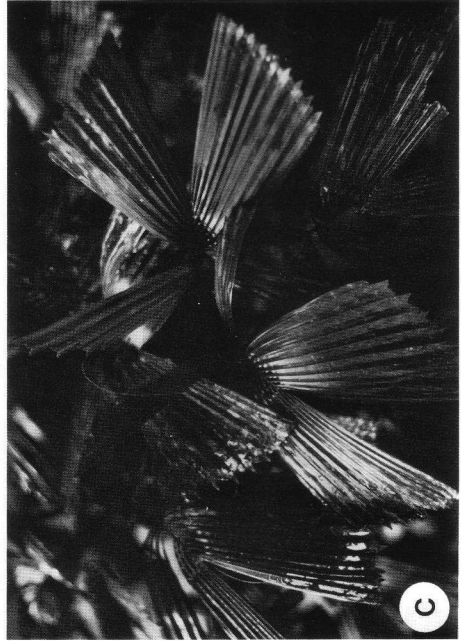
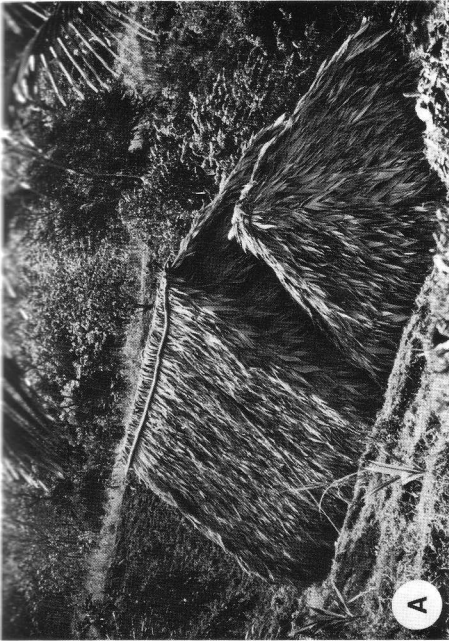
also common in the subcanopy. These species are capable of rapid growth in height because they lack a prolonged period of establishment growth. Stilt palms are often seen growing in canopy gaps, which are required for entrance into the upper levels of the forest (Vandermeer et al. 1974). *Prestoea decurrens* (Fig. 1B) is another common mid- to subcanopy species with graceful pinnate foliage and a slender green trunk.

Subcanopy palms interact in unique ways with other plants and with animals as well. The almond-shaped fruits of *W. georgii* are eaten and dispersed by at least nine species of mammals and birds, including white-faced monkeys and agoutis (Vandermeer et al. 1979). Because adult *Welfia* trees consistently attract foraging small mammals, they are favorite hunting grounds of the venomous bush-master during periods of peak fruitfall (Harry Greene, personal communication). Subcanopy palms also have a major impact on the structure of the vegetation beneath them due to the physical damage caused by the abscission and dropping of the large, heavy leaves. This effect has been documented for seedlings of *Welfia georgii*, where 20% of seedling mortality in a 9-month period was due to damage by subcanopy palm leaves (Vandermeer 1977). Seedlings of other species are also seriously affected by physical damage from subcanopy palms (Hartshorn 1972).

Twenty-three of the 30 native palms at La Selva are understory species less than 10 m tall. These species occupy a range of habitats, from the most deeply shaded areas to more open canopy gaps and streambanks. Many of the understory palm species have distinct site preferences. *Calyptrogyne sarapiquensis* (Fig. 2B) and *Astrocaryum alatum* are more abundant in poorly drained swamp forest. *Calyptrogyne sarapiquensis* is also common along streambanks, which often flood during rainy periods. *Geonoma interrupta* and *Chamaedorea exorrhiza* tend to be



1. A. *Bactris gasipaes*; B. *Prestoa decurrens*; C. *Bactris wendlandiana*; D. *Socratea durissima*.



2. A. Thatch roof of *Geonoma congesta*, Manuel Antonio National Park, Costa Rica; B. *Calypstrogyne sarapiquensis*; C. *Reinhardtia gracilis* var. *rostrata*; D. *longivaginata*.

found only on the more nutrient-rich recent alluvium deposited by the Rio Puerto Viejo. *Geonoma deversa* is patchily distributed on hilltops on weathered basaltic soils in the southern half of the property. *Pholidostachys pulchra* is rather common in the southern half of the property on moderately well drained soils. The common understory species, *Asteroogyne martiana*, *Geonoma congesta* (see Fig. 2A), *G. cuneata*, *G. longevaginata* (Fig. 2D), and *Synechanthus warscewiczianus* tend to occur in both deeply shaded habitats and in small to average-sized canopy gaps, although these species all require at least moderate shade.

Five species of *Bactris* are found at La Selva, including the cultivated *B. gasipaes* or peach palm, which is known locally as "pejibaye" (Fig. 1A). The fruits of this species are starchy, and are typically boiled and eaten with mayonnaise. The hearts ("palmito") of pejibaye are also quite delicious. All of the *Bactris* species here are colonial, and the clumps of *B. porschiana* and *B. longiseta* can be extensive. The dwarf species *B. wendlandiana* (Fig. 1C) is very striking, with its narrow stem, fuzzy bifid leaves, and bright red fruits. A new species of *Bactris* was recently described by Dr. H. E. Moore, Jr., but is currently unnamed. This species is the loveliest of the lot, with pinnate, glossy, dark green foliage and few spines.

Only one species of climbing palm occurs at La Selva. *Desmoncus costaricensis*, whose uppermost pinnae are modified into reflexed hooks which act as climbing organs, is not a species to fight with; the small black spines along the climbing stems are fierce.

It is likely that all the genera of palms at La Selva have been found; however, the absence of *Raphia taedigera* is enigmatic, since this species occurs nearby, across the Rio Puerto Viejo, and is extremely abundant in coastal swamps. In 1983, a small population of *Chamaedorea geonomiformis* was discovered in a relatively unexplored area of the reserve and a new species of *Chamaedorea* from La Selva was described by Moore several years ago. Species new to La Selva or to science may still be lurking out there somewhere.

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