

# Notes on *Chamaedorea* in Peru

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1. A beautifully grown specimen of *Chamaedorea fragrans* at Fairchild Tropical Botanic Garden, Miami.

Although *Chamaedorea* is one of the largest palm genera in the Americas, its representation in Peru is small but of great interest. This paper provides valuable new information on the genus.

*Chamaedorea* is one of the largest Neotropical palm genera. As in many genera of small highly diversified palms of tropical forest understory, the taxonomy of *Chamaedorea* is still problematic. Some species are very polymorphic, and many names have been published for each morph. Closely related taxa can be interpreted as several narrowly circumscribed species or as a single broad species. Such differences in taxonomic statements can be seen in comparing the treatment of *Chamaedorea* by Hodel (1992), which includes

around 100 species and that of Henderson et al. (1995), which recognizes 77 species. Most species of *Chamaedorea* occur from Mexico to Central America, just reaching Colombia near the Panama isthmus, but there is a minor center of diversity in the Andes and nearby lowlands of the Pacific coast and in the western Amazon. However, the number of species existing in this region of South America has been much debated, especially in the widespread and polymorphic *C. linearis* complex. Gentry (1986) recognized five species within this

2. *Chamaedorea angustisecta* in seasonal forest, Madre de Dios.





3. The dry forest of the Tumbes Reserved Zone covers extensive areas of hills reaching 900 m elevation, and is home to two palm species: *Aiphanes eggersii* and *Chamaedorea linearis*.

group, Hodel (1992) three and Henderson et al. (1995) a single species. In their conservative taxonomy of *Chamaedorea*, Henderson et al. recognized five species for Peru, including one endemic.

Several field trips to various parts of Peru over the last few years allowed us to see all five species and make new observations on them, which we report here. Among the species found in Peru, *Chamaedorea fragrans* is of special interest, not only because it is endemic and little known in its natural habitat, but also because it is highly sought-after in cultivation. A handsome, very attractive palm, with thin stems and bifid leaves (Fig. 1), it produces very fragrant flowers, as its name indicates, and is easy to grow indoors or outdoors in warm climates. In contrast to its horticultural success, *C. fragrans* has seldom been collected in the wild and little is known about its ecology, other than that it grows in premontane rainforest in eastern Peru (Henderson 1995). Recently we were fortunate enough to observe *C. fragrans* at Pozuzo, its type locality in Pasco, and learn more about this rare and beautiful palm.

The other South American species of *Chamaedorea* are little known in cultivation, although they are common and often abundant in the wild. *Chamaedorea angustisecta* (Fig. 2), very rarely cultivated, is widespread in seasonal forests of central and southeastern Peru. In the wet, northeastern lowlands, another species nearly unknown in cultivation, *C. pauciflora*, is abundant (Front Cover). Typically an Amazonian palm, *C. pauciflora* extends to Brazil, and just reaches the lower Andes, where it is found with *C. pinnatifrons*. The most widespread *Chamaedorea* species, *C. pinnatifrons*, ascends to more than 2500 m elevation and ranges to Mexico. Finally, we observed *C. linearis* in the coastal region of Peru, in the sanctuary of the Tumbes dry forest, a few miles away from the extensive Peruvian/Chilean desert.

#### *Chamaedorea linearis* in Tumbes

The small region of Tumbes is located on the coast of northwestern Peru at the border with Ecuador. A remarkable characteristic of this region is the vast extension of protected areas, including the



4 (left). The bright red, large fruits of *Chamaedorea linearis* are especially attractive. 5 (right). *Chamaedorea fragrans* establishing in a humus deposit on rugged limestone.

National Sanctuary of Mangrove, the Tumbes Reserved Zone and the Cerros de Amotape National Park, the last extending southward into the region of Piura. These three entities constitute the northwestern Peru Biosphere Reserve and encompass 231,402 ha (INRENA 2002). The vegetation within the reserve is truly spectacular and well conserved thanks to the efforts of INRENA, the institute in charge of managing the protected areas. A vast expanse of mostly pristine forest is preserved at the edge of the Peruvian coastal desert. Most impressive is the dry deciduous forest, dominated by gigantic, baobab-like Bombacaceae species, including *Ceiba trichistandra* (ceibo) and *Cavanillesia platanifolia* (petrino), often covered with hanging *Tillandsia usneoides* (Fig. 3). Visiting the Tumbes Forest Reserve requires a permit and a guide from INRENA, the latter quite indispensable in order to find one's way in this wilderness sanctuary, and even more so to find a palm. First, a three to four hours' drive from the city of Tumbes with a good 4x4 vehicle will take you to the entrance of the reserve. Then, one needs to walk along seldom-used trails within the seemingly endless undulating forested hills near the Pacific coast.

We walked 60 km round trip in two days in the forest to see two palm species – *Aiphanes eggersii* and *Chamaedorea linearis*. Palms are absent from most of the dry forest. At low elevation, only *A. eggersii* is to be found, and it occurs in wetter valley bottoms. In the transitional forest between the lowland dry deciduous forest and the premontane evergreen forest at 600–700 m elevation, *A. eggersii* becomes abundant, and *C. linearis* begins to appear. The latter is a medium-sized, solitary palm with pinnate leaves and slender trunk, not especially attractive except for its bright red fruits (Fig. 4), but still rewarding after walking so long in search of any palm. Above 700 m elevation in the premontane forest, *C. linearis* becomes dominant in the understory, while *A. eggersii* disappears.

Although *Chamaedorea linearis* is a common Andean species, it was very interesting to document its occurrence and ecology at the edge of its distribution on the Pacific coast of northern South America. The phytogeographical significance of the Tumbes dry forest has long been recognized. It is a very peculiar forest, with numerous endemic species, including large trees.

Moreover, this strange forest type forms a transition between two contrastingly different vegetation types, in the south with the hyper-arid desert of Peru-Chile, and the other in the north, in Ecuador with the wet forest of the Choco region. These sharp vegetation changes are due to the convergence at the Equator along the coast of South America of the cold Humboldt current coming from southern latitudes and the warm North-Equatorial Pacific current. Despite the great interest of the Tumbes forest, its palm flora remains poorly known. A single collection of *Chamaedorea linearis* from Tumbes, with incomplete data (Simpson 391, F) was previously recorded (Kahn & Moussa, 1994).

#### ***Chamaedorea pinnatifrons* in the Andes**

*Chamaedorea pinnatifrons* is a common component of Andean forests. In some cloud forests above 2000 m elevation, especially on steep slopes, it is sometimes the only palm species. In such habitats, it is frequent to find a bifid-leaved form of this species. Spruce (1871) described this form from

the eastern Andes of Peru as a distinct species, *C. geonomoides*. As Hodel (1992) mentioned, the bifid and pinnate-leaved forms frequently occur together and seem to represent variability within *C. pinnatifrons*. In a cloud forest at 2100 m elevation in Pasco where we found the two forms growing together, the bifid form had very short erect inflorescences with stout rachillae (Fig. 5), while the most common pinnate-leaved form had larger inflorescences with drooping rachillae. However, Spruce described *C. geonomoides* as having thin, flexuous and drooping rachillae, which seems to indicate that these distinctive inflorescence characters are not consistently associated with differences in leaf shape, and thus it is justified to consider a single, variable species.

#### ***Chamaedorea angustisecta* and *Chamaedorea pauciflora* in the Amazon lowlands**

These two species are largely sympatric in the lowlands of eastern Peru and occur with *Chamaedorea pinnatifrons* as well, but unlike this species, they do not grow above 700 m elevation.

6. A large clump of *Chamaedorea fragrans* in forest on limestone rock, Pozuzo.



7. Hanging, flexuous stems of *Chamaedorea fragrans* on a vertical limestone cliff.



*Chamaedorea pauciflora* is very common and abundant in Loreto (Kahn & Mejia 1991), northeastern Peru, but *C. angustisecta* is apparently absent (Kahn & Moussa 1994). This region is very wet, with no dry season, and *C. pauciflora* grows there in a variety of habitats, including *terra firme* and periodically flooded forests. To the south the climate becomes more and more seasonal, and *C. pauciflora* is associated there with *C. angustisecta*, which become very abundant in the southeastern region of Madre de Dios and adjacent parts of Bolivia. The two species cannot be mistaken with

each other, as *C. pauciflora* has bifid leaves while *C. angustisecta* has very regularly pinnate leaves with numerous, narrow leaflets.

#### *Chamaedorea fragrans* in the type locality

Spruce (1871) reported this species as "widely distributed along the eastern roots of the Peruvian Andes," which suggested that it was common at that time. *Chamaedorea fragrans* seems widespread in this region but with a very patchy distribution. It has been repeatedly collected from three small areas in the regions of San Martín, Huánuco and



8. The distinctive, olive-like fruits of *Chamaedorea fragrans*.

Junín, along with a few collections from isolated points in Pasco and Cusco. We recently visited the type locality of the species at Pozuzo in the central region of eastern Peru, and we finally understood the reason of this distribution pattern. *Chamaedorea fragrans* is restricted to forest on limestone rocks where it grows as a lithophytic species in pockets of humus deposited in the holes produced by the chemical alteration of the limestone by acidic water (Fig 5). It is very abundant and locally dominant in this habitat. It forms dense clumps composed of hundreds of thin

stems, which are especially striking in the open under-storey of the forest on limestone rocks (Fig. 6), or hanging along vertical cliffs (Fig 7). The species immediately disappears outside the limestone outcrops. There are several of these outcrops in the Pozuzo area, each one supporting its own population of *C. fragrans*. Because limestone occurs as isolated and often distant outcrops in the Peruvian Amazon, *Chamaedorea fragrans*, which seems strictly associated to this habitat, has logically a disjunct distribution. On the other hand, limestone outcrops are very

distinctive, easily recognizable geological structures, so it would be easy to find more localities of *C. fragrans*. Because this habitat generally has no use, forest on limestone rocks is generally perfectly preserved, as is the case in Pozuzo, and the species is probably neither threatened nor declining. Another interesting observation is that the shape of the bifid leaves is different in Pozuzo from that of the commonly cultivated plants in the USA. In Pozuzo the leaves are narrow and the two lobes not much divergent (Fig. 6), while in cultivated plants, the lobes are strongly divergent and the leaf has a much more open shape (Fig. 1), suggesting that there is some degree of variation in this species as well.

Pollination in *Chamaedorea fragrans* would be very interesting to study. Hodel (1992) reported that it rarely fruits in cultivation, suggesting a deficiency in the pollination mechanism that probably requires specific insects. In Pozuzo, on the other hand, *C. fragrans* produces fruits in great abundance (Fig. 8). The emission of scent is certainly related to pollination and is one of the most attractive attributes of the species. Spruce gave a poetic description of it: "the Peruvian girls stick it in their hair, put it under their pillows and use it largely in decorating the little crosses which they set up at the junction of forest-paths. My specimens, dried fourteen years ago, still give out their fine odor of mignonette with a dash of primrose when hot water is poured on them."

#### New collections of *Chamaedorea* made in Peru

*Chamaedorea angustisecta*: Madre de Dios Río Madre de Dios upstream from Puerto Maldonado, Reserva Amazonica Lodge, Oct. 2002, Millán & Pintaud 564 (USM). *Chamaedorea fragrans*: Pasco, Pozuzo, along road to Codo de Pozuzo, 700 m elevation, Feb. 2004, Millán & Pintaud 835, 836 (USM). *Chamaedorea linearis*: Tumbes, Tumbes Reserved Zone, Cotrina control post, 03°50'27"S, 80°09'39"W, 750 m elevation, May 2004, Millán

& Pintaud 1016 (USM). *Chamaedorea pauciflora*: Loreto, mouth of Río Tigre, 04°26'37"S, 74°06'49"W, 130 m elevation, Mar. 2004, Millán & Pintaud 926 (USM). *Chamaedorea pinnatifrons*: Pasco, Oxapampa, on road to Huancabamba, Cooperativa 2 de Mayo, 2100 m elevation, Feb. 2004, Millán & Pintaud 828 (USM). Loreto, Río Corrientes in front of Villa Trompeteros, 150 m elevation, Nov. 2003, Millán & Vegas 767 (USM).

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