Indigenous Palms (Arecaceae) of El Salvador, Central America

PABLO GALÁN, CELIO MOYA LÓPEZ, JOSE YADER SAGETH RUIZ CRUZ,

AARÓN VILLACORTA, BEVERLYNG HERRERA DE TURCIOS,

AND SAMAEL CARRILLO MORENO

Abstract

Eight species of indigenous palms are reported for El Salvador. We base this finding on bibliographic information, websites, research projects, consultations with Arecaceae specialists, and review of material deposited in various national herbaria, including LAGU (Jardín Botánico La Laguna), MHES (Museo de Historia Natural de El Salvador) and TECLA (Banco de Germoplasma de El Salvador). We provide Information on nomenclature, synonyms, species descriptions, distribution, phenology, habitat, conservation status and ethnobotany of the indigenous species of El Salvador. We also provide a key to the species, distribution maps, tables, and photographs as supporting documentation. We highlight *Brahea salvadorensis* as the only palm species originally described in El Salvador. Finally, we list and discuss additional palm species previously thought to be indigenous but now no longer considered so and exotic species.

Resumen

Reportamos ocho especies de palmas nativas de El Salvador. Basamos este hallazgo en información bibliográfica, sitios web, proyectos de investigación, consultas con especialistas en Arecaceae y revisión de material depositado en varios herbarios nacionales, incluyendo LAGU (Jardín Botánico La Laguna), MHES (Museo de Historia Natural de El Salvador) y TECLA (Banco de Germoplasma de El Salvador). Proporcionamos información sobre nomenclatura, sinónimos, descripciones de especies, distribución, fenología, hábitat, estado de conservación y etnobotánica de las especies nativas de El Salvador. También proporcionamos una clave para las especies, mapas de distribución, tablas y fotografías como documentación de apoyo. Destacamos a *Brahea salvadorensis* como la única especie de palma descrita originalmente en El Salvador.

Finalmente, enumeramos y discutimos especies de palmas adicionales que anteriormente se consideraban nativas pero que ahora no se consideran así y especies exoticas.

Introduction

Located on the Pacific slope, El Salvador is the smallest country in Central America (20,935 km^2) and is bordered by Guatemala to the west, Honduras to the north, and the Gulf of Fonseca to the east, which it shares with Nicaragua. With an array of various geographical features, including mountain ranges, volcanoes, plains, rivers, and lakes, it comprises 29 tropical ecosystems (MARN 2011), which is based on the UNESCO 2000 classification. The country's maximum elevation is 2,730 meters above sea level at Cerro El Pital.

The Arecaceae family, once called Palmae, consists of approximately 212 genera with 2,600 species distributed in nearly all tropical and subtropical regions of the world and extending to some warm temperate areas (Dransfield et al. 2008, Grayum 2003, Read et al. 2001). Ackermann et al. (2011) suggested a slightly more conservative number of 183 genera and 2,400 species, which are closely linked to the tropics and subtropics of the world, reaching their greatest level of diversity in evergreen rain forests.

The Arecaceae comprises small to large plants whose life form is popularly called “palm.” Although they can also be classified as woody shrubs, treelets, trees, and even vines, and many species can attain great heights, by one definition they do not constitute trees because they do not form xylem or wood. However, palm stems do possess phloem and xylem but they are formed in the absence of a circular vascular cambium, which in traditional woody trees lays down xylem or wood on the inside and phloem or bark on the outside. Palms possess xylem and phloem but they are in discrete vascular bundles scattered throughout the palm stem with a preponderance toward the stem periphery. Furthermore, palms do form hard woody tissues, which can be called wood, but they do so in a different manner than that of traditional trees.

Palm habits are dwarf to tall, solitary or cespitose, slender to robust or massive, rarely climbing, fibrous and woody, hermaphroditic, monoecious, dioecious, or polygamous plants. They are sometimes armed on the trunk, leaves, inflorescences, and even fruits, and are glabrous or variously covered with indumentum, including wax. Stems can be clean, ringed, and smooth or rough with persistent leaves and/or leaf bases.

Ackermann et al. (2011) noted that palms comprise a great diversity in stems. In some species they are less than 25 cm tall, or even acaulescent, while in others they can reach up to 60 m tall; diameters can vary from three mm to one m. Typically stems are unbranched and are topped

with a crown of leaves. Inflorescences, which can emerge from among or below the leaves, generally have strong, fibrous, enclosing bracts, are small to large, and can be unbranched or branched to numerous orders.

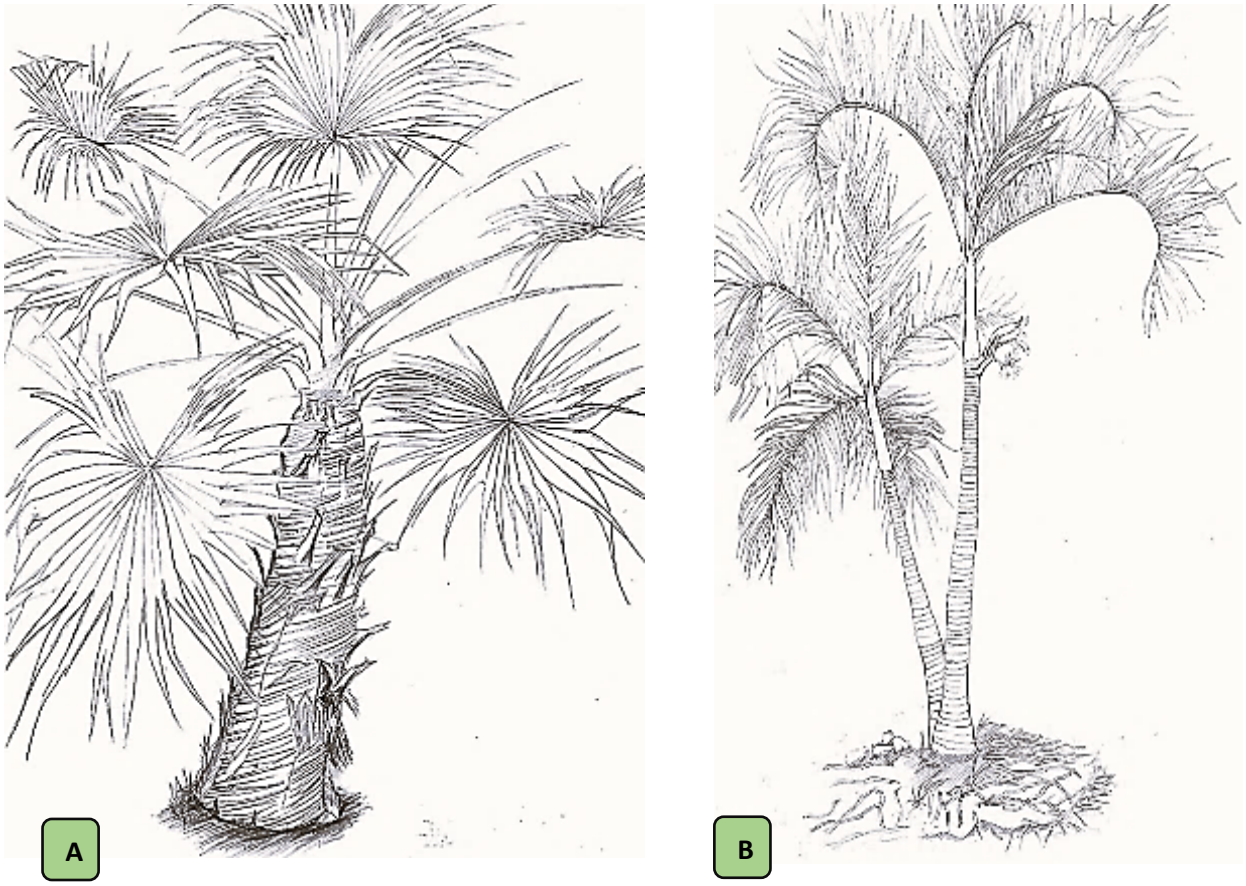
Dransfield et al. (2008) and Uhl and Dransfield (1987) show that palms represent a structural microcosm because their morphological diversity is the greatest among the monocots, and can be of acaulescent, climbing, shrubby, or arboreal habit. They can be of solitary or clustered habit. Their leaves, sometimes popularly called fronds, constitute one of the distinctive characters. They are composed of a base, which attaches the leaf to the palm stem at the base, a short or long petiole, which attaches the base to the blade, and the blade, which is typically a relatively large, mostly flat organ to collect sunlight for photosynthesis. Leaves are rather variable in size and shape (Ackermann et al. 2011). Two basic types of blades exist, each with its own subtype. First is the fan or palmate leaf, which are mostly round and divided into segments that originate from a central point or nearly so, like fingers on a hand. A subset is the costapalmate leaf with an extension of the petiole into the blade. Second is the pinnate or pinnately ribbed leaf, which has a long central axis called a rachis from which pinnae or leaflets arise, much like a feather. A subset is the bipinnately compound leaf where the leaflets or pinnae are further divided into sub-leaflets or sub-pinnae. **Figure 1** illustrates the common habits and two basic leaf types of palms.

Nationally and regionally, considerable bibliographic information on the Arecaceae exists for El Salvador. Despite this, we recognize some historical gaps in the information, including a lack of material in local herbaria, which leads to artificially narrow distribution data for some species, and a lack of photographs and other data, which could help to determine the presence or absence of species considered rare or absent in the country, including *Astrocaryum mexicanum, Attalea cohune*, and *Chamaedorea schiedeana*.

A comprehensive, detailed, and well illustrated account of the indigenous palms of El Salvador, including species descriptions and distribution is lacking. Thus, such an account of this conspicuous and often economically and ethnobotanically important group of plants is much needed.

Material and Methods

We base our study on bibliographic information; websites; field research; consultations with Arecaceae specialists; and review of the material deposited in various herbaria, including LAGU (La Laguna Botanical Garden), MHES (Natural History Museum of El Salvador), and TECLA (Germplasm Bank of El Salvador). Also, we examined material available on digital herbaria platforms that have a large number of specimens from the Mesoamerican region, including a general review at the Missouri Botanical Garden (MO) and specific specimens at the Field



1. Representation of two types of palms. **A.** With solitary or single stem, palmate leaves. **B.** With multiple or clustered stems and pinnate leaves. © 2024 Samael Carrillo.

Museum of Chicago (F) (Field Mus. 2024), Royal Botanic Gardens, Kew (K) (Kew 2024), Universidad Nacional Autónoma de México (MEXU) (UNAM 2023), New York Botanical Garden (NY) (NYBG 2022–2023), and Wien University (WU) (JACQ 2024).

For palm distribution information for El Salvador, the origin of the information used for each department is denoted by adding the superscripts "H" for herbarium specimen and "A" for author field observations. In this study, we used ES as abbreviation for El Salvador. Common or vernacular names, descriptions, and phenology mostly apply to El Salvador.

Taxonomic Classification of the Arecaceae in El Salvador

Baker and Dransfield (2016) updated the classification of the Arecaceae, comparing it with the two significant, recent works (Dransfield et al. 2008, Uhl and Dransfield 1987). They divided the Arecaceae into 5 subfamilies, 28 tribes, 27 subtribes, and 198 genera, estimating about 2,600

species. According to this classification, two subfamilies, four tribes, one subtribe, five genera, and eight species are indigenous to El Salvador (**Table 1**).

Table 1. Classification of the Indigenous Palms (Arecaceae) of El Salvador (based on Baker and Dransfield 2016).

Subfamilies	Tribes	Subtribes	Genera	Species
Coryphoideae	Sabalae	--	*Sabal*	*S. mexicana*
	Trachycarpeae	--	*Brahea*	*B. salvadorensis*
Arecoideae	Chamaedoreeae	--	*Chamaedorea*	*C. costaricana* *C. nubium* *C. pinnatifrons* *C. tepejilote*
	Cocoseae	Bactridinae	*Acrocomia*	*A. aculeata*
			Bactris	*B. major*

Update of Reports of Palm Species in El Salvador

We present information for indigenous and introduced palm species in El Salvador based on the work of national and international authors. We assembled a chronological listing of the most significant studies, summarizing the indigenous species in **Table 2** and species erroneously considered to be indigenous to El Salvador in **Table 4.**

Dahlgren (1936): seven species, all consider indigenous; now one, *Attalea cohune* (as *Orbignya cohune*) considered introduced (**Tables 2, 4**).

Standley and Calderón (1941): three indigenous species (**Table 2**) and other introduced species (**Table 4**).

Guzmán (1947): 12 species, noting two indigenous species, *Acrocomia aculeata* and *Attalea cohune*, the latter now consider introduced.

Rohweder (1956): only the genera *Acrocomia*, *Bactris*, *Brahea*, *Chamaedorea*, and *Cocos*.

Allen (1959): 24 species, of which four were considered indigenous and the other 20 introduced as ornamentals (**Tables 2, 4**).

Glassman (1972): six species, some of them as synonyms, four of them considered indigenous (**Table 2**).

Table 2. Summary of reports of indigenous palms of El Salvador.

Species	Dahlgren, 1936	Standley and Calderón, 1941	Guzmán, 1947	Allen, 1959	Glassman, 1972	Berendsohn et al., 1993	Henderson et al., 1995	Linares, 2003	Berendsohn et al., 2012	POWO, 2024	Galán et al., 2024
Acrocomia aculeata (≠ *A. vinifera*)	**	**	**	**	(**)	**		**	**	**	**
Bactris major (≠ *B. balanoides*)	**	**		**	(**)	**	**	**	**	**	**
Brahea salvadorensis (*Erythea salvadorensis)*	**			**	(**)	**		**	**	**	**
Chamaedorea costaricana						**	**		**	**	**
Chamaedorea nubium						**	**			**	**
Chamaedorea pinnatifrons						**			**	**	**
Chamaedorea tepejilote	**	**		**	**	**	**	**	**	**	**
Sabal mexicana				**		**	**	**	**	**	**

Berendsohn (1993): 47 species, of which 15 were considered indigenous; however, it includes four species that have now become synonyms, basionyms, unaccepted names, or misidentified; eight species are considered accepted names (**Tables 2, 4**).

Villacorta and González (1993): 26 species of palms in the collection of the La Laguna Botanical Garden, including introduced species; they noted four indigenous species.

Henderson et al. (1995: nine species in El Salvador, five as indigenous; they noted *Chamaedorea arenbergiana* as possibly present in the country but without evidence.

Williams et al. (2002): only a *Chamaedorea* sp. in a checklist of a regional flora.

Linares (2003): 24 species, including five indigenous species (**Tables 2, 4**).

Linares (2011): two species, *Chamaedorea pinnatifrons* and *C. tepejilote*, in a local protected are comprising a semi-abandoned coffee plantation.

Hernández Alvarado (2012): two species, *Chamaedorea tepejilote* and *Brahea salvadorensis*, both of which are somewhat doubtful because we observed only *C. costaricana* and the sighting of *B. salvadorensis* is undocumented.

Berendsohn et al. (2012): 38 species, eight indigenous and the remainder cultivated as ornamentals (**Tables 2, 4**).

POWO (2024): 13 indigenous species, of which only eight are actually indigenous (**Tables 2, 4**).

Key to the Indigenous Species of Palms of El Salvador

1. Leaves palmate 2

    2. Petiole margins with teeth, leaf blade not costapalmate . . . . . *Brahea salvadorensis*

    2. Petiole margins lacking teeth, leaf blade costapalmate . . . . . *Sabal mexicana*

1. Leaves pinnate or, if simple, then pinnately ribbed 3

    3. Plants armed; stems, leaves, and inflorescences with black, needle-like spines 4

        4. Stem solitary, robust . . . . . *Acrocomia aculeata*

        4. Stems clustered, slender . . . . . *Bactris major*

    3. Plants unarmed; stems, leaves, and inflorescences lacking spines 5

        5. Stems solitary 6

            6. Stem robust, 2 cm or more in diameter; leaves long-pinnate . . . . . *Chamaedorea tepejilote*

            6. Stem slender, less than 1 cm in diameter; leaves short-pinnate . . . . . *Chamaedorea pinnatifrons*

        5. Stems clustered 7

            7. Stems slender, less than 1 cm in diameter; leaves mostly simple, bifid, rarely pinnate and if latter then rachillae drying zigzag . . . . . *Chamaedorea nubium*

            7. Stems robust, 2 cm or more in diameter, leaves pinnate; rachillae not drying zigzag 8

                8. Leaf sheath apex with a prominent, fibrous ligule on either side of the petiole . . . . . *Chamaedorea costaricana*

                8. Leaf sheath apex lacking a prominent, fibrous ligule on either side of the petiole . . . . . *Chamaedorea tepejilote*

Taxonomic Treatment of the Indigenous Palms of El Salvador

The descriptions, phenology, habitat, and altitude have been obtained primarily from herbarium specimens deposited in national herbaria and complemented from various on-line databases, including a general review of Global Biodiversity Information Facility (GBIF) and specific records at the Botany Collections, the Smithsonian National Museum of Natural History (US 2020); C .V. Starr Virtual Herbarium, the New York Botanical Garden (NYBG 2020–2023); Dendroflora of El Salvador (Dendroflora 2022); Jacq Virtual Herbaria, Wien University (WU) (JACQ 2024), Plants of the World Online (POWO 2024), the Royal Botanical Garden, Kew (K) (Kew 2024), The Palm Web (Palm Web 2024); and TROPICOS (MO) (TROPICOS 2024). Some collectors have used the Map of Terrestrial Ecosystems (MARN 2011) as a habitat reference. Collection dates of herbarium specimens are recorded as month, day, year.

1. *Acrocomia aculeata* (Jacq.) Lodd. ex Mart., Hist. Nat. Palm. 286. 1845.

≡ *Cocos aculeata* Jacq., Select. Stirp. Amer. Hist. 278, t. 169. 1763.

Synonyms reported for El Salvador:
Acrocomia belizensis L. H. Bailey, *A.* mexicana Karw., *A. panamensis* L. H. Bailey, *A. vinifera* Oerst.

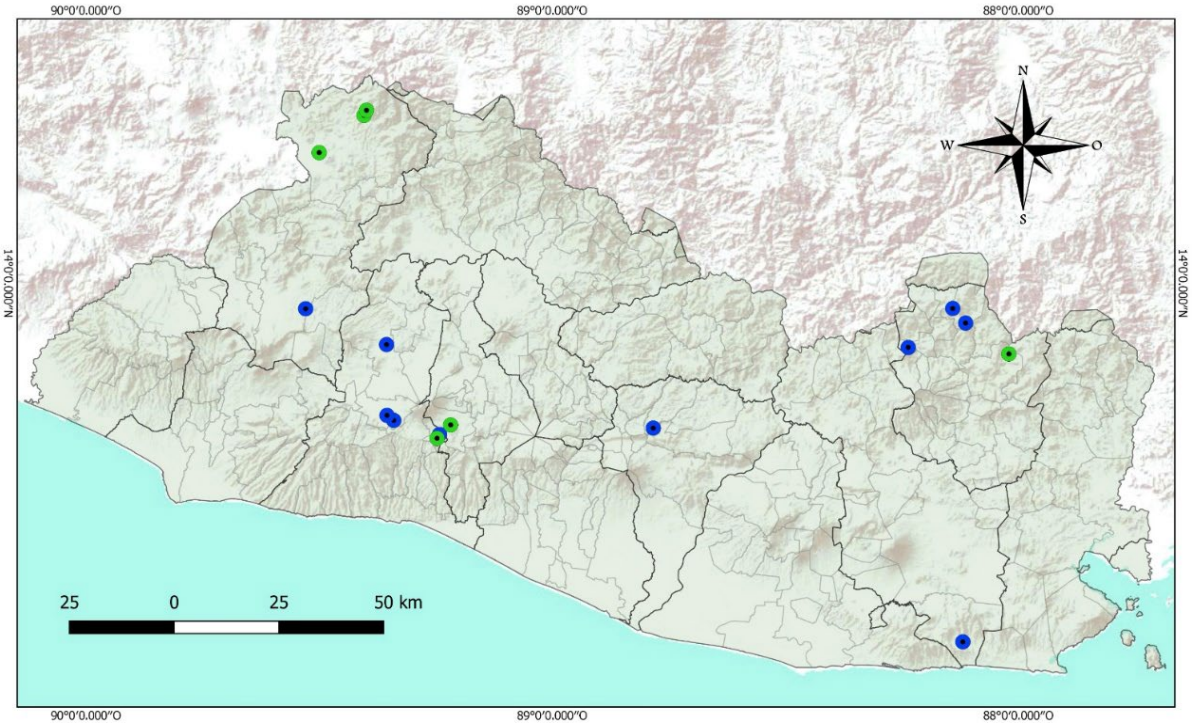
Common or vernacular names; *corozo*, *coyol*.

Description: Monoecious; stem solitary, 10 to 15 m tall, 35 cm diam.; stem, leaves, and inflorescences armed with black, needle-like spines; leaves pinnate, 3 to 4 m long, pinnae, numerous, ca. 50 to 60 on each side, ca. 100 cm long and 2 to 4 cm wide, linear to narrowly lanceolate, irregularly arranged, green adaxially, whitish abaxially (Read et al 2001); inflorescences borne among leaves, to 90 cm long, bract 1 m long, woody, turning brown; staminate and pistillate flowers white and yellow; fruits spherical, to 4 cm in diameter, turning brown to golden when ripe (**Fig. 2**).

Phenology: Flowering from April to May, fruiting from March to June of the following year (Read et al. 2001); flowering from February to June (Grayum 2003). In El Salvador, it has been collected with fruits in February, March, August, and October and observed with flowers from October to February.

Distribution and habitat: Quero Rico (1994) indicated *Acrocomia aculeata* is distributed from México to Belize and Guatemala, where it inhabits secondary vegetation to 1,000 m elevation. De Lima et al. (2018), Grayum (2003), Henderson et al. (1995), Read 2001), and Rueda et al. (2019) noted that it is distributed from México to South America and the Antilles. Grayum (2003) stated it inhabits dry and humid forests, generally in grasslands and disturbed sites, to 500 m

2. *Acrocomia aculeata*. **A.** Habit. **B.** Spines on petiole. **C.** Inflorescence. **D.** Fruits. © 2024 P. Galán and S. Álvarez.



Map 1. Distribution of *Acrocomia aculeata*. Herbarium record; Photographic record.

elevation in Costa Rica. Read (2001) and Rueda et al. (2019) suggested it is uncommon in Nicaragua where it is found in dry forests and open fields, Pacific and north-central zones, from 100 to 1,300 m elevation. Henderson et al. (1995) noted that humans greatly influenced its distribution.

In El Salvador, it has been recorded in secondary vegetation; mixed, semi-deciduous, well drained submontane tropical forest; river basin; seasonal, evergreen, needle-leaved, lowland forest; ranging from 700 to 1,164 m elevation.

Herbarium references: SANTA ANA: Metapán, 07-11-1962, *Winkler s.n.* (ULM); 10-10-2019 *Galán and Posadas 5183* (LAGU); 08-31-2021, *Galán et al. 5731* (LAGU, MO). LA LIBERTAD: Antiguo Cuscatlán, 03-09-2020, *Galán 5295* (LAGU). SAN SALVADOR: *Calderón 693* (NY, US); San Salvador, 05-1922, (NYBG 2020–2023; US 2020–2024.). MORAZÁN: Río Sapo, 02-06-2004, *Carballo et al. 1036* (B, K, LAGU, MO).

Observations and photographic records: SANTA ANA: carretera antigua a San Salvador, El Bejuco, 05-01-2023. LA LIBERTAD: San Juan Opico, carretera a Tacachico, 12-18-2022; Colón, km 20 carretera panamericana, 10-24-2022; Colonia Jardines de Colón "Cuéllar" 05-27-2023; Antiguo Cuscatlán, esquina opuesta a iglesia y parque, 06-29-2020. SAN VICENTE: San Esteban Catarina, 12-13-2020. SAN MIGUEL: Chirilagua, calle a El Cuco. MORAZÁN: San Isidro, 12-03-2023;

carretera a Perquín (Ruta de la Paz), 04-20-2024; calle a El Mozote, creciendo en barrancos y laderas, en bosque de transición entre selva y bosque de pinos, 02-17-2024.

Distribution for El Salvador (Map 1): Santa Ana [A,H], La Libertad [A,H], San Salvador [H], San Vicente [A], San Miguel [A], Morazán [A,H].

2. Bactris major Jacq., Select. Stirp. Amer. Hist. 134. 1781.

– "*Bactris ovata*" Stokes in Bot. Mat. Med. 4: 394 (1812), nom. illeg.

Synonyms reported for El Salvador:
Augustinea ovata Oerst., *Pyrenoglyphis ovata* (Oerst.) H. Karst., *Bactris augustinea* L. H. Bailey, *B. balanoidea* (Oerst.) H. Wendl.

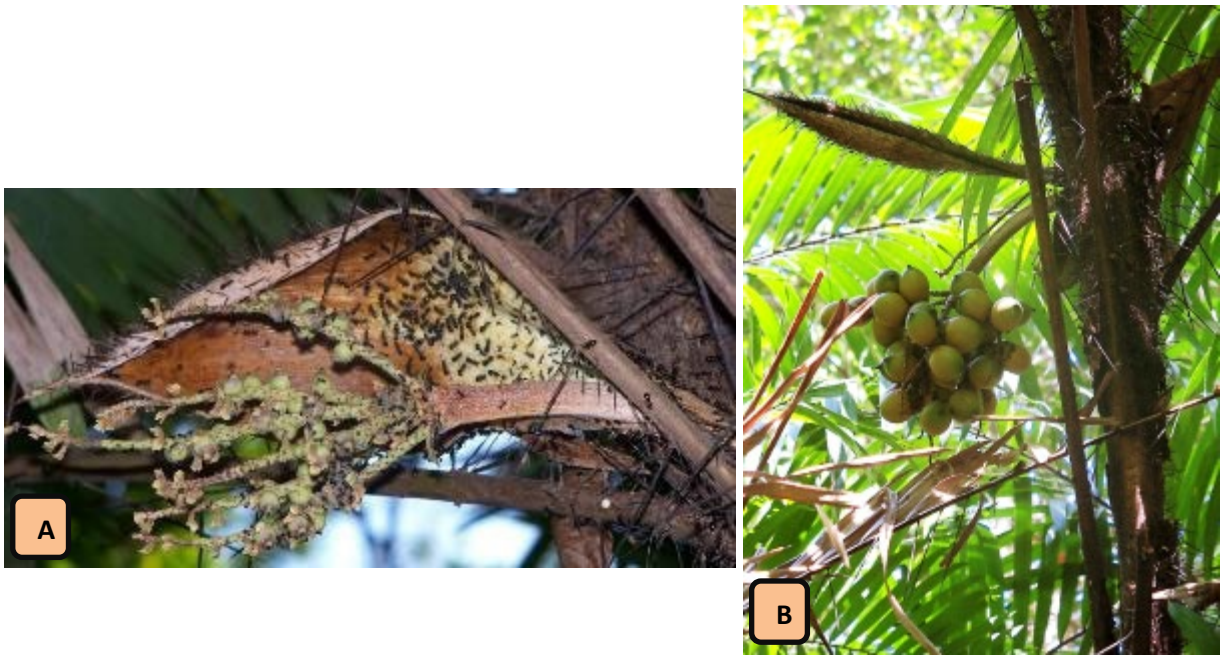
Common or vernacular names: *coyol, huiscoyol*.

Description: Monoecious; stems cespitose, forming dense or open clumps, 1-10 m tall (Palmweb 2024); stems to 6 cm diam., erect to leaning, dark brown; leaves 8 to 10 per stem, 1 to 1.3 m long, 60 cm wide; petiole 0.1 to 1.5 m long; pinnae 25 to 48 per side, linear, regularly arranged in same plane; inflorescence interfoliar, armed with black, needle-like spines, bract tan; panicle with many branches; flowers yellowish white or cream colored; fruits ovoid with persistent calyx, green or grayish when unripe, turning purple to black at maturity; seed very hard (**Fig. 3**).

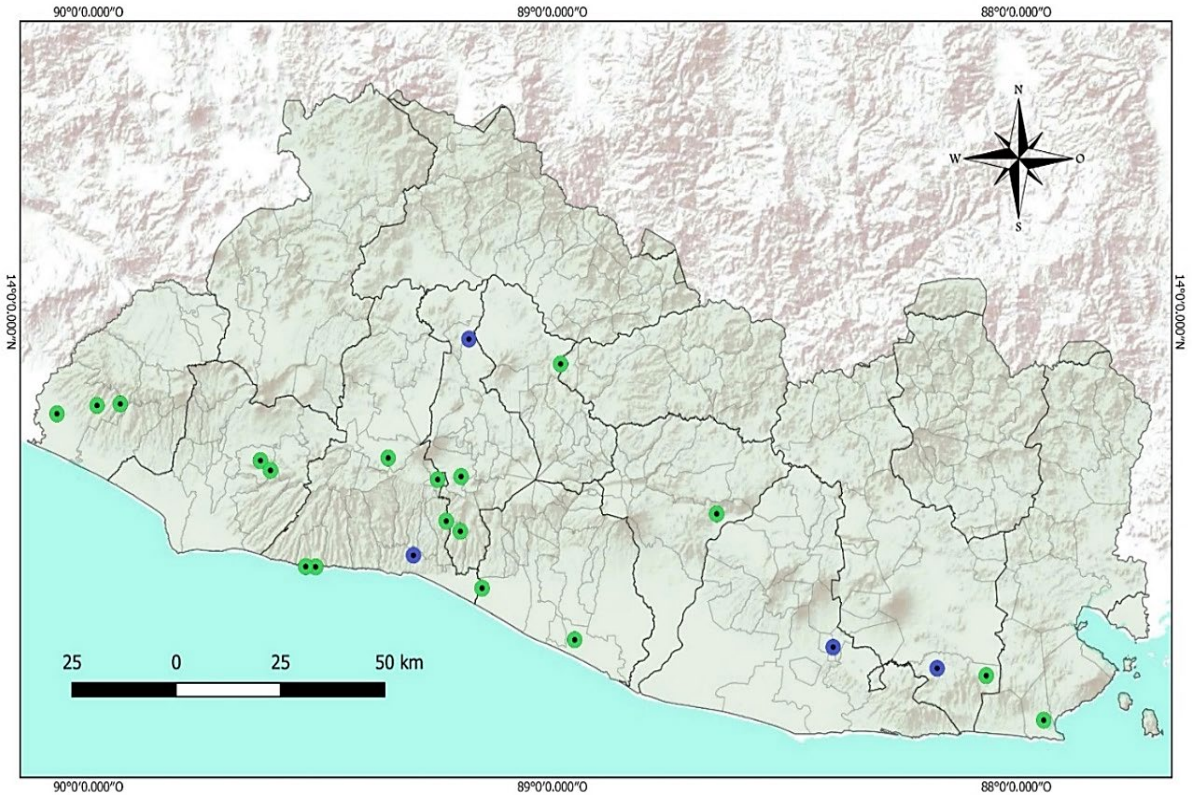
Phenology: Flowering in December and January (Quero Rico 1994). For El Salvador, it flowers from January to April; unripe fruits occur from February to November and ripe fruits in March, July, and August.

Distribution and habitat: *Bactris major* occurs from México (Veracruz, Tabasco, Chiapas, Yucatán) to Panama, in savannas and riparian vegetation, to 50 m elevation (Quero Rico 1994). In El Salvador, it has been reported from a variety of habitats, including in lowland, broad-leaved, tropical, semi-deciduous forest; well drained, subdeciduous vegetation; understory; gallery forest; lowland, flood-prone areas; and mainly in coastal zones. De Nevers et al. (1996) reported it in seven departments while Henderson (2000) reported it in six departments of El Salvador.

Herbarium references: AHUACHAPÁN: P. N. El Imposible, 03-14-1992, *Sandoval and Chinchilla 302* (B, K, LAGU, MO); 04-19-1999, *Berendsohn and Villacorta 1649* (B, LAGU); San Francisco Menéndez, 03-08-2000, *Rosales 338* (B, LAGU); A. P. Santa Rita, 01-24-2004, *Rosales 2027* (LAGU); El Corozo, 08-20-2019, *Rivera 330* (LAGU). SONSONATE: Sonsonate, 03-18-1922 to 03-27-1922, *Standley 22351* (NY, US); Cuisnahuat, 03-11-2010, *Galán et al. 963* (LAGU); Caluco, 05-16-2012, *Galán and Peña 1398* (B, LAGU, MO); 05-16-2012, *Rodríguez and Peña 2914* (LAGU). LA



3. *Bactris major*. **A.** Infructescence. **B.** Immature infructescence showing bract and spines. © 2024 P. Galán.



Map 2. Distribution of *Bactris major*. ● Herbarium record; ● Photographic record.

LIBERTAD: Carretera del Litoral, 10-18-1962, *Winkler s.n.* (ULM); Antiguo Cuscatlán, 02-27-1986, *Flores 26* (B, LAGU); La Libertad, 01-12-1993, *González and Villacorta 127* (B, K, LAGU); 11-23-1996, *Aparicio and Hernández 27* (B, K, LAGU); Jicalapa, 07-10-2014, *Galán and López 3002* (LAGU); Colón, 11-20-2022, *Galán and Olmedo 6113* (LAGU); Huizúcar, 02-04-2023, *Galán and Villacorta 6174* (LAGU). SAN SALVADOR: San Salvador, [gerope] San Miguel, 1857 (NY, 2023; Kew, 2023), *Wendland s.n.* (K); near San Salvador, 1922, *Calderón 1185* (NY, US); Rosario de Mora, 04-20-1996, *González et al. 302* (B, K, LAGU, MO); Parque Saburo Hirao, 01-13-2009, *Lara 1218* (LAGU). CABAÑAS: Cinquera, 03-20-2003, *Carballo and Carrillo 665* (LAGU). LA PAZ. La Herradura, 04-30-1962, *Winkler s.n.* (ULM). SAN VICENTE: national highway, 2 miles w of the puente Cuscatlan,03-08-1959, *Allen 7270* (US); ca. 50 miles NW of San Miguel, 02-23-1976, *Croat 32793* (MO); Las Galeras, 02-09-1998, *Davidse et al. 37479* (B, BM, ITIC, LAGU, MO). SAN MIGUEL: Laguna de Olomega, 02-20-1922, *Standley 20992* (US); Hacienda Potrero Santo, 01-28-1942, *Tucker 845* (NY, US). LA UNIÓN: Laguna de Maquigüe, 02-18-1922, *Standley 20900* (NY, US); Conchagua, 05-25-2022, *Sagastizado s.n.* (LAGU).

Observations and photographic records: LA LIBERTAD: La Libertad, Ctón. Tepeagua, 01-29-2022. SAN SALVADOR: Guazapa, Hda. San Cristobalito, 08-15-2012. USULUTÁN: Ereguayquín, carretera del litoral, 12-18-2021. SAN MIGUEL: Chilanguera, carretera a Playa El Cuco 02-26-2022.

Grayum (2003) noted that all material from Mesoamerica, Trinidad, and northeastern Brazil corresponds to *Bactris major* var. *major*.

Distribution for El Salvador (Map 2): Ahuachapán[H], Sonsonate[H], La Libertad[AH], San Salvador[AH], La Paz[H], San Vicente[H], Usulután[A], San Miguel[AH]. *Bactris major* is the most collected/recorded palm species in El Salvador; it has been collected and recorded in ten departments.

3. Brahea salvadorensis H. Wendl. ex Becc., Webbia 2: 105 1907.

≡ *Acoelorraphe salvadorensis* (H. Wendl. ex Becc.) Bartlett, Publ. Carnegie Inst. Wash. 461: 32. 1935.

≡ *Erythea salvadorensis* (H. Wendl. ex Becc.) H. E. Moore, Gentes Herbarum 8: 217. 1951.

= *Acoelorraphe cookii* Bartlett, in Publ. Carnegie Inst. Wash. 461: 32. 1935.

= *Erythea cookii* (Bartlett) H. E. Moore, in Gentes Herbarum 8: 217. 1951.

When naming and describing *Brahea salvadorensis*, Beccari (1907) cited *Wendland s. n.* as the type, noting that the specimen was at B and Wendland had annotated it with the name "*Brahea*

salvadorensis." However, Cuccuini and Nepi (2006, fig. 13) provided a drawing of *B. salvadorensis* present in FI and annotated as "Wendland, ex Wendland," which made Moya (2019) carefully review the FI material. In the drawing of the flower of *B. salvadorensis* at FI, Beccari ascribed the authorship to Wendland and wrote "San Salvador: Contschagna, *frammenti di spadice dato a Dammer di Wendland* 1900." This phrase means that the inflorescence fragment that Beccari used for the description was actually collected by German botanist Udo Dammer near the volcano Conchagua in 1900 in El Salvador when he was collecting *Chamaedorea* in Central America (Dammer 1904). This notion is confirmed on the specimen at B, which contains only fruits and is annotated "*Leg. H. Wendland s. n.* 12.1900 *com*. Dammer." Thus, Moya (2019) designated the specimen at FI that Beccari used to describe the flower as the lectotype and the specimen present at B as an isolectotype.

Glassman (1972) considered *Acoelorraphe salvadorensis* to be synonymous with *Erythea salvadorensis.*

Common or vernacular names: hat palm, *suyate*.

Description: Monoecious; stem solitary, 2–6 m tall; leaves palmate, blade not costapalmate; inflorescences ca. 1 m long, emerging from among the leaves, whitish; flowers white; fruits white maturing dark brown to black. (**Fig. 4**).

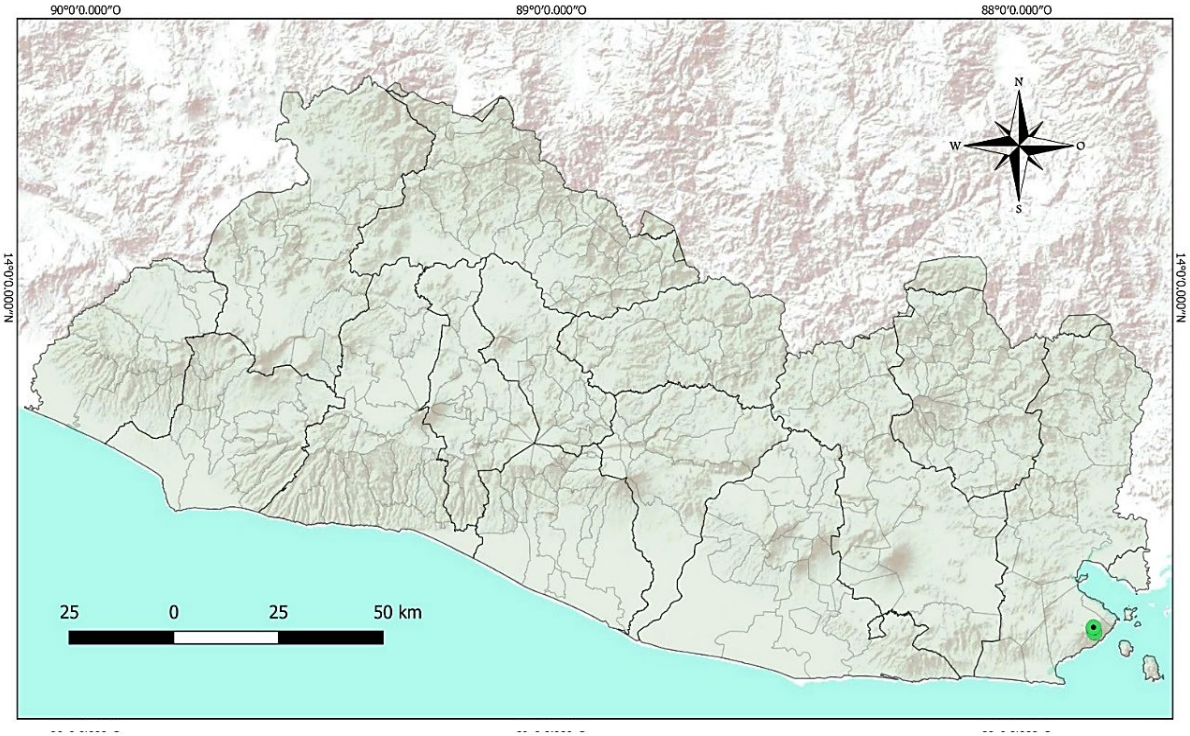
Beccari (1907) made the first description of this often gregarious species, basing it on Wendland's unpublished notes, the latter of whom described it as characterized by the thin tomentose branchlets; glomerular-ternal flowers; sepals acute, entirely tomentose except for a narrow band near the margin; corolla glossy abaxially, very shortly tubular proximally; the stamens forming a ridge around the ovary, adnate in the proximal half to the undivided part of the corolla; and the completely glabrous ovary.

Phenology: Flowering from March to August (Quero Rico 1994). For El Salvador, flowers are reported from December to February and fruits in May.

Distribution and habitat: El Salvador, Honduras and Nicaragua (POWO 2024), in low, deciduous forest and oak forest, from 550 to 900 m elevation (Quero Rico 1994). In El Salvador, it has been found only on the slopes of Volcán Conchagua in lowland, well-drained, broad-leaved, tropical, semi-deciduous forest (MARN 2011).

Herbarium references: LA UNIÓN: Volcán Conchagua, 01-31-1998, *Monro, et al. 2119* (LAGU, MO)*;* 01-12-2006, *Morales 14420* (LAGU, MHES); 05-24-2011, *Rodríguez et al. 2314* (LAGU); 02-12-2019, *Galán et al., 4939* (LAGU, MO, WU). (**Map 3**).

4. *Brahea salvadorensis*. **A**. Habit, habitat, and leaves. **B**. Stem with persistent leaf bases. **C**. Petiole, showing teeth. **D.** Inflorescence, rachillae and white flowers. **E.** Immature fruit. © 2024 A. Sorto.



Map 3. Distribution of *Brahea salvadorensis*. ● Herbarium record; No photographic record.

Beccari (1907) reported *Brahea salvadorensis* for Conchagua in the Department of La Unión; Bartlett (1935) reported it as *Acoelorraphe salvadorensis;* Standley and Steyermark (1958) reported it from Guatemala, El Salvador and Honduras as Erythea salvadorensis; Henderson et al. (1995) and Read (2001), reported it as a synonym of *B. dulcis.* Quero Rico (2000), Berendsohn et al. (2012), The Plant List (2013), and POWO (2024) considered *B. salvadorensis* as an accepted name.

Distribution for El Salvador (Map 3): La Unión[H].

4. Chamaedorea costaricana Oerst., Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1858: 19. 1859.

= *Chamaedorea linearia* L. H. Bailey, in Gentes Herbarum 6: 249. 1943.

= *Chamaedorea quezalteca* Standl. and Steyerm., in Publ. Field Mus. Nat. Hist., Bot. Ser. 23: 204. 1947.

= *Chamaedorea seibertii* L. H. Bailey, in Gentes Herbarum 6: 238. 1943.

5. *Chamaedorea costaricana*. **A.** Habit. **B.** Flowers. **C**–**D.** Immature fruits. © 2024 Y. Ruiz and P. Galán.

Allen (1959) erroneously reported *Chamaedorea woodsoniana* for El Salvador but he was referring to *C. costaricana*.

Common or vernacular names: *cuiliote, cuiliote amargo, cuiliote dulce, pacaya*.

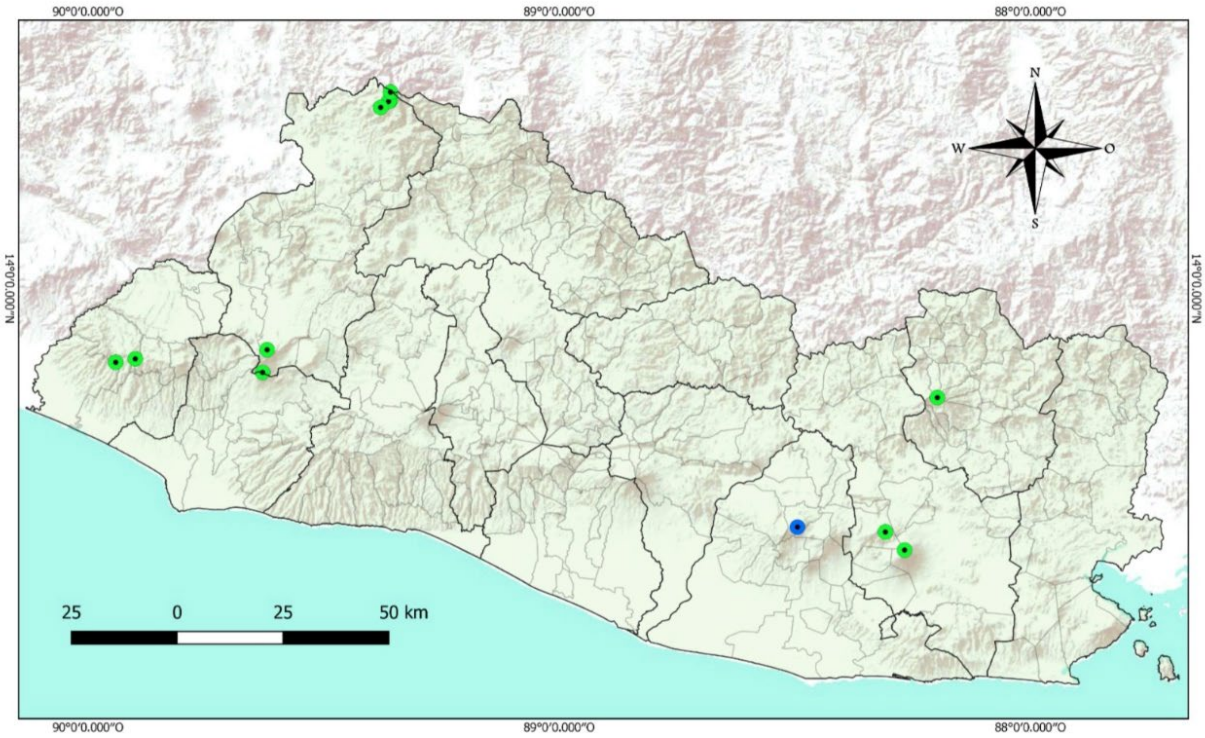
Description: Dioecious; stems clustered, 2–4 m tall, mostly erect and sometimes eventually leaning and becoming decumbent (Palmweb 2024), dense or open clumps 3 to 8 × 3 to 6 m; stems green, ringed; petiole ca. 35 cm long, leaves 7 per stem, long-pinnate, 22–26 pairs of pinnae, 10 to 40 or to 63 cm long, 1.1 to 4.5 cm wide in the middle (Grayum 2003), long ligules at apex of leaf base on either side of petiole; inflorescences infrafoliar, erect, with yellowish green buds; flowers yellow; infructescence with orange rachis and rachillae, 10 to 20 cm long; fruits spherical, becoming black when ripe **(Fig. 5**).

Phenology: For El Salvador, *Chamaedorea costaricana* was recorded with floral buds in November, flowers in November and March, and fruits in January, February, June, September, and November.

Distribution and habitat: Based on the unusually long ligules at the leaf base apex, Hodel (1991) reported *Chamaedorea costaricana* in El Salvador but as *C. quezalteca*, which occurs from southern México to Guatemala, El Salvador, and Honduras. He also mentioned having collected cultivated specimens in California, which were grown from seeds collected on Volcán Cerro Verde in El Salvador. We consider *C. quezalteca* to be a synonym of *C. costaricana*.

Chamaedorea costaricana occurs from 1,000 to 2,000 m elevation in dense, humid, or wet forest; submontane broad-leaved tropical semi-deciduous forest; altimontane seasonal, evergreen, broad-leaved, tropical forest; and lower montane, broad-leaved, tropical semi-deciduous forest.

Herbarium references: AHUACHAPÁN: Sierra de Apaneca, *Standley 20137* (GH, F); Parque Nacional El Imposible, 11-21-1991, *Sandoval 32* (B, HBG, LAGU); 01-24-1998, *Monro et al. 2023* (B, BM, ITIC, LAGU, MO); 10-31-2007; *Menjívar et al. 1659* (MHES). SANTA ANA: Volcán de Santa Ana, 03-29-1987, *Carlson 680* (F); *Jurado s.n.* (LAGU); Metapán, 02-05-2020, *Galán and Magaña 5270* (LAGU, MO, NY)*;* 02-05-2020, *Galán and Carranza 5271* (LAGU, MO); 06-29-2021, *Galán et al. 5639* (LAGU, MO)*;* Cerro Verde, 11-18-2021, *Galán et al. 5891, 5892* (LAGU, MO)*;* Los Andes, 02-15-2023, *Galán et al. 6182* (LAGU). SAN MIGUEL: Volcán de San Miguel, 02-05-1999, *Sidwell et al., 865* (B, BM, ITIC, LAGU, MO); Chinameca, El Pacayal, 12-10-2021, *Cerén et al. 5081* (MHES, MO). MORAZÁN: Cerro Cacahuatique, 01-22-2014, *Berendsohn et al, 1791* (B, LAGU).



Map 4. Distribution of *Chamaedorea costaricana*. Herbarium record; Photographic record.

Observations and photographic records: USULUTÁN: Laguna de Alegría, 04-16-224 (Y. Ruiz Cruz).

Distribution for El Salvador (Map 4): Ahuachapán[H], Santa Ana[H], Sonsonate[H], Usulután[A], San Miguel[H], Morazán[H].

5. Chamaedorea nubium Standl. and Steyerm. Field Mus. Nat. Hist., Bot. Ser. 23: 202. 1947.

Common or vernacular names: *cuiliote, cuiliote amargo, cuiliote de montaña*.

Description: Dioecious; stems clustered, to 2.5 m tall (until 10 m, fide Palmweb 2024), green, ringed, 8 to 10 mm diameter; leaves 7, bifids, or sometimes short-pinnate with 2 pinnae; petiole 8 to 13 cm long. Inflorescence infrafoliar, sometimes emerging through persistent sheaths, erect to spreading; peduncle 10 to 27 cm long (Palmweb 2024) rachis 1 to 4 cm long or more, greenish or yellowish in flower, red-orange in fruit; stamainate flowers golden-yellow, pistilate flowers pale yellow; infructescence with orange peduncle; fruits turning black (**Fig. 6**).

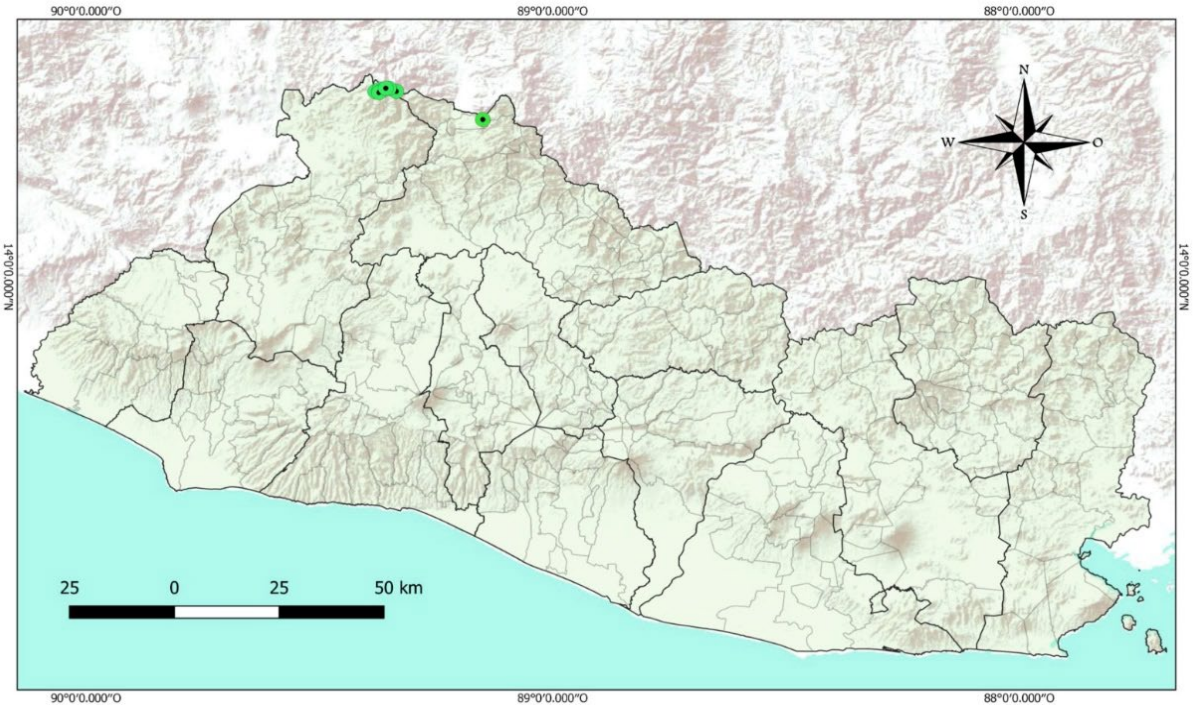
Phenology: In El Salvador, *Chamaedorea nubium* has green and yellow floral buds in February, flowers in January and February, immature green fruits in September and December to February, with yellow fruits in February and black fruits in January.

6. *Chamaedorea nubium*. **A**. Habit. **B**. Leaves. **C**. Flowers. **D**. Inflorescence. © 2024 P. Galán.

Throughout its range, *Chamaedorea nubium* is typically found with simple leaves although sometimes pinnate-leaved forms are encountered.

Distribution and habitat: *Chamaedorea nubium* occurs in cloud forest and in a very humid, upper montane, seasonal, evergreen, broad-leaved tropical forest from 1,800 to 2,322 m (MARN 2011). It occurs on the highest mountain peak in El Salvador. Henderson et al. (1995) and POWO (2024) mentions the range of distribution from in Chiapas, Guerrero and Oaxaca states in México and Guatemala, Honduras and El Salvador. In the latter, it is found in Santa Ana and Chalatenango departments.

Herbarium references: SANTA ANA: Miramundo Mountain Range, 01-27-1966 to 01-31-1966, *Molina R. et al., 16899* (NY); Parque Nacional Montecristo, 01-30-1998, *Villacorta 2678* (B, K, LAGU)*;* 01-23-2002, *Carballo and Monterrosa 130* (B, BM, LAGU, MO); 09-04-2002, *Carballo 487*



Map 5. Distribution of *Chamaedorea nubium*. ● Herbarium record; No photographic record.

(B, EAP, LAGU, MO); 12-01-2004, *Monterrosa and Carballo 853* (LAGU); 01-13-2015, *Galán and Matute 3177* (LAGU, MEXU, NY, WU); 01-13-2015, *Rodríguez and Magaña 5063* (LAGU, NY); 01-21-2016, *Rodríguez and Magaña 5511* (B, LAGU); 02-07-2018, *Galán et al. 4528* (K, LAGU, MO, WU); 02-05-2020, *Galán and Perdido 5266* (B, LAGU, MO, NY, WU); La Encantada Private protected natural area, 02-18-2021, *Galán et al. 5530* (LAGU, MO, NY, WU). CHALATENANGO: Los Essesmiles, 03-21-1942, *Tucker 1099* (MICH).

The specimen *Monro et al*. *2023* in the UNAM Open Data Portal as *Chamaedorea nubium* was reidentified and confirmed as *C. costaricana* after examination of material at LAGU.

Distribution for El Salvador (Map 5): Santa Ana[H], Chalatenango[H].

6. Chamaedorea pinnatifrons (Jacq.) Oerst., Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1858: 14. 1859.

≡ *Borassus pinnatifrons* Jacq. in Pl. Hort. Schoenbr. 2: 65. 1797.

= *Chamaedorea membranacea* Oerst. in Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn 1858: 22. 1859.

Common or vernacular names: *cuiliote, cuiliote de cotuza, cuiliote dulce de montaña, cuiliote de tamagás, pacaya enana, quiliote dulce*.

Description: Dioecious; stem solitary, from 3.5 to 4 m tall, 2.5 cm diam., green, smooth, ringed; leaves pinnate, pinnae 20 to 22 cm long, 7.3 cm wide, sigmoid, leathery, deep green on both surfaces; inflorescence infrafoliar, one per node, initially green then turning white and then yellow; pistilate inflorescence with spreading to erect branches; pistillate flowers yellow; staminate inflorescences with 3 to 25 pendulous branches; staminate flowers with petals connate at apex (Palmweb 2024); infructescence rachillae orange; fruits to 20 mm long, round or globose, initially green then passing through yellow, orange, and red before turning black (Céren López 2009) (**Fig. 7**).

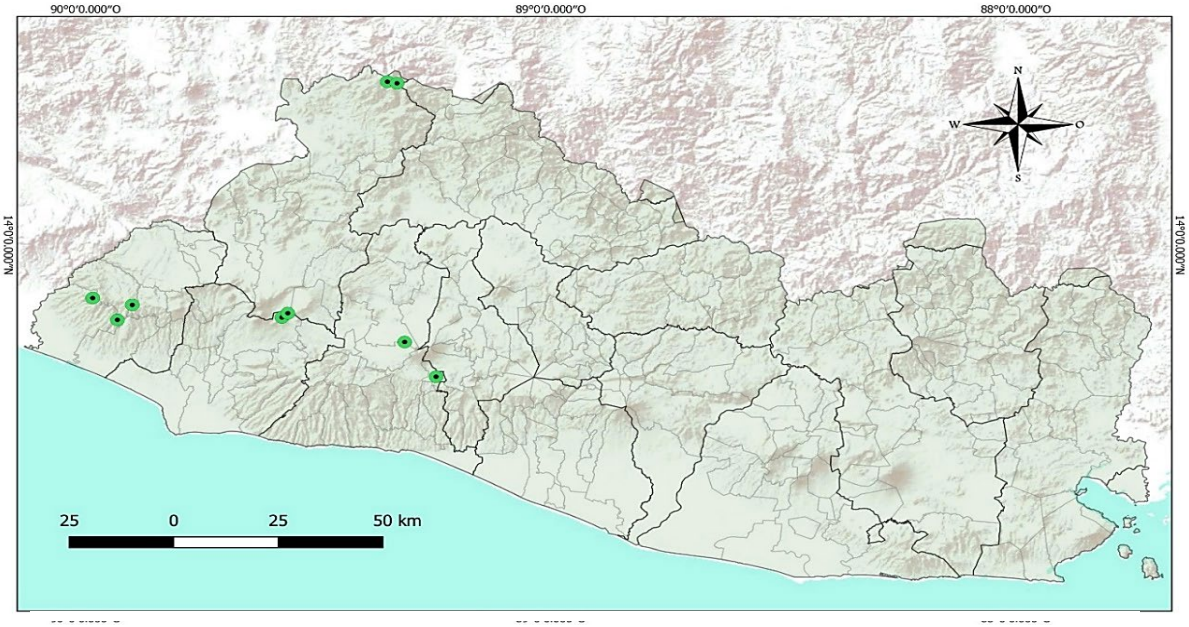
Phenology: For El Salvador, *Chamaedorea pinnatifrons* flowers in January, July and November; immature fruits occur in February, April, June and July, with ripe fruits in November and January, and some dry fruits persisting into April.

Distribution and Habitat: *Chamaedorea pinnatifrons* is distributed in western El Salvador in a variety of habitats. It occurs in steep, moist or wet situations on forest margins; primary forests; semi-deciduous forests; premontane forests; lower montane, tropical, semi-deciduous, broadleaf forests; and in disturbed forests and abandoned coffee plantations (MARN 2011) from 650 to 1893 m elevation.

Herbarium references: AHUACHAPÁN: Apaneca Mountain Range, 01-17-1922 to 01-19-1922, *Standley 20165* (NY); Parque Nacional El Imposible, 01-06-1990, *Sermeño 198* (LAGU, MO); 12-11-1990, *Berendsohn et al., 1360* (LAGU); 12-12-1990, *Berendsohn et al. 1371* (B, LAGU, MO); 07-30-1991, *Toledo 4* (B, K, LAGU); 11-21-1991, *Sandoval and Chinchilla 3* (LAGU); 11-27-1991, *Sandoval and Chinchilla 45* (LAGU); 11-25-1993, *Villacorta et al. 1296* (HBG, LAGU); 04-27-1998, *Sandoval 1847* (B, LAGU); 06-09-2023, *Rodríguez et al 9140* (LAGU); Tacuba, 07-12-2007, *Rodríguez et al. 849* (LAGU. SANTA ANA: Las Lajas Reserve, 06-22-2000, *Monro and Douglas 3459* (B, LAGU); Metapán, 04-16-2002, *Martínez 935* (B, LAGU); La Hondurona, 07-06-2007, *Menjívar and Morales 1415* (MHES). SONSONATE: near Rio Acachapa, 05-08-1942, *Tucker 1357* (K); Izalco, 04-12-2012, *Galán and Calderón 1314* (B, LAGU, MHES, MO); 04-12-2012, *Rodríguez and Guerrero 2837* (B, LAGU, MO). LA LIBERTAD: Antiguo Cuscatlán, 05-28-1986, *Flores 74* (B, LAGU, MO); San Juan Opico, 06-11-2012, *Galán and Carpio 1488* (B, LAGU, MO). CHALATENANGO: Citalá, La Encantada Private protected natural area, 02-17-2021, *Galán and Calderón 5508* (LAGU).

According to M. L. Reyna (pers. comm.), the plants reported in La Laguna Botanic Garden (*Flores 74*) were brought from Montecristo National Park.

7. *Chamaedorea pinnatrifrons*. **A**–**B**. Habit, leaves. **C**. Infructescence, fruit. © Fundación Enrique Figueroa Lemus



Map 6. Distribution of *Chamaedorea pinnatifrons*. ● Herbarium record; No photographic record.

Distribution for El Salvador (Map 6): Ahuachapán[H], Santa Ana[H], Sonsonate[H,] Chalatenango[H], La Libertad[H].

7. Chamaedorea tepejilote Liebm. ex Mart., Hist. Nat. Palm. 308. 1849.

= *Chamaedorea sphaerocarpa* Burret, in Notizbl. Bot. Gart. Berlin-Dahlem 11: 762. 1933.

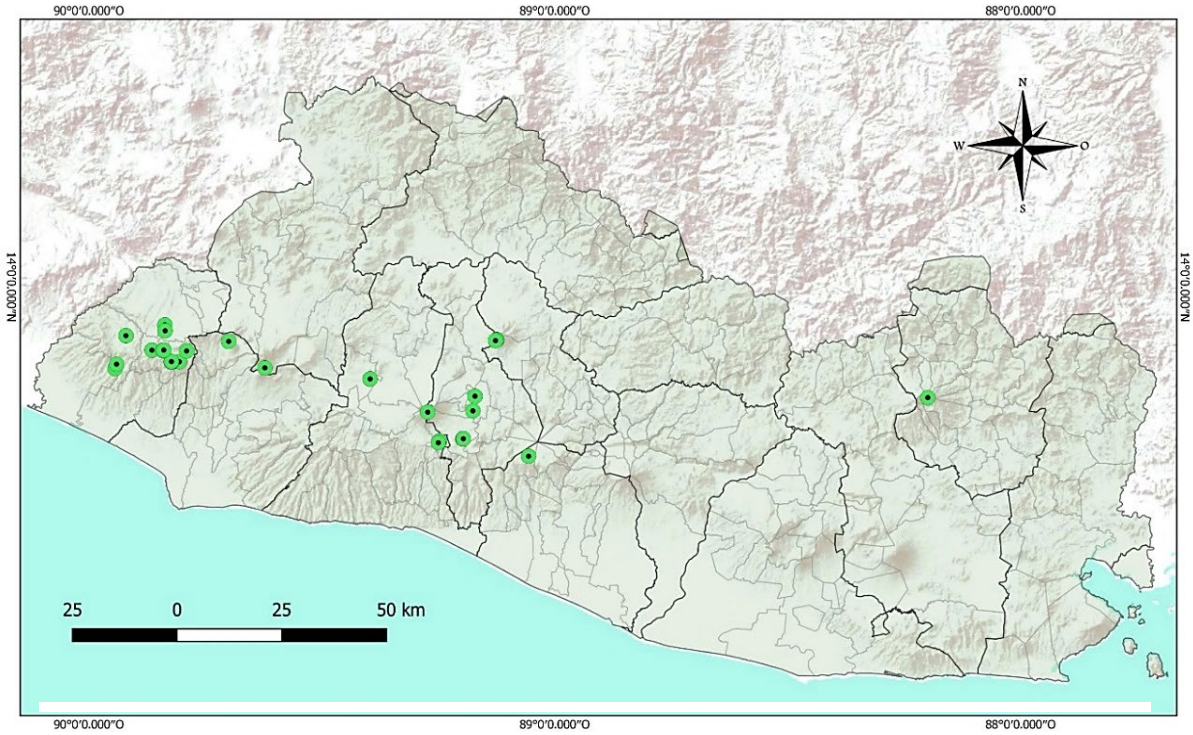
= *Chamaedorea wendlandiana* (Oerst.) Hemsl., in Biol. Cent.-Amer., Bot. 3: 407. 1885.

= *Stephanostachys wendlandiana* Oerst., in Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn 1858: 28. 1859.

Common or vernacular names: large *pacaya*, *pacaya.*

Description: Dioecious; stem solitary, to 4 m tall, Palmweb (2024) mentions that sometimes it is cespitose, erect, or decumbent, 2 to 7 m tall; stem 3.1 to 5 cm diam., green, ringed, prop roots prominent at the base; leaves 5 to 8, long-pinnate, 2.2 m long; petiole 16 to 42.5 cm long, a yellow band abaxially; rachis 92.5 to 110 cm long; 16 to 28 pairs of pinnae; inflorescences infrafoliar and erect-spreading, 53 cm to long, with 4 to 6 yellow-green bracts; peduncle 6 to 27 cm long; rachis 1 to 30 cm long, green to yellow in flower, red-orange in fruit; staminate and pistillate flowers yellow; fruiting rachillae orange; fruits to 20 mm long, 7 to 8 mm diam., ellipsoid to ovoid or nearly globose, green turning black. (**Fig. 8**).

8. *Chamaedorea tepejilote*. **A.** Habit, stem. **B.** Roots and stem base. **C**. Petioles. **D**. Immature fruits. © 2024 P. Galán.



Map 7. Distribution of *Chamaedorea tepejilote*. ● Herbarium record; No photographic record.

Phenology: *Chamaedorea tepejilote* flowers in January, February, March, October and December. It was found with immature fruits in January, February, March, June, October and December.

Distribution and habitat: According to Hodel (1992), *Chamaedorea tepejilote* is distributed from southern México through Central America and into Colombia in northern South America, mostly in moist forests. In El Salvador, it has been found in disturbed forests; submontane, broad-leaved, semi-deciduous, tropical forest; secondary forest; coffee plantations; home gardens; and parks; rarely in or near dry situations like lowland, broad-leaved, semi-deciduous tropical forest; 500 to 1,880 m elevation.

Herbarium references: AHUACHAPÁN: 1923, *Padilla 558* (US); Parque Nacional El Imposible, 10-17-2017, *Rodríguez et al. 6307* (LAGU); 10-31-2007, *Menjívar et al. 1640* (MHES); Ataco, 01-14-2022, *Cerén et al., 5067-5071* (MHES, MEXU); 02-10-2022, *Cerén 5072* (MHES, MEXU); 11-04-2023*, Galán et al. 6503* (TECLA); Ahuachapán, 03-02-2022, *Cerén 5160, 5161* (MHES, MEXU); Apaneca, 01-14-2022, *Cerén et al. 5062, 5063, 5064, 5065, 5066* (MHES, MEXU). SONSONATE: Cerro El Águila, 05-21-2003, *Rodríguez and Cerén s.n*. (LAGU). LA LIBERTAD: Antiguo Cuscatlán, 06-06-1989, *Berendsohn and Martínez 1302* (K, LAGU); 04-12-2019, *Galán 5210* (LAGU, MO, NY); Santa Tecla, 03-14-2022, *Cerén and Menjívar 5165* (MHES, MEXU); Ciudad Arce, 08-31-2023,

Galán 6342 (TECLA). SAN SALVADOR: 1922, *Calderón 580* (US); near San Salvador, 12-20-1921, *Standley 19388* (NY, US); 03-30-1922 to 04-24-1922, *Standley 23622* (US); Tonacatepeque, 12-30-1921, *Standley 19494* (US); 12-31-1921, *Calderón 246* (US); Lake Ilopango, 02-03-1998, *Sidwell et al. 599* (B, BM, ITIC, LAGU, MO); Guazapa, 10-05-2021, *Cerén et al. 5007-5009* (MHES, MEXU); Ciudad Delgado, 12-21-2021, *Cerén 5057* (MHES, MEXU); Cuscatancingo, 02-11-2022, *Cerén 5073, 5078* (MHES, MEXU); Saburo Hirao Park, 02-15-2022, *Cerén 5074-5077* (MHES, MEXU). MORAZÁN: Chilanga, 01-23-2014, *Rodríguez and Pineda 4571* (LAGU).

Distribution for El Salvador (Map 7): Ahuachapán[H], Sonsonate[H] , La Libertad[H], San Salvador[H], La Paz[H], Morazán[H].

8. Sabal mexicana Mart., Hist. Nat. Palm. 246. 1838.

≡ *Inodes mexicana* (Mart.) Standl. in Contr. U.S. Natl. Herb. 13: 71. 1920.

= *Sabal guatemalensis* Becc. in Webbia 2: 68. 1907.

Common or vernacular names: hat palm, palm, savanna palm (Allen 1959).

Description: Monoecious; unarmed; stem solitary, to 12 m tall, rarely to 20 meters tall (Read et al 2001), to 35 cm diam., typically covered with persistent leaf bases and broken petioles; leaves palmate, costapalmate, to 3 m long including the petiole; inflorescence ca. equaling the leaves in length, highly branched, the axes mostly covered by sheathing bracts (Read et al 2001); flowers sessile and solitary, whitish to yellowish; fruits 11–20 mm in diameter, spherical, oblate or subpyriform, becoming black (**Fig. 9**).

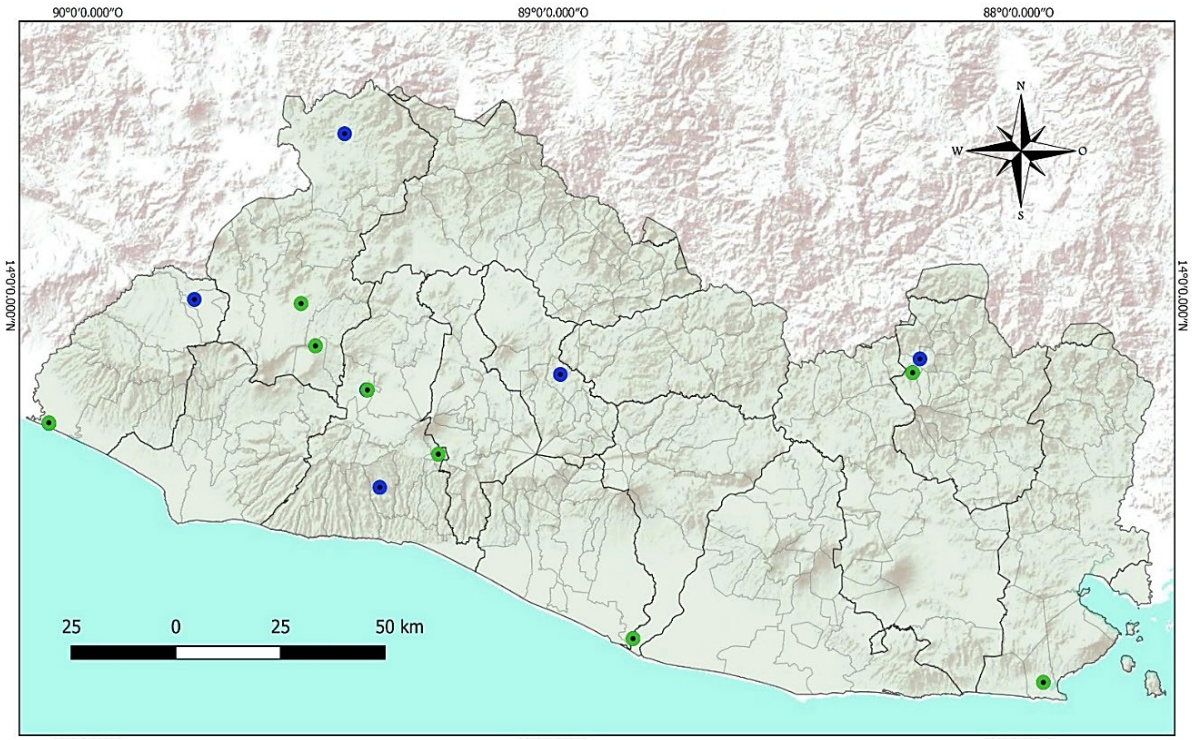
Phenology: *Sabal mexicana* flowers from December to January and in July; it has green immature fruits in July and December and black, ripe fruits in December.

Distribution and habitat: *Sabal mexicana* occurs in southern Texas in the United States, throughout México, Guatemala, and El Salvador. In the latter country, it is typically found in dry forest and disturbed forest, in corn fields, along roadsides, in open areas crops at the roadside with several palms of different sizes around, and in open areas to 881 m elevation. Companion trees include *Cedrela odorata*, *Cordia alliodora*, *Crescentia alata*, and *Enterolobium cyclocarpum*.

Henderson et al. (1995) and Zona (1990) considered *Sabal guatemalensis* to be a distinct species.

Herbarium references: AHUACHAPÁN: San Francisco Menéndez, 12-15-2009, *Monterrosa et al. 1908* (LAGU); Garita Palmera, 07-08-2015, *Cerén et al. 3643* (FT, ITIC, LAGU, MEXU, MHES). SANTA ANA: Santa Ana, 12-07-2019, *Galán and Olmedo 5212* (LAGU, MO, NY, WU); El Congo, 07-09-2022, *Galán et al. 6072* (B, LAGU, MHES, MO, WU). LA LIBERTAD: Antiguo Cuscatlán, 01-13-2020, *Galán and Ramírez 5229* (B, LAGU, MHES, MO, NY, WU); Ciudad Arce, 02-20-2024, *Galán*

9. *Sabal mexicana*. **A**. Habit. **B.** Stem with cut petioles. **C**. Inflorescence. **D**. Immature fruits. © 2024 J. L. Olmedo and P. Galán.



Map 8. Distribution of *Sabal mexicana*. Herbarium record; Photographic record.

et al. 6652 (MHES, TECLA). SAN SALVADOR: San Salvador, 11-1921, *Calderón 252* (US). SAN VICENTE: Coastal plain near Estero de Jaltepeque, 08-21-1958, *Allen 6897* (NY, US)]. MORAZÁN: San Simón, 12-27-2008, *Galán et al. 484* (ITIC)]. LA UNIÓN. Conchagua, 05-05-2022, *Sagastizado s.n.* (LAGU).

Observations and Photographic records: AHUACHAPÁN. Atiquizaya, El Jícaro, 04-03-2023. SANTA ANA. Metapán, road to Guatemala, 09-28-2022. LA LIBERTAD. Comasagua, street to El Peñón, 12-18-2022. CUSCATLAN. Tenancingo, main street, 06-14-2008. MORAZAN. El Rosario, central park, 08-06-2008.

Distribution for El Salvador (Map 8): Ahuachapán[A,H], Santa Ana[A,H], La Libertad[A,H], Cuscatlán[A], San Vicente[H], Morazán[A,H], La Unión[H].

Ecological Reports

Here we list and discuss ecological reports of the indigenous palms of El Salvador. We include photographs of some species in their natural environment (**Fig. 10**).

Flores (1980), described a plant community called “palm grove,” which was made up of species such as *Acrocomia aculeata* (as *A. vinifera*), *Brahea salvadorensis* (as *B. dulcis*), and *Bactris major*

10. A. *Acrocomia aculeata*, pastures at roadside, San Juan Opico, La Libertad. **B**. *Chamaedorea costaricana*, submontane forest, Cerro Cacahuatique, Morazán. **C**. *Bactris major*, riverbank, Huizúcar, La Libertad. **D**. *Sabal mexicana*, crop fields, El Congo, Santa Ana. **E**. *Chamaedorea tepejilote*, forested area, La Laguna Botanical Garden, La Libertad. **F**. *Chamaedorea nubium*, cloud forest, Parque Nacional Montecristo, Santa Ana. © 2024 P. Galán.

(as *B*. *subglobosa*), which tend naturally to inhabit the margins of mangroves or, further inland, coastal plains and deciduous dry forest. At that time, the most extensive palm groves were located on the margins of the Gulf of Fonseca, Jiquilisco Bay, Jaltepeque Estuary, El Pimental Beach, and Barra de Santiago, where communities of hat palm previously dominated but which are currently quite reduced. However, Flores misidentified the hat palm as *B. salvadorensis* when it was actually *Sabal mexicana.*

Witsberger et al. (1982) reported that the understory palm *Bactris major*, *huizcoyol*, was frequent in the undergrowth at Walter T. Deininger Park.

Berendsohn (1991), in a study of the tree vegetation of the Laderas de la Laguna Forest, reported on the non-arboreal vegetation, highlighting the presence of *Chamaedorea tepejilote* as the most important shrub species.

Reyna de Aguilar (1993) worked on the ecological biodiversity in the Barra de Santiago and El Imposible Basin and reported *Acrocomia aculeata* (as *A. vinifera*), *Bactris major*, *Chamaedorea tepejilote*, *Chamaedorea* sp., and the introduced *Cocos nucifera* at Parque Nacional El Imposible. She reported *A. aculeata*, *B. major*, *C. nucifera* and *Sabal mexicana* in the Barra de Santiago and Santa Rita region. She also noted that *A. aculeata* occurred in dry parts of the coastal zone and lower part of Parque Nacional El Imposible; *B. major* was in flooded areas and near bodies of water, mainly in the Santa Rita Forest; *C. nucifera* was extensively cultivated along beaches; and *S. mexicana* formed "palm vegetation" on the coastal plain.

Rivera Hernández and Aparicio Guzmán (1998) in a vegetation study in the El Amatal Natural Reserve in La Libertad, reported the presence of *Bactris major* (as *B. subglobosa*).

Lagos (1999), in his *Common Trees of El Salvador*, reported that two indigenous species, *Brahea salvadorensis* (as *Erythea salvadorensis*) and *Sabal mexicana*, inhabited coastal areas along with two introduced, cultivated species, *Cocos nucifera* and *Attalea cohune* (as *Orbignya cohune*).

Villacorta Hernández (2001), reported *Bactris major* within the shrub stratum on the banks of Laguna El Jocotal and in surrounding areas in the department of San Miguel.

Monro et al. (2001) reported *Acrocomia aculeata*, *Brahea salvadorensis* (as *B. dulcis*), and *Chamaedorea tepejilote* as shade trees in coffee plantations in El Salvador:

Ramírez-Sosa et al. (2002) in a floristic study at El Amatal mixed forest, La Libertad, reported *Bactris major* as one of the three most prominent species in the forest (47% of the total counted individuals), noting its clustering habit.

Ramírez-Sosa (2003) described some representative plants in different vegetative strata of Parque Nacional El Imposible, noting the presence of two introduced species, *Attalea cohune* and *Cocos nucifera*, the latter with many uses, and three indigenous species, *Bactris major*, *Chamaedorea pinnatifrons,* and *C. tepejilote*.

Conservation Status of El Salvador's Indigenous Palms

According to the official list of threatened or endangered species (MARN 2023), four species are reported to be at risk at the national level, including three endangered and one threatened (the

introduced *Attalea cohune* [as *Orbignya* cohune] was included). In contrast, the IUCN lists one species, *Brahea salvadorensis*, as critically endangered (**Table 3**). The primary threats to indigenous palms in El Salvador are habitat disturbance and loss, which has several causes, including clearing of land for farming and ranching, fire, and urban encroachment, and global warming and its attendant consequences, including excessively high temperatures, increasing aridification, and excessive or inadequate precipitation.

Table 3. Species presenting some conservation status at the national and international levels. A: Threatened with Extinction; CR: Critically Endangered; EP: Endangered.

Species	MARN	CITES	IUCN
Acrocomia aculeata	EP	-	-
Brahea salvadorensis	EP	-	CR
Sabal mexicana	A	-	-

Ethnobotany

The Arecaceae is one of the most ethnobotanically and economically important families in tropical regions, providing a wide variety of products, including stems, fruits, seeds, and apical meristems for food; leaves for thatch and fiber; stems for wood for construction; leaf petioles and inflorescences (bracts) for tools and household items; and many parts of the palms for cultural and religious ceremonies. *Calamus* spp. (rattan), *Cocos nucifera* (coconut), *Elaeis guineensis* (oil), and *Phoenix dactylifera* (date) are among the most globally recognized palm species for their ethnobotanical and economic products. In the Latin American region, *Bactris gasipaes*, *Brahea dulcis*, *Euterpe precatoria*, and *Mauritia flexuosa* are among the most ethnobotanically important palms (Sander et al. 2023).

We reviewed some uses and traditional knowledge of El Salvador's indigenous palms. Flores (1980) noted that mature fruits of *Acrocomia aculeata* serve as livestock feed and imparted a better flavor and aroma to milk. Catholic rituals use flowers and floral buds during Holy Week; flowers are used as aromatic ornaments, buds are braided to make small crosses that are placed on the doors of the houses on "Palm Sunday" at the beginning of Holy Week. Fruits are consumed fresh, prepared in honey, and in some places used to make an artisanal wine.

González Ayala (1993), in an ethnobotanical study on the Day of the Cross in El Salvador, reported three species of palms used to decorate the cross with their flowers and/or fruits, including the indigenous *Acrocomia aculeata* (flowers) and *Bactris major* (fruits) (**Fig. 11**), and the cultivated *Cocos nucifera* (fruits).

11. A. Marketing of *Bactris major* "coyol" fruits in San Salvador, for decorations on "Day of the Cross." **B**. Women and children making brooms from *Sabal mexicana* palm leaves in Tenancingo, Cuscatlán. **C**. Inflorescences of *Chamaedorea tepejilote* ("*pacaya*") sold in Santa Ana city. © 2024 A: Y. Ruiz; B: P. Galán; C: E. Jaco.

Cerén López et al. (2009), mentioned that grilled young stems and meristems from *Chamaedorea pinnatifrons* are consumed in some locations of Ahuachapán department in El Salvador.

Echeverría et al. (2009) reported *Bactris major* as a wild, edible plant, noting that it is frequent in very humid forests and in open areas around streams and rivers.

Menjívar et al. (2009), mentioned that immature staminate inflorescences of *Chamaedorea tepejilote*, grilled or wrapped in egg with tomato sauce, are consumed in El Salvador; the latter prepared version is most popular.

Galán and Vicente (2011) reported *Brahea salvadorensis* as a source of fiber used in the municipalities of Nahuizalco in Sonsonate, Tenancingo in Cuscatlán, and El Rosario and San Simón in Morazán. In Tenancingo the fibers came from palms occurring in San Luis La Herradura, La Paz. However, because *B. salvadorensis* is only known from Volcán Conchagua in La Unión, we conclude that the source of the fiber is actually *Sabal mexicana* (*Galán and Vicente 484* [ITIC, MHES]) (**Fig. 11**).

Rivera Ayala and Flores Martínez (2016), in an ethnobotanical study conducted in Las Pilas canton, San Ignacio, Chalatenango, reported that *Chamaedorea pinnatifrons* and *C. tepejilote* were used for food; similarly, the introduced *Cocos nucifera* was also used for food.

Probably, after *Cocos nucifera*, *Chamaedorea tepejilote* is the most used edible palm in El Salvador, its nearly mature, unopened staminate inflorescences, resembling ears of corn, are consumed cooked in different dishes, as well as raw or pickled (**Fig. 11**).

Palms Erroneously Considered Indigenous to El Salvador

Here we note species with dubious presence or reports for El Salvador, whether due to lack of herbarium material, insufficient information, issues with geographical distribution, or for being considered synonyms in recent revisions or interpretations. **Table 4** summarizes these species and reports.

Astrocaryum mexicanum Liebm. ex Mart., Hist. Nat. Palm. 323. 1853.

Berendsohn (1993) cites *Tucker s.n.* (material from 01/28/1942) at US, which is in the database as *Tucker 845* and de Nevers determined in 1997 as *Bactris major*; strangely, in the database at NY, a duplicate of *Tucker 845* exists that de Nevers determined as *Astrocaryum mexicanum*. Nonetheless, Henderson in 1997 determined it as *B. major* var. *major*. Quero Rico (1994) mentioned that *A. mexicanum* occurred from México (Veracruz, Oaxaca, Tabasco, Chiapas) to Belize, Guatemala, and Honduras in moist and wet forests from 100 to 500 m elevation. In POWO (2024), *A. mexicanum* is still considered an indigenous species of El Salvador.

Attalea cohune Mart., Voy. Amér. Mér. 7(3): 121. 1844.

≡ *Orbignya cohune* (Mart.) Dahlgren ex Standl. in Trop. Woods 30: 3. 1932.

Common or vernacular names: *cohune, corozo*.

Standley and Calderón (1941), noted that *Attalea cohune* (as *Orbignya cohune*) was cultivated in various sites in El Salvador and that it naturally occurred in the western coastal zone of México and the northern coast of Central America. Berendsohn (1993) included it as an indigenous

Table 4. Palms erroneously considered indigenous to El Salvador.

Species	Dahlgren, 1936	Standley and Calderón, 1941	Guzmán, 1947	Allen, 1959	Glassman, 1972	Berendsohn et al., 1993	Henderson et al., 1995	Linares, 2003	Berendsohn et al., 2012	POWO, 2024	Galán et al., 2024
Astrocaryum mexicanum						**	**		**	**	**
Attalea cohune (*Orbignya cohune*)	**	**	**	**	(**)	**	**	**	**	**	**
Bactris gasipaes							**				**
Brahea dulcis							**		**	**	**
Chamaedorea brachypoda					**	**					**
Chamaedorea graminifolia	**	**		**		**					**
Chamaedorea schiedeana	**	**		**							**
Desmoncus chinantlensis										**	**
Desmoncus orthacanthos							**				**

species of El Salvador. Linares (2003) noted that it was found near Garita Palmera in Ahuachapán, but without herbarium specimens. Berendsohn et al. (2012) suggested it was distributed from southern México to Nicaragua and Colombia, including El Salvador, and that it was also cultivated in El Salvador. In the most recent monograph of the genus, Henderson (2020) indicated it occurred from México, to Guatemala, Belize, Honduras and Colombia, but was absent in El Salvador. POWO (2024) noted that it is indigenous to México, Belize, Guatemala, Honduras, Colombia, and El Salvador.

Thus, according to these reports, we consider it a non-indigenous species to El Salvador but one that has been cultivated sporadically primarily in Ahuachapán for many decades. The Ministry of Environment and Natural Resources listed it as an endangered species in 2023 (MARN 2023).

Herbarium references: SAN SALVADOR: 1963, *Calderón 1636* (NY).

Observations and Photographic Records: AHUACHAPÁN. Parque Nacional El Imposible, 08-22-2019; Ahuachapán-Tacuba highway, 04-08-2024. SANTA ANA. Chalchuapa, road to the mud springs, 03-07-2023.

Bactris gasipaes Kunth, en Humb. et al., Nov. gen. sp. Quarto ed. 1: 302, Folio ed. 1: 242. 1816.

= *Guilielma utilis* Oerst.

All reports of this species in El Salvador and surrounding countries noted that it was cultivated (Allen 1959, Grayum 2003, Henderson et al. 1995, Linares 2003).

Brahea dulcis (Kunth) Mart., Hist. Nat. Palm. 3(7): 244. 1838.

≡ *Corypha dulcis* Kunth, Nov. Gen. Sp. [H.B.K.] 1: 300. 1816.

Henderson et. al. (1995) and Read et al. (2001) considered *Brahea salvadorensis as a synonym of B. dulcis*, which accounts for the latter name being listed for El Salvador.

Chamaedorea geonomiformis Standl. and Steyerm. Publ. Field Mus. Nat. Hist., Bot. Ser. 23: 198 1947.

Chamaedorea geonomiformis was reported for El Salvador based on material of *Molina R. 16899* at US, but Hodel (1992) determined duplicates of this collection at NY as *C. nubium*.

Chamaedorea graminifolia H. Wendl., Index Palm. 62. 1854.

Chamaedorea graminifolia has had a lengthy and somewhat tortuous history. It remained poorly known for nearly 150 years until Hodel (1992) placed *C. schippii*, a much better known species with clustered stems and long-pinnate leaves from Guatemala, Belize, and perhaps southern México, in synonymy with it, making *C. graminifolia* a clustered-stemmed species with long pinnate leaves from México to Nicaragua. However, about 10 years later, Grayum (2003), working off the recent discovery in eastern Costa Rica of material with solitary a stem he considered to be the true *C. graminifolia*, resurrected *C. schippii* from synonymy, making *C. graminifolia* a solitary-stemmed species with long-pinnate leaves from Costa Rica and Nicaragua. Unfortunately, and despite Grayum's work, the die had already been cast that *C. graminifolia* was a clustered-stem, long-pinnate-leaved species, and subsequent floral accounts often listed any clustered *Chamaedorea* with long-pinnae leaves from Nicaragua northwards erroneously as *C. graminifolia*. Thus, reports of *C. graminifolia* from El Salvador, including Berendsohn (1993), Lamer and Linares (2010), and POWO (2024) are erroneous and typically represent *C. costaricana*.

Later Berendsohn et al. (2012) excluded *Chamaedorea graminifolia* from El Salvador because it occurs on the Caribbean slope in Central America. Grayum (2003) and Read et al. reported it as indigenous to Nicaragua and Costa Rica on the Atlantic slope.

Sandoval 1257 a B and LAGU and *Rodríguez et al. 848* at LAGU contain scant material and information, and are likely not *Chamaedorea graminifolia*.

Chamaedorea elegans Mart. Linnaea 5: 204–205. 1830.

The natural distribution of *Chamaedorea elegans* is from México to Belize, Guatemala, and Honduras (Hodel 1992, Henderson et al. 1995, POWO 2024). Quero Rico (1994) is the only report of this species for El Salvador and it was without herbarium material or locality.

Chamaedorea schiedeana Mart. Linnaea 5: 204. 1830.

Hodel (1992) and Henderson et al. (1995) noted that *Chamaedorea schiedeana* was endemic to México. Material and reports listing it from El Salvador (Quero Rico 1994) are probably referring to *C. pinnatifrons*. POWO (2024) and TROPICOS (2024) note that it is endemic to México.

Specimens of *Padilla 40* and *Standley 20165* and *20208* at US are identified as *Chamaedorea schiedeana* but lack updated determinations and images for review.

Desmoncus chinantlensis Liebm. ex Mart. Hist. Nat. Palm. 3: 321. 1853.

In the most recent monograph of *Desmoncus* (Henderson 2011), no members of this genus are listed for El Salvador although *D. chinantlensis* occurs in surrounding countries, which probably gave rise to assumptions and reports that it must then occur in El Salvador, too.

Palm Web (2024) lists *Desmoncus chinantlensis* from southern México to Nicaragua, but not for El Salvador while POWO (2024) reports it is indigenous from southern México to Nicaragua including El Salvador. Tropicos (2024) still lists *D. chinantlensis* as a synonym of *D. orthacanthos*, which is contrary to Henderson (2011).

Desmoncus orthacanthos Mart. Hist. Nat. Palm. 2: 87. 1824.

Henderson et al. (1995) reported *Desmoncus orthacanthos* to be indigenous from México to Central America (from Atlantic slope) (including El Salvador), South America, and Trinidad and Tobago. However, in his later monograph of the genus, Henderson (2011) listed this species as restricted to the Atlantic rain forest of southeastern Brazil, referring the other reports of it in México and Central America to *D. chinantlensis*, which does not occur in El Salvador.

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Pablo Galán is a biologist and Curator of TECLA Herbarium and an independent researcher. pgogalan@gmail.com https://orcid.org/0000-0002-7037-7853

Celio E. Moya López is an independent researcher specializing in the palm biology of Cuban and Caribbean palms. celio.moya@gmail.com https://orcid.org/0000-0002-5033-483X

Yader Sageth Ruiz Cruz is a biologist, M in C, Teacher in University of El Salvador, Eastern Multidisciplinary Faculty; Fundación Naturaleza El Salvador, San Salvador,El Salvador. yadersa@gmail.com https://orcid.org/0000-0003-4252-0488

Aarón Villacorta is a biologist with a Bachelor of Biology. aarovillacorta@gmail.com https://orcid.org/0000-0003-4374-4272

Beverlyng Herrera de Turcios is the Coordinator of the Bachelor's Degree in Modern Languages, specializing in French and English, University of El Salvador, Eastern Multidisciplinary Faculty. beverlyng.herrera@ues.edu.sv

Samael Carrillo Moreno is a biologist, University of El Salvador, Eastern Multidisciplinary Faculty. Angelsamael52@gmail.com https://orcid.org/0009-0004-1612-3379

Author Contributions:
Pablo Galán—Initial idea, writing, field research, bibliographical research, photographs, English editing in corrections.
Celio Moya—Bibliographical research, writing, taxonomic key.
Yader Ruiz—Field research, bibliographical research, writing, photographs.
Beverlyng Herrera—English translation.
Aarón Villacorta—Maps.
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