

Acanthophoenix in Réunion, Mascarene Islands

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1. Old plantation of *Acanthophoenix rubra* at Anse des Cascades (alt. 5 m).

The islands of Réunion, Mauritius and Rodriguez constitute the Mascarene archipelago. The island of Réunion, or La Réunion in French, is the largest and the youngest of the group, at only three million years old, with an active shield volcano named Piton de la Fournaise. It is home to two known species of *Acanthophoenix* and a third species, *A. rousselii*, described herein.



2. A wild population of *Acanthophoenix crinita* in Hauts de Bois Blanc; from late morning the fog sets up and maintains high humidity. (Photo by Nicolas Talibert)

Uninhabited when the first French settlers landed in 1642, Réunion was mainly covered by tropical rain forest on the windward side and semi-dry ecosystems on the leeward side. More than 350 years later, the native vegetation has been thoroughly disturbed by human and agricultural pressure. Deforestation has made space for farming and human establishment, so that some of the endemic species, including palms, once abundant are nowadays endangered, at least in the wild.

By the end of the nineteenth century, on the other hand, at a time when palm populations were much more abundant than nowadays, Jacob de Cordemoy recognized two distinct species of *Acanthophoenix* in his *Flore de La Réunion*: *Acanthophoenix rubra* or *palmiste rouge* (Fig. 1) in the lowlands of the windward side (southeast and east coasts) and *Acanthophoenix crinita* or *palmiste noir* (Fig. 2), occurring at 800–1800 m, in the mountainous back country.

In *Flore des Mascareignes*, Moore and Guého (1980) treated *Acanthophoenix* as a monotypic genus with *Acanthophoenix rubra* its sole species. Endemic to Réunion and Mauritius, *A. rubra* was regarded as an extremely variable species and rare in the wild in Mauritius. Moore and Guého (1980) claimed that this species is still well represented in Réunion by

some wild populations in remote locations and also in palm groves, especially in the sections of Saint-Philippe and Bois Blanc. Although they reported some differences between lowland and highland populations, they stated that there was “no real discontinuity” among the *Acanthophoenix* populations. This conclusion was formulated after their visit to a few sites, including the ONF (National Forest Service) nursery in Basse Vallée (alt. 610 m) and the René Huet plantation in La Crête (alt. 630 m). The Huet plantation was started in 1961 with both *Acanthophoenix rubra* and *A. crinita*. Forty years later, most of the palms are hybridized, which was probably already true by the time of Moore and Guého’s visit. No doubt it has led to confusion in the taxonomy of *Acanthophoenix*.

Observations conducted in the field and examination of flowers and seeds lead the present author to conclude that there are three species of *Acanthophoenix*, with differences in vegetative feature, inflorescences, fruits, seeds, seedlings and young plants. In addition to the previously recognized *A. rubra* and *A. crinita*, a third species should be recognized. This *palmiste*, which is herein described as *A. rousselii* (Front Cover), is a close relative of *A. rubra* and occurs, at present, only on the Roussel family estate at Trois-Mares, at 600–850 m elevation. It was pointed out by Thérésien



3. *Acanthophoenix rubra*: stem base shaped like an elephant's foot on an old specimen at Anse des Cascades.

Cadet some 30 years ago, but with his untimely death this third species of *Acanthophoenix* was forgotten for decades.

Taxonomic Account

Acanthophoenix H. Wendl., Ann. Gén. Hort. 6: 181. 1866.

A genus of three species endemic to the Mascarene Islands.

1. *Acanthophoenix rubra* (Bory) H. Wendl., Fl. Serres Jard. Paris 2(6): 181. 1866.

2. *Acanthophoenix crinita* (Bory) H. Wendl., Ann. Gén. Hort. 6: 181. 1866.

3. *Acanthophoenix rousselii* Ludwig, *sp. nov.*, a *A. rubra* staminibus plerumque 9 vice 11 vel plus, fructu curvato vice ellipsoideo differt, a *A. crinita* staminibus 9 vice 6, fructu multo majore et eophyllo pinnato vice bifido differt. Type: Réunion. Roussel Estate, Trois Mares, Le Tampon, on the side of a field path, alt. 610 m, 20 Apr 2006, N. Ludwig 974-1. (Holotype: REU; isotypes: K, P)

Solitary pleoanthic monoecious palm with erect trunk to 15–25 m tall and 20–30 cm

diam., surface light gray, rather smooth, only slightly marked with leaf scars; trunk base swollen in a characteristic “elephant foot.” Leaves pinnate, 15–20 in crown; crownshaft conspicuous, sheaths 90–120 cm long, 45 cm wide at the base, up to 6 mm thick, abaxially dark brown, covered with dense fur-like black hair 6–8 mm long, except on half length median axis where glabrous; petiole and rachis 2.50–3 m long, glabrous or with a fine indument abaxially in the distal part; leaflets 70–80 pairs, pendulous and regularly attached on both edges of the rachis, leaflet tip acute, olive green color on both surface, leaflet midrib adaxially armed with thin reddish-brown bristles 2–4 cm long, thin flexuous dot-like scales on abaxial side of midrib. Inflorescences infrafoliar, first enclosed in a tough unarmed brown prophyll; inflorescences ivory-colored, pendulous, 100–110 cm long, branching to 2 orders with 50–70 rachillae; peduncle base enlarged in a crescent shape where attached to the trunk; peduncle and rachis armed with strong sinuous black spines 2–3 cm long; rachillae bearing densely arranged triads of flowers, two staminate flowers flanking one pistillate flower, all sessile

opposite page

4 (upper left). *Acanthophoenix rubra*: this five or six year old specimen shows leaf sheaths armed with strong black spines. 5 (upper right). *Acanthophoenix rubra*: the leaf sheaths become unarmed on specimens aged eight or nine years and older. 6 (lower left). *Acanthophoenix rousselii*: close up of a leaf sheath covered by dense fur-like hair. 7 (lower right). *Acanthophoenix crinita*: swollen leaf sheath with stiff bristles inserted on verrucose base.





8 (above) *Acanthophoenix crinita*: close-up of leaf sheath showing stiff bristles resembling tenrec fur.
9 (below). *Acanthophoenix crinita*: spathe opening on young inflorescence on the right and infructescence on the left.

and glabrous. Staminate flowers 12×12 mm, ivory white turning to light yellow except pistillode and basal part of filaments pink-colored; sepals 3, narrow triangular with acute tip, 1.5 mm long; petals 3, elliptic, valvate, 7×3 mm; stamens 9 (sometimes 8) with white sagittate anthers 3–4 mm long and coiled filaments 8 mm long; pistillode 2–3 mm with trifold tip. Pistillate flowers ivory-white, globose to subspherical, slightly asymmetrical, smaller than staminate flowers 4.5×3 –4 mm; sepals and petals similar, membranous, imbricate. Mature fruit black with persistent beige or light brown perianth, ellipsoidal and slightly curved, 15 – 20×8 mm; mesocarp thin, dark purple; endosperm homogenous, embryo basal.

This species has a limited distribution within the town limits of Le Tampon. It grows in Trois Mares at an altitude of 600–850 m, in remnants of a transitional lowland forest ecosystem specific to the leeward side of the island.

Etymology: The specific epithet honors the Roussel family who owns the 202 hectare (500 acre) property where the species was first identified.

Morphology

Stems.

All *Acanthophoenix* palms are single-stemmed palms with the characteristic “elephant foot”





10 (above). *Acanthophoenix rubra* immature infructescence broken off by a gust of wind at Anse des Cascades. 11 (below). *Acanthophoenix crinita*: rachilla section with staminate flowers and pear-shaped pistillate flowers ($\times 4.5$). (Photo by Marc Gérard and Nicole Ludwig)

base (Fig. 3). The older the specimen, the more swollen the stem base; although it appears that the swelling is more accentuated in *Acanthophoenix rubra*. This characteristic allows for a larger root system to be in contact with the ground and may give more stability to the palm, an adaptation that may help it to resist cyclone-force winds.

The stems of *Acanthophoenix rubra* and *A. crinita* show circular leaf scars along almost their entire height but more distinctly toward the crown. Narrow cracks perpendicular to leaf scars are visible except in the upper portion where intervals between scars are smooth. Another distinctive feature of *A. crinita* worth mentioning is that the leaf scars are often subtended with a row of short spines. The leaf scars of *Acanthophoenix rousselii* are less distinct and longitudinal cracks not frequent, so that the stem looks quite smooth.

Acanthophoenix crinita grows very slowly, and a 40-year old specimen was found on René Huet's property at La Crête with a stem only 2.3 m high. Another the same age reached 3 m, not including the leaves.

Leaves

Leaf sheaths at the stem apex form a crownshaft with variable appearance. In *Acanthophoenix rubra* the crownshaft is tubular or slightly swollen, reddish-brown. Young specimens, less than eight or nine years old (Fig. 4), have sheaths armed with strong,





12. Rachilla of *Acanthophoenix rousseii*: with colorful staminate flowers and sub-globose pistillate flowers ($\times 5$). (Photo by Marc Gérard and Nicole Ludwig)

straight, black spines up to 10–12 cm long inserted on a swollen base. On older palms, the sheaths become unarmed and as smooth as velvet (Fig. 5). Leaf sheaths of *Acanthophoenix rousseii* are dark brown, densely covered with short soft hair (Fig. 6). The crownshaft of *Acanthophoenix crinita* often looks swollen (Fig. 7), with the outer sheaths pushed out by young inflorescences; sheaths are brown or light brown and covered with stiff hairs reminiscent of “tangué” (tenrec) fur (*Tanrec ecaudatus*) (Fig. 8).

The leaves are pinnate with 40–60 pairs of leaflets, which are acute, pendulous and regularly arranged on both sides of the rachis. The petiole is short with a flat adaxial side and a convex abaxial side. It becomes unarmed on adult or sub-adult palms, though in *Acanthophoenix crinita* there may be some persistent lateral bristles. In this species, the petioles and rachis are covered with a fine waxy indument that can be rubbed away easily. The petioles and rachis of *A. rubra* and *A. rousseii* are glabrous. In the three species the

13. Staminate flower of *Acanthophoenix rousseii*. Watercolor painting by Deborah Roubane.



leaflet midrib is adaxially armed with thin reddish-brown bristles and bears small dot-like scales on abaxial side.

Inflorescences

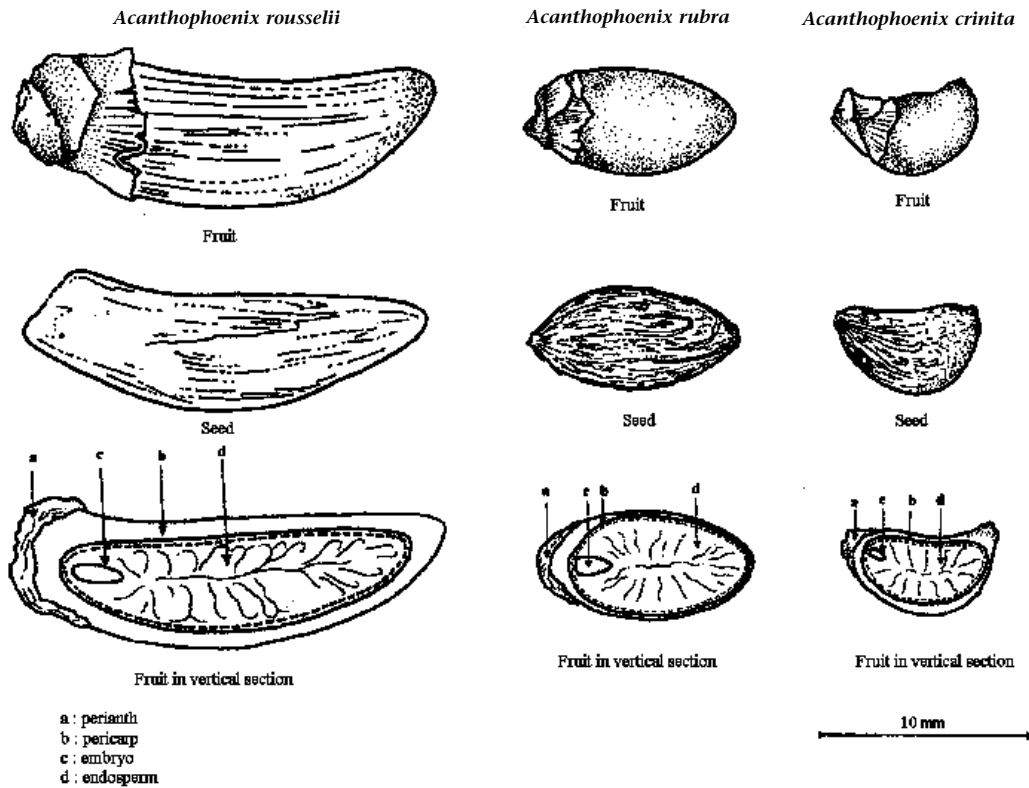
The inflorescences are infrafoliar, at first completely enclosed in a tough, unarmed prophyll, green with reddish traces in *A. rubra*, brown in *A. rousseii* and dark brown in *A. crinita* (Fig. 9). The ivory-colored inflorescences are long, pendulous, branching to two orders with 25–70 rachillae. The peduncle base is enlarged into a crescent shape where it clasps the stem. The peduncle and rachis are armed

with strong black spines, straight in *A. rubra* (6–8 cm long) (Fig. 10), shorter and curved in *A. rousseii* and *A. crinita* (2–3 cm long), with spine length decreasing toward the apex of the rachis.

The rachillae bear densely arranged triads of flowers, two staminate flowers flanking one pistillate flower. Staminate flowers have three short triangular sepals and three elliptic, valvate and ivory white petals that are sometimes orange spotted. Stamen number is variable, the rule seems to be: six stamens for *A. crinita* (Fig. 11), nine stamens for *A. rousseii*



14. Section of rachilla of *Acanthophoenix rubra* with staminate flowers removed to expose globose pistillate flowers ($\times 4.5$). (Photo by Marc Gérard and Nicole Ludwig)



15. Comparisons of fruits, endocarps and seeds of three species of *Acanthophoenix*.

and twelve stamens for *A. rubra*. In *A. rubra* and *A. rousselii* the filaments are flexuous and often coiled in bud; the anthers are elongate, basally sagittate and spiraled after dehiscence. In *A. crinita* anthers and filaments are shorter. Anthers are white, while filaments can be ivory white, orange or pink, even bi-colored in *A. rousselii* (Figs. 12 & 13). The presence of a pistillode, more or less trifid, is nearly constant. At anthesis, *A. crinita* male flowers show sagittate anthers and rather thick filaments barely longer than petals; the cone-shaped pistillode has a slightly curved apex. *Acanthophoenix rousselii* male flowers show the outer whorl of three stamens with regular filaments, the inner whorl of six stamens with filaments connate in pairs up to one-third their length and a bright pink, ovoid pistillode.

Pistillate flowers are smaller than staminate flowers. They are globose in *A. rubra* (Fig. 14), sub-globose in *A. rousselii* and pear-shaped in *A. crinita*. The perianth consists of three white, membranous, imbricate sepals and three similar petals embracing the base of the ovary. Pollination is performed by bees and starts at the end of the austral winter.

Fruits

When mature, the fruits are black and the persistent perianth is beige or light brown. The mesocarp is thin, dark purple and contains tannins. In the seed, the embryo is basal and the endosperm homogenous. Shape and size of fruits and seeds differentiate the three taxa, as emphasized in Fig. 15.

Seed dispersal and germination

The dispersal of *Acanthophoenix crinita* seeds is performed by the Réunion bulbul (*Hypsipetes borbonicus*), an endemic bird that lives in forest environments from 100 m to 2000 m altitude; however, the red-whiskered bulbul (*Pycnonotus jocosus*), a species of Indian origin and present in Réunion for 30 years, is spreading in the montane rain forest and taking over as a seed disperser.

Acanthophoenix rubra seeds are dispersed nowadays by the red-whiskered bulbul and other exotic species of the local bird fauna including the common myna (*Acridotheres tristis*), the spot-backed weaver (*Ploceus cucullatus*) and the red fody (*Foudia madagascariensis*). Despite the presence of these



16. Young plants under forest canopy, at the foot of an adult specimen of *Acanthophoenix rubra* in the Jardin des Epices in Saint-Philippe.

exotic birds in Réunion, seed dispersal of *A. rubra* is quite limited.

As for *Acanthophoenix rousseii* seeds, their larger size (20×8 mm) precludes dispersal by the extant bird fauna. Extinct species such as Réunion pink pigeon (*Nesoenas duboisi*), Mascarene blue pigeon (*Alectroenas nitidissima*) and the Mascarene black flying fox (*Pteropus niger*) may have played an important role as dispersal agent of *A. rousseii* seeds in the past.

All species of *Acanthophoenix* bear large amounts of seeds, and seedlings are found at the foot of or nearby adult specimens (Fig. 16). Dispersal away from adults appears rare, even in the presence of exotic birds that act as seed dispersers.

Because of the economic interest of the *palmiste rouge*, a study on germination ability of seeds was led by CIRAD (Centre de coopération internationale en recherche

17. Eighteen month old *Acanthophoenix rubra* (left) and *A. crinita* (right) in a greenhouse of the City of Paris. (Photo by Franck Hoedts)



Table 1. Characteristics of *Acanthophoenix* species summarized and compared.

	<i>A. rubra</i>	<i>A. rousseii</i>	<i>A. crinita</i>
Stem			
height (m)	15–25	15–25	8–10?
diam. (cm)	20–30	20–30	10–20
color	red-brown	light gray	dark brown
surface	rough	smooth	very rough
leaf scars	very distinct	less distinct	very distinct, spiny
Leaves			
leaves in crown	15–20	15–20	10–15
leaf length (m)	2.5–3.0	2.5–3.0	2.0–2.3
sheath length (cm)	90–120	90–120	60–80
sheath color	reddish brown	dark brown	brown or light brown
sheath indument	black spines, 10–12 cm when young, unarmed when adult	dense fur-like hair	stiff hair, like tenrec fur
petiole	unarmed, no waxy indument	unarmed, no waxy indument	few setae on both edges, waxy indument
leaflets	70–80 pairs	70–80 pairs	40–60
color, abaxial	grayish or whitish	olive green	dark green
color, adaxial	yellow green	olive green	dark green
Flowering & Flowers			
season	Oct., Nov.	Oct., Nov.	Aug., Sept.
yrs to 1 st flowering	15–18	15–18	10–12
stamens	(11–)12(–15)	(7–)9(–10)	(5–)6(–9)
Fruits			
fruit maturation	May, June	May, June	April, May
fruit length (mm)	8–10	15–20	6–7
fruit diam. (mm)	6	8	5
Seedlings			
sheath	reddish brown, armed with reddish or light brown spines to 2cm	greenish, armed with brown spines to 2 cm	blackish, armed with black spines to 2 cm
petiole & rachis	reddish brown, armed with reddish or light brown spines, no waxy indument	green or reddish with reddish or brown spines, no waxy indument	green, armed with dark brown or black spines, dense waxy indument
leaflets	5–7 pairs	5–7 pairs	1–3 pairs
leaflet shape	linear with acuminate apex	linear with acuminate apex	terminal leaflet elongated oval with acute, rarely acuminate apex; other leaflets lanceolate with acuminate apex
leaflet size	10–12 cm long, 6–8 mm wide	10–12 cm long, 6–8 mm wide	terminal: 15–18 cm long, 25–30 mm wide; others: 18–20 cm long, 14–18 mm wide
abaxial color	whitish	olive green	dark green
adaxial color	light green	olive green	dark green



18. A wild population of *Acanthophoenix crinita* in Hauts de Bois Blanc (altitude 1200 m). (Photo by Nicolas Talibert)

agronomique pour le développement) and Frédéric Normand in 1992. The experiment was done on samples of 300 units, either fruits or seeds. All samples were subjected to different treatments before sowing. The seed containers were wrapped in microporous black plastic film in order to retain optimal moisture and temperature conditions. The first seedlings appeared three months later, but the germination rate, after 250 days, remained rather poor.

CIRAD's experiments had three conclusions: Seeds must be fresh and newly collected; seed germination rate reaches 13% after 24 hours soaking in warm water; and seed germination rate does not exceed 4% if the pericarp is not removed. These germination rates seem to be lower than what we might expect, especially for sown fruit. Inhibiting factors in the fruit pericarp might explain this poor rate, but this explanation is doubtful, since *Acanthophoenix rubra* has a very thin layer of flesh. What is more, in Saint-Philippe, palm grove owners sow entire fruit and not cleaned seeds. The rate of seed germination depends mainly on the maturity of seeds when harvested (not too early and not too late). Seeds must be collected on trees and sown right away.

Observations on *Acanthophoenix rousselii* germination, both in the field or in shade house, have been made for three years by Eloi Boyer. In June 2001, 10,000 fruit were collected

in Trois-Mares and sown at once, without prior cleaning or soaking, on moist seed beds consisting of half leaf-mould and half sifted soil. The first seedlings sprouted five months later. By August 2002 seeds of the same sample continued to germinate, so that germination period may extend over one year. About 2400 young palms have been obtained from 10,000 seeds, which is a germination rate of 24%. The rate may be improved if the seeds are cleaned and soaked before sowing.

In June 2002 at Trois-Mares, on the Roussel estate, we counted 350 young plants distributed over one square meter surface at the foot of three adults of *Acanthophoenix rousselii*. They arose from spontaneous sowing of the previous year. However, the germination conditions on this site are not exactly natural conditions since the land is plowed, fertilized and watered frequently. The regular practice of truck farming, while respecting small patches around palm trees, establishes favorable conditions for palm regeneration, but on fallow land, seedlings are rarely seen at the foot of adult palms.

There is no study on the optimum germination conditions of *Acanthophoenix crinita*. In the Plaine des Palmistes area, many seedlings are visible at the foot of trees where birds nest. They eat the tiny fruit of *A. crinita* and partial digestion in the birds' guts removes the flesh and softens the woody endocarp, assisting germination.

Seedling morphology

Twenty to twenty-four months after germination, young plants of *Acanthophoenix rubra* and *A. rousseii* show four to five leaves and much similarity. Differences with *A. crinita* are much more obvious (Fig. 17). Another difference is visible in specimens five years old and older. *Acanthophoenix rubra* and *A. rousseii* have recurved leaves while *A. crinita* has erect leaves.

Table 1 summarizes the morphological characteristics for the three different *Acanthophoenix* palms.

Distribution of *Acanthophoenix*

In the late eighteenth or early nineteenth centuries, the French naturalists who traveled through Réunion Island agreed that palms were plentiful in the local environment. The first person to give a detailed description of the different species was Bory de Saint Vincent who visited the island from August to December 1802. In the Chaudron district, nowadays downtown Saint-Denis, a city of over 160,000 inhabitants, he noted, while crossing a plantation, that "it was covered with *palmistes* that seemed to have been protected when the land was cleared." But he lamented that "*palmistes* have become uncommon near housing estates and will be soon relegated in out of reach locations, the only way to save it from human gluttony." His was a sad premonition of what was to come.

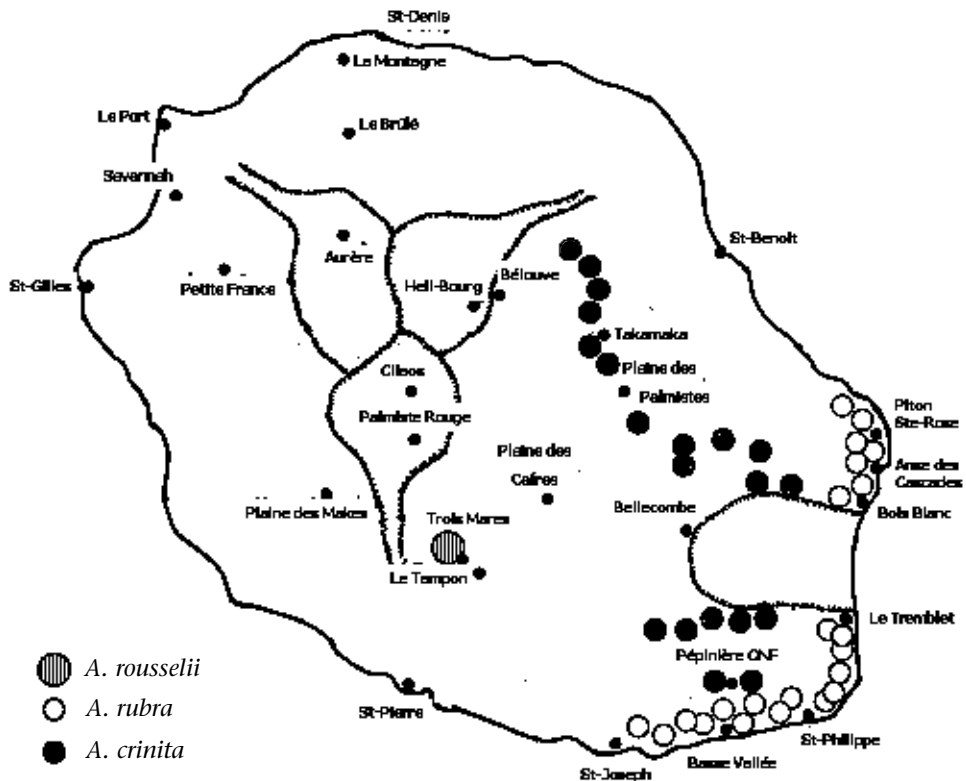
Of the palms that Bory saw in coastal lands or at low altitude (< 600 m), he did not specify if they were *palmistes blancs* (*Dictyosperma album*) or *palmistes rouges* (*Acanthophoenix* spp.), except in the Tremblet area, on the southeast coast, where the presence of *A. rubra* was explicitly

noted. He reported the plentiful presence of *A. crinita* in the highlands above Saint-Denis, at Plaine d'Affouche, on the upper Plaine des Cafres, especially at Piton Villers, and of course, at Plaine des Palmistes, whose "name comes from the incredible quantity of *palmistes* that can be found; they are extremely numerous and tight." However, Bory stayed too short a time in Réunion, and nobody pointed out the *palmiste* from Trois Mares (*A. rousseii*), which was probably confused with *A. rubra*.

Two hundred years later, *palmiste* survival prospects are worrying, and the wild populations have suffered considerable declines. By the end of the nineteenth century, the first authorized forestry agent cut 65,000 adult specimens of *Acanthophoenix crinita* from Plaine des Palmistes in order to sell the hearts! In the 1960s the ONF, though in charge of forest environmental protection, continued to deliver harvesting permits to the inhabitants of Plaine des Palmistes. In the present state, the wild populations of *A. crinita* are distributed as follows: 1) Isolated specimens or small groups of *palmistes* in the southeast submontane rainforest above 800 m: at Basse Vallée, Saint-Philippe and Bois Blanc. In these areas, more or less accessible, poaching for palm cabbage still occurs, though it is in decline. Unfortunately this illegal practice slows down the process of establishing notable populations of *A. crinita*. 2) Scattered populations in the upper Langevin Valley above Cap Blanc, toward Nez Coupé du Tremblet, Hauts de Sainte-Rose, Ilet Patience and Takamaka Heights. They occupy remote locations difficult of access in the mountain rainforest (> 1000 m) and in the *Pandanus montanus* wet thicket ecosystem (1400–1800 m).

Table 2. Distribution of *Acanthophoenix* species

Species	<i>A. rubra</i>	<i>A. rousseii</i>	<i>A. crinita</i>
Ecosystems	Lowland rain forest on wind ward side of the island	Transitional lowland forest on leeward side of the island	1) Mountain rain forest 2) <i>Pandanus montanus</i> wet thicket ecosystem on windward highlands
Altitude (m)	< 600	< 850	1) 850–1400 2) 1400–1800
Presence in Mauritius	yes	no	no



19. Distribution of *Acanthophoenix* populations in Réunion.

In short, the wild populations of *Acanthophoenix crinita* grow in the mountain rainforest or Mesothermic Hygrophilous Ecosystem (Cadet 1980). Its weather characteristics are: cool temperature (annual average temperature < 17°C), frost may occur several days a year toward altitude upper limit, average rain fall of 4000 mm per year at 1500 m, cloud cover and frequent fog (Figs. 2 & 18).

Once abundant on Réunion Island, as reported by early botanists, *Acanthophoenix rubra* does not exist in the wild any more. The beautiful palm grove at Anse des Cascades is the oldest plantation of *A. rubra* on the island. Also in Bois Blanc, on the forest edge in the upper section of chemin de l'Indivis, visitors may notice old *palmistes rouges* growing in old, abandoned fields. Nowadays, the species is commonly grown as a cash crop and in gardens around houses, on the southeast and east coast, from Saint-Joseph to Sainte-Rose. *Acanthophoenix rubra* cultivation requires a minimum average rainfall of 3000 mm per year (4300 mm in Saint-Philippe) and an annual average temperature of 24°C. These weather characteristics describe the Megathermic Hygrophilous Ecosystem or

lowland tropical rainforest, well represented in the Mare Longue forest nature reserve in Saint-Philippe.

Acanthophoenix rousselii has a restricted distribution inside Le Tampon town limits. Besides its presence in a few gardens, it grows in Trois-Mares between 600 and 850 m. In 2001, 76 adult specimens were recorded, most of them 80 years or more old, scattered on the Roussel estate's 202 hectares (500 acres). Cyclone "Dina," which hit Réunion in January 2002, knocked the crowns off a few vulnerable palm specimens, while others were completely defoliated by groups of spot-backed weaver-birds (*Ploceus cucullatus spilonotus*). By the end of year 2003, the population of *Acanthophoenix* in Trois-Mares had declined to 64 adults. On the Roussel estate, *Acanthophoenix* palms grow together with numerous trees or palms, including *Dictyosperma album* var. *album*, endemic either to Réunion or the Mascarene Archipelago. These are huge specimens, which were preserved when the land was cleared in the late nineteenth century.

In the past, it is likely that *Acanthophoenix rousselii* had a much larger distribution area covering the west coast lowlands from Saint-



20. A new plantation of *Acanthophoenix rubra* in Basse Vallée (alt. 300 m) on land previously planted with *Pandanus utilis* whose stumps are still visible.

Pierre to Saint-Denis, with possible incursions in Cirque de Cilaos and Cirque de Mafate. In Cirque de Cilaos, a village named Ilet Palmistes Rouges is located on the edge of the megathermic semi-dry zone. During the dry months, the lack of rain is made worse because of the presence of a poor soil that does not retain the water. The village name refers to a red *palmiste* population, of which nothing remains. The local conditions do not allow *A. rubra* to grow and the “missing” palm may have been *A. rousselii*. It would also be advisable to search for the hypothetical presence of *A. rousselii* toward Aurère, in the Cirque de Mafate, where a wild population of *Dictyosperma album* var. *album* remains in an out of reach location.

Ecological, distributional and altitudinal characteristics of the three species of *Acanthophoenix* are summarized in Table 2. The different species are distributed in separate areas (Fig. 19), so that the possibility of hybridization in the wild remains remote. Individual palms with features intermediate between the three types of *palmistes* are extremely rare. Exceptions are in Basse Vallée, on the site of the former ONF nursery and on the Leichnig plantation; also in La Crête (Saint-Joseph district) on the René Huet plantation where *A. rubra* and *A. crinita* are grown together.

Future prospects for *Acanthophoenix* palms in Réunion Island

The threats to *Acanthophoenix* palms and possible extinction of wild populations have already been mentioned, but because they have a major effect on the evolution of the island flora, they bear repeating. These reasons are: the over-harvesting of palm cabbage for three centuries, the progressive disturbance and destruction of forests at low and intermediate altitudes for growing coffee trees or the intensive farming of sugar cane, the extinction of bird species that used to perform seed dispersal and the introduction on the island of animal pests and diseases that prevent good regeneration.

As long as wild populations survive as remnants, the Réunion *Acanthophoenix* species are not threatened with total extinction. *Acanthophoenix rubra* cultivation was re-established in Saint-Philippe some 25 years ago to fulfill consumer demand for palm cabbage, a delicacy in Creole cooking, and to stop poaching. At the beginning, *palmiste rouge* was usually cultivated under forest canopy, on slopes and on marginal lands. In recent years, with the technical assistance of the CIRAD, farmers have started a program of growing palms in open fields, sometimes associated with a companion crop (Fig. 20).

Rescue of *Acanthophoenix rousseii* came from a recent private initiative, after this palm was clearly differentiated from *A. rubra*. We are grateful to Eloi Boyer, whose work in the past three years has consisted of surveying fructification and harvesting the seeds as soon as they matured, sowing seeds and transplanting seedlings that sprouted under "mother palms" in order to grow the young palms in a shade house. Currently, the encouraging results of this palm rescue have yielded some 4500 young plants – a very positive beginning! A program of donation of young *A. rousseii* palms to private individuals ready to respect an agreement of proper cultivation has just begun. These palms are not supposed to end up in a cooking pot! Careful distribution of ex situ collections is also required to avoid risk of hybridization and planting out of their phylogeographic zone.

Conservation status of *Acanthophoenix crinita* is quite satisfactory, even if the wild populations from the heights above Saint-Denis and Sainte-Marie, Plaine d’Affouches or Plaine des Cafres died out a long time ago. The wild populations in *Pandanus montanus* wet thicket ecosystem in the eastern highlands survive in good condition and a re-introduction attempt is under way. On private properties at Plaine des Palmistes, the presence of old specimens (70 years old and over) is not unusual, and they must be considered as survivors of a wild population. In the past 15 years the number of palm groves has increased, and in the village near the community hall, *A. crinita* is widely used for park landscaping purposes.

In the late seventies the ONF led a program of planting *Acanthophoenix crinita* in Basse Vallée. A palm nursery started to operate near the forest station, and young specimens were planted in 1979 on a land already partly reforested with *Cryptomeria*. Twenty-five years later, the result is disappointing, and the palms are less than 3 m tall. Perhaps the *Cryptomeria* forest cover, the mediocre soil and the low altitude (600 m) of the station are to blame for the slow growth of the palms.

Mass production of young palms in nurseries (Fig. 21) would allow, sooner or later, the re-introduction of *Acanthophoenix* species in their respective forest ecosystems. However, this is a premature undertaking as long as wild cabbage harvesting is not completely eradicated. The awareness of protecting the local floral heritage is reaching more and more



21. Patrick Fontaine among young *Acanthophoenix rubra* in the Jardin des Epices nursery, Saint-Philippe.

people, especially through associations working for conservation of nature. Growing awareness brings hope for the future of *Acanthophoenix* species in Réunion.

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JIM SPECHT

1930–2006

Jim Specht's name may not sound familiar to many readers; he has not been active in the International Palm Society since mid-1980. Prior to this, he was very active, and held the presidency of the California society in the 1960s. In 1967 Jim was instrumental in creating the first California newsletter, which has evolved into *The Palm Journal*.

When I first began to notice palms and their exotic beauty, Jim Specht was one of the first two people I contacted (Ed Moore was the other). Jim was very helpful in getting me started in my early gardening adventures, and especially generous with his time and encouragement. Jim introduced me to stable litter as a mulch in the garden; I continued to use this as long as it was available from local stables. Unfortunately those mulch sources go directly to landscapers or nurseries now, and I am unable to obtain any.

Jim lived in the San Diego State College area near La Mesa. He had palms in his garden that were totally foreign to me in the early 1960s. At that time, only 20–30 palm species were available for us to grow. Jim introduced me to *Copernicia*, *Acrocomia*, *Dyopsis lutescens* and *Ptychosperma*. Jim and Alice were both teachers in the Santee school district; prior to that, he was an engineer and then an auditor for the City of San Diego. I attribute his skillful designs, his ability to instruct me and others and his great organizational skills on setting up the newsletter and being local president to

those teaching skills and organizational talents. He also was quite a tennis player, so he did more than gardening in his free time. Around 1989, Jim and his wife Alice built a new home on Mountain View Drive, near Normal Heights. I was astounded that he could leave his paradise home to start all over. However, he quickly created a new show place. Then in 1993, he and Alice moved to the big island near Hilo. They built a house there, and landscaped it quickly and fabulously as well. In 1995, his health began to decline, and he and his wife moved back to San Diego to be closer to their two sons. This time they moved to Rancho Bernardo. He had developed Alzheimer's disease, and it became very difficult for Alice to care for him around the clock. Eventually Alice and their sons moved Jim Specht to a fulltime care facility nearby.

Jim was very generous with his time and his plants. He donated numerous plants to the San Diego Zoo and Balboa Park; the large *Ravenea rivularis* above Palm Canyon is one of his plants.

In 2005, the Southern California Palm Society chapter honored him at our January Banquet with a Lifetime Achievement Award. I was one of many local palm society members who received valuable information from Jim Specht, and I know he made strong associations with other palm growers in Hawaii during his brief stay there.

JIM WRIGHT