

# PLANTS AND PLANTING IN MEDITERRANEAN LANDSCAPES (VOLUME 1)

Editors

Juan José Galán Vivas  
Vicente Caballer Mellado



**EVERGREEN TREES**

**DECIDUOUS TREES**

**SHRUBS**

**CONIFERS**

**PALM TREES**

**MEDICINAL AND AROMATIC**

**GROUNDCOVERS**

**HEDGES**

**CLIMBERS**



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#### Editors

Juan José Galán Vivas  
Vicente Caballer Mellado

#### Layout designers

Antonio Fresneda Colomer  
Juan José Galán Vivas  
Júlia Martínez Villaronga (transfer to the English version)

#### Collaborators (in the preparation of the botanic datasheets)

Rafael Barrera Valero  
David Sanz Sánchez  
César Martínez Graullera  
Raquel Katz Perales

#### Translated by

Jacinta Mary Harrington-Flynn  
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If the reader detects a mistake in the book or wishes to contact the authors, he can send an email to [edicion@editorial.upv.es](mailto:edicion@editorial.upv.es)



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# 4

## PALM TREES, ZAMIACEAE AND CYCADACEAE



## Chapter 4

## PALM TREES, ZAMIACEAE AND CYCADACEAE

- Subchapter 4.1** Introduction
- Subchapter 4.2** Species
- Subchapter 4.3** Commercialization, use and planting
- Subchapter 4.4** Maintenance
- Subchapter 4.5** Bibliography

## Subchapter 4.1

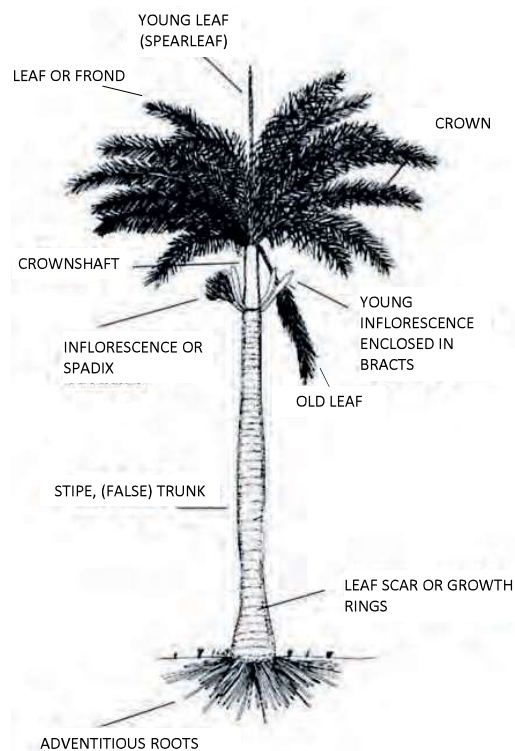
## Introduction

Palm trees belong to the Arecaceae or Palmae family. They are woody monocotyledon plants that date back to the Upper Cretaceous. They are evergreen and long-lived plants.

The root system of palm trees, unlike that of trees (main root and secondary, tertiary roots...), is made up of a set of roots, called adventitious roots, which arise at the base of the trunk or stipe (false trunk). As it grows in length as the plant ages. These are fasciculate roots; they all have the same functional importance.

The trunk is protected by developing leaves. Another of its peculiarities is that the trunk does not have secondary thickening (a growth in thickness). Most species reach maximum thickening before the trunk begins to grow in height. The leaves of palm trees have a characteristic and striking shape while their flowers are small and inconspicuous when compared to other plants. The fruits can be small and abundant (dates) or large and few (coconut).

In the following Figure 4.1.1, you can see the different parts of the plant that make up its morphological structure.



**Figure 4.1.1: Morphology of the palm**

### Global distribution

While palm trees can be found all over the world, in Europe the number of autochthonous species is scarce. Some of the common species are: the Palmetto (*Chamaerops humilis*) of Mediterranean origin, the Canary Palm (*Phoenix canariensis*), as its name indicates, originally from the Canary Islands, and the *Phoenix theophrasti* from Crete (Greece) and some areas of Turkey.



*Chamaerops humilis*



*Phoenix canariensis*



*Phoenix theophrasti*

Tropical Asia is where the largest number of species can be found (around 1,400) followed by the American continent (800 species). Palm trees are also present in Africa and Australia.

### The economic importance of palm trees

The palm tree is of great economic significance, especially in less developed countries. As an example, we will cite the *Cocos nucifera* (coconut tree) and the *Phoenix dactylifera* (date palm), which are basic elements in the economy of some Asian and African countries.

Palm leaves are used to roof homes and to produce cooking oil, fibers for mats, brushes, rugs, raffia, the sap to produce palm sugar, etc.

In the west, palm trees are seen as the quintessential ornamental plants of tropical gardens. They are also used as houseplants.

As in previous chapters, the selection criteria to choose a particular species are determined by many factors, including:

- For its structure and external morphology
  - Size or height
  - Type and color of the leaves
  - Bloom season
  - Production of ornamental or undesirable fruit

- For its necessities or physiological limitations
  - Resistance to frost and severe cold
  - Resistance to drought
  - Requirement of sunlight
  - Resistance to winds
  - Resistance in coastal areas
  - Resistance to urban contamination
  - Requirements of soil, pH, texture, humidity...
  - Rate of growths
  - Longevity
  - Resistance to infestations and diseases

In urban areas, the palm tree is part of part of street and avenue alignments (promenades) and can also be found isolated or in groups in green spaces (gardens, urban parks).



Subchapter 4.2

Species

This subchapter describes **18 species of palm trees, 1 cycadaceae and 1 zamiaceae** used in gardening and landscape design. They have been selected primarily for their ornamental use, botanical interest, or other characteristics. As a result, an in-depth analysis is carried out in this subchapter.

But first of all, it is essential to consider the morphology of the palm tree. This will make it easy to identify and differentiate between species and allow for an adequate understanding of the technical datasheets that describe each species.

To begin, palm trees are classified into three groups according to the number of stipes:

**1. Single trunk palm tree (with one stipe): Only the terminal bud has the ability to develop itself**

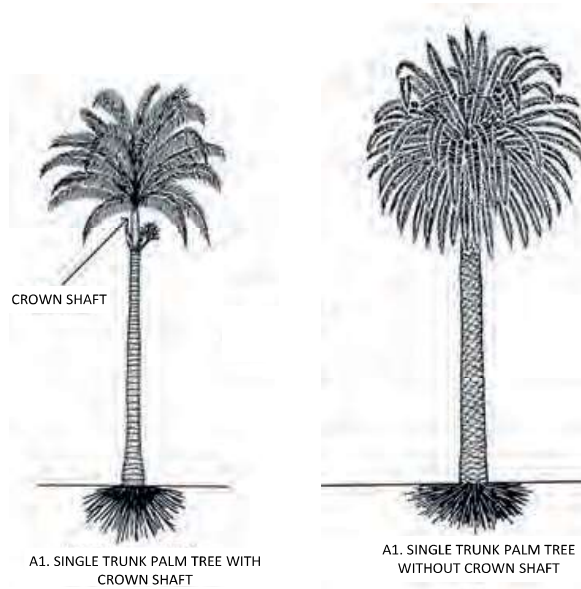


Figure 4.2.1: Single trunk palm trees. (NTJ 07P COITAPAC)

**2. Palms with multiple trunk (clumping): Multiple trunks where basal offsets or suckers are produced**

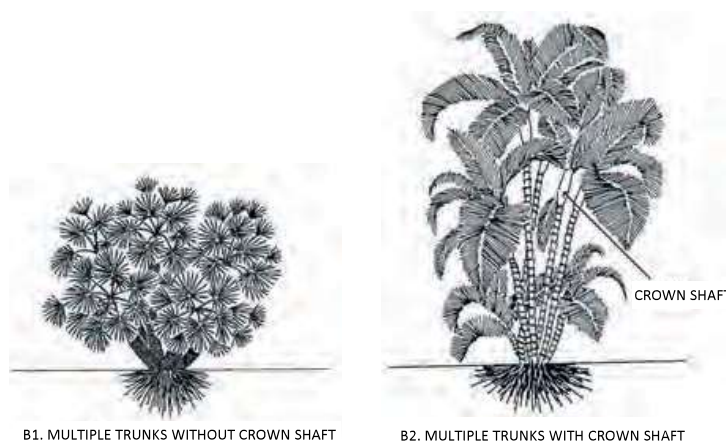


Figure 4.2.2: Palm tree with multiple trunks. (NTJ 07P COITAPAC)

### 3. Other types of Palm tree

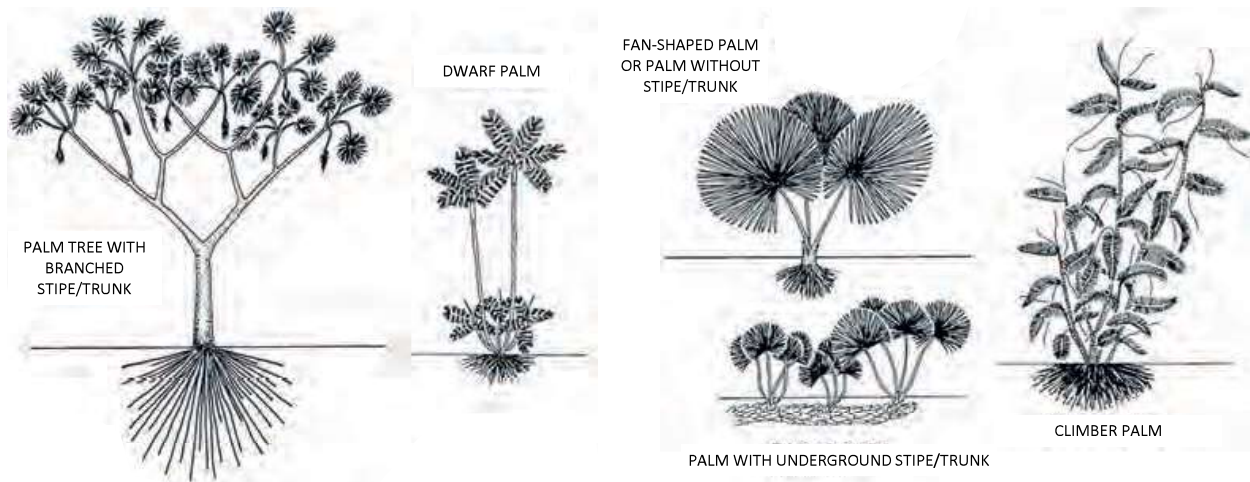


Figure 4.2.3: Other types of palm trees. (NTJ 07P COITAPAC)

The following diagram shows the different types of trunks or stipes (Figure 4.2.4.)

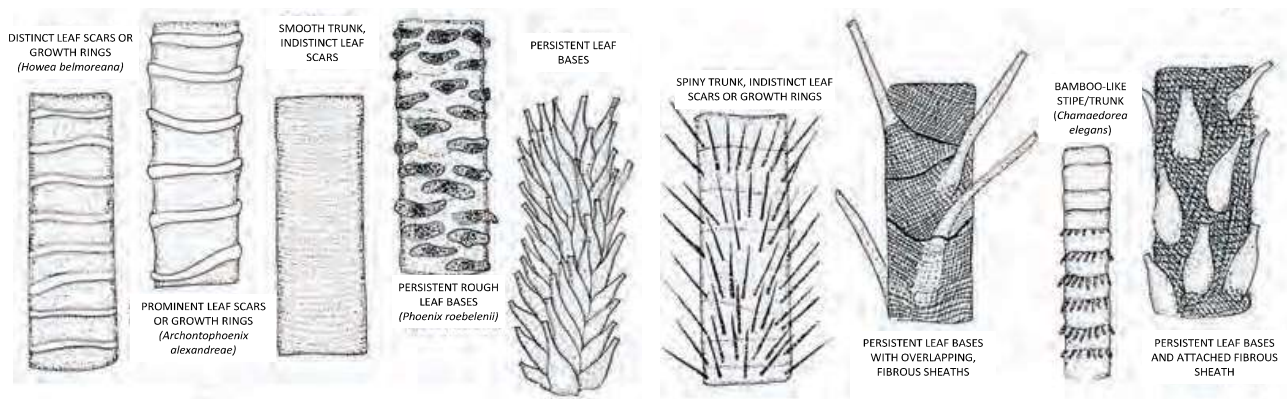


Figure 4.2.4. Types of Palm trees (Palms throughout the world. D. Jones)

The trunks of palm trees stand out for their strength and flexibility and each species has its own characteristic trunk. They can be smooth, fibrous, with spines or covered with the sheath of the leaves.

The leaves are found in the trunk through a point that we call a node. The space between leaves is called the internode space. Thanks to the observation of the internode spaces, we can understand the type of growth as short or very close internodes indicate slow growth and longer internodes indicate rapid and vigorous growth.

The leaves or fronds are normally found in the crown, but in some species, they are distributed throughout the upper part of the stipe. The leaf has a lignified base (wooden appearance) that joins it to the trunk and is called the petiole. When joining the petiole with the trunk, it forms the sheath or foliar base. In Figure 4.2.5 we can see diverse types of sheaths.

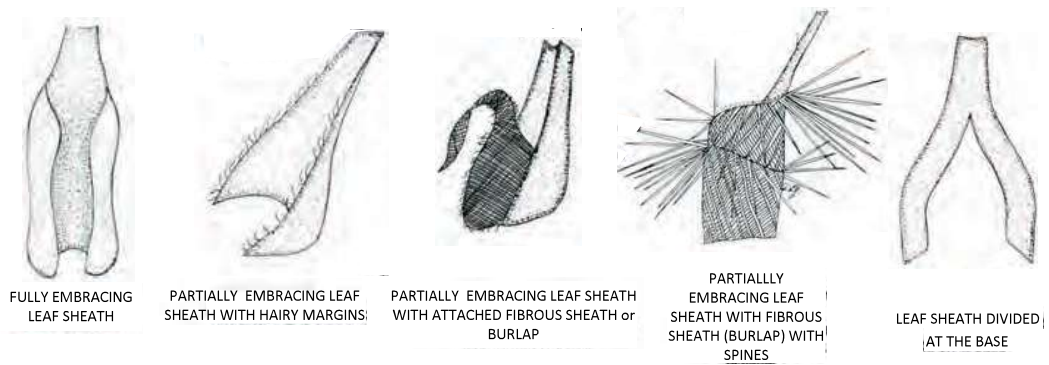


Figure 4.2.5.: Types of sheaths (source: Palms throughout the world. D. Jones)

Palm trees can be classified according to leaf type:

- A. Pinnate: The leaves are divided into leaflets or pinnas
- B. Palmate or fans-shaped: Circular or semi-circular leaves (that can be divided into leaflets)
- C. Entire: The blade of the leaf is not divided
- D. Bipinnate: The leaves are divided twice. Firstly, they have a primary rachis (as is the case with pinnate leaves), and then, with a secondary rachis, where the leaflets appear.

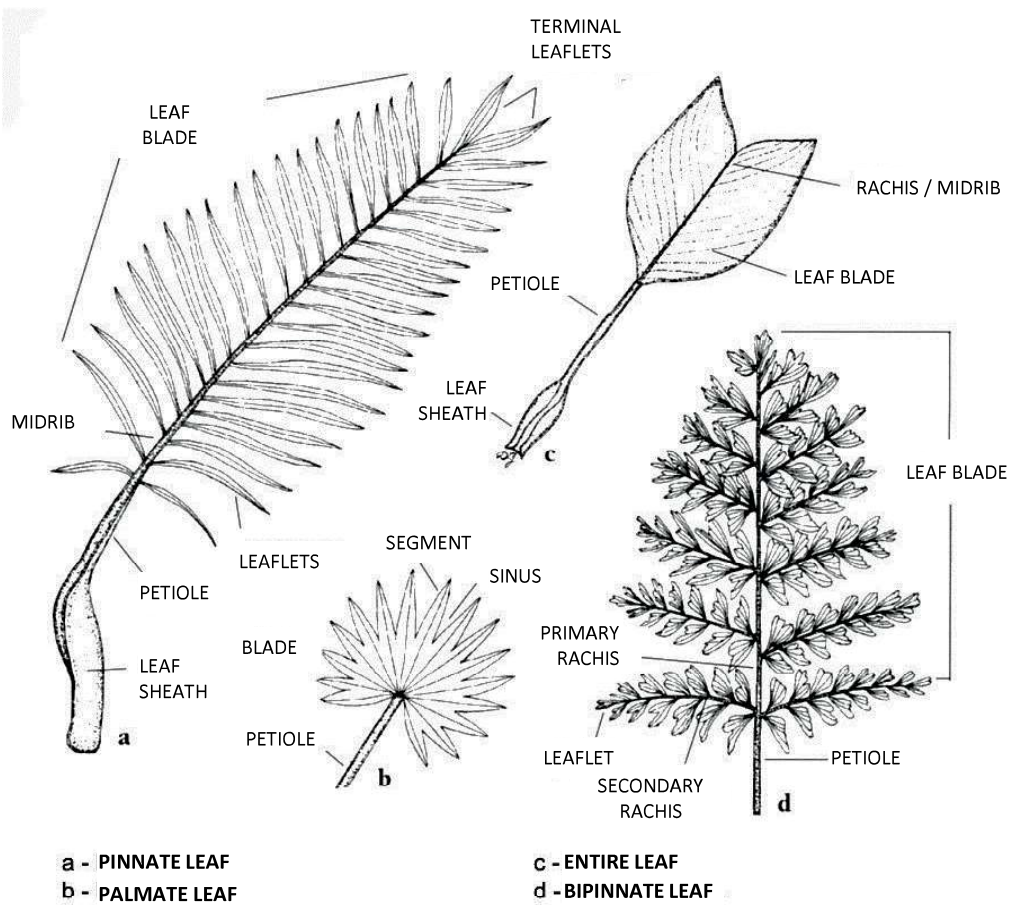


Figure 4.2.6: Types of Palm leaves (source: Palms throughout the world. D. Jones)

Most palm trees have an axillary inflorescence. The entire inflorescence is called a spadix and in its immature state it is protected by bracts.

Flowers can be bisexual (hermaphrodite) or unisexual.



Figure 4.2.7: Types of inflorescences. (Source: Palms throughout the world. D. Jones)

The following pages include a table of parameters and values that have been used to complete a botanic datasheet for each studied species. Each botanic datasheet gathers the information of a certain palm tree species: botanical and ecological aspects, uses, cultivation, and other characteristics of interest, including its commercialization. This information is complemented by photographs displaying the general appearance of the tree species and different morphological details.

PARAMETERS AND VALUES USED FOR THE BOTANIC DATASHEET	
<b>TAXONOMY</b>	
<b>TAXONOMY RANKS</b>	DIVISION, SUBDIVISION, TYPE, ORDER, FAMILY
<b>VARIETIES</b>	VARIETIES OF INTEREST
<b>STRUCTURE</b>	
<b>GROWTH HABIT</b>	SINGLE TRUNK, MULTIPLE TRUCK, DICHOTOMIC BRANCHES, LATERAL BRANCHES, ABNORMAL BRANCHES, MULTIPLE TRUNK CLIMBERS
<b>HEIGHT</b>	M or CM
<b>DIAMETER</b>	M or CM
<b>HABITAT</b>	EMERGENT, UNDERSTOREY, MANGROVES, COASTAL, RHEOPHYTE, AQUATIC, DESERT, CALCIPHILES, TROPICAL
<b>FROND</b>	CROWN OR SCATTERED
<b>ROOT</b>	ADVENTITIOUS, EPIGEAL IN STILTS, EPIGEAL IN COLUMNS
<b>MORPHOLOGY</b>	
<b>TRUNK</b>	
<b>SURFACE (FIBERS)</b>	NAKED, COVERED (FIBER: OCHREA ATTACHED OCHREA OVERLAPPED, NO OCHREA, IN HESSIAN FABRIC
<b>SIZE</b>	STRAIGHT THIN, STRAIGHT STOUT, CURVE THIN, CURVE STOUT
<b>TEXTURE (NAKED SURFACE) SHEATH (COVERED SURFACE)</b>	ROUGH; SMOOTH COMPLETELY ENCIRCLING TRUNK, PARTIALLY ENCIRCLING TRUNK,
<b>LEAF SCARS</b>	++ (EXTREMELY VISIBLE); + (VISIBLE); INVISIBLE
<b>SPINES</b>	YES, NO
<b>LEAF</b>	
<b>TYPE</b>	PINNATE, BIPINNATE, PALMATE, COSTAPALMATE, ENTIRE
<b>SIZE</b>	in CENTIMETERS
<b>SIZE OF LEAFLET</b>	in CENTIMETERS
<b>COLOR UPPER SIDE (US)</b>	PALE GREEN, LIGHT GREEN, DARK GREEN, BLUE/GREEN, GREY, PURPLE, PALE YELLOW, VARIEGATED, RUST, SILVER
<b>COLOR LOWER SIDE (LS)</b>	PALE GREEN, LIGHT GREEN, DARK GREEN, BLUE/GREEN, GREY, PURPLE PALE YELLOW, VARIEGATED, RUST, SILVER
<b>ARRANGEMENT OF LEAF (IF PINNATE OR BIPINNATE) ARRANGEMENT OF LEAF (PALMATE OR COSTAPALMATE)</b>	IN ONE PLANE, IN TWO PLANES, REGULAR, IRREGULAR, ERECT, PLUMOSE, DROOPING  ENTIRE, THREAD, BILOBED, NOTCHED, FRAYED

<b>LEAF SHAPE AND + APEX (IF PINNATE OR BIPINNATE)</b>	IN ONE PLANE, IN TWO PLANES, REGULAR, IRREGULAR, ERECT, PLUMOSE, DROOPING APEX: ACUTE, BLUNT, UNEQUALLY EMARGINATE, OBLIQUELY PREAMORSE, 4-PRONGED, CONCAVELY PREAMORSE, 3-PRONGED PREAMORSELY 3-PRONGED
<b>LEAF BASE (IF PALMATE OR COSTAPALMATE )</b>	DIVIDED ¼ PART, DIVIDED UNTIL THE BASE, ALMOST ENTIRE
<b>THREADS</b>	YES, NO
<b>INFLORESCENCE</b>	
<b>TYPE</b>	- PALMACEA: IN CORYMB, IN TOP, CROWN/HEAD, IN CLUSTERS, IN SPIKE, IN UMBEL, IN CATKIN, IN SPADIX, IN CROWN SHAFT, IN PANICLE. - CYCADACEAE: CONE
<b>POSITION OF INFLORESCENCE</b>	AXILLARY, INTERFOLIAR, AXILLARY INFRAFOLIAR SHORT, AXILLARY INFRAFOLIAR LONG, AXILLARY RADICAL, TERMINAL.
<b>TYPE OF FLOWER</b>	UNISEXUAL, HERMAPHRODITE
<b>SIZE OF INFLORESCENCE</b>	in CENTIMETERS
<b>FRAGRANCE</b>	SI; NO; UNPLEASANT
<b>FRUIT</b>	
<b>SIZE</b>	CM or MM
<b>TYPE</b>	FOLLICLE, PLURIFOLLICLE, LEGUME, LOMENT, SAMARA, DOUBLE SAMARA, PLURISAMARA, CAPSULE, ACHENE, TETRACHENE, POLYACHENE, NUT, ACORN, SYCONIUM, HESPERIDIUM, SOROSIS, BERRY, RACEME, POME, BALAUSTA, DRUPE, STROBILUS, PSEUDO STROBILUS, CONE
<b>EDIBLE</b>	YES, NO
<b>COLOR</b>	RED, GREEN, YELLOW, BROWN, PALE, WHITE, PURPLE
<b>FRUITING SEASON</b>	JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC
<b>GROWTH</b>	
<b>RATE</b>	VERY SLOW, SLOW, MEDIUM, FAST, VERY FAST
<b>LONGEVITY</b>	<25 YEARS 25 YEARS 50 YEARS, 75 YEARS, >100 YEARS
<b>ECOLOGY</b>	
<b>CLIMATE</b>	
<b>ALTITUDE</b>	INTERVAL OF ALTITUDE / ELEVATION ABOVE SEA LEVEL
<b>IRRIGATION</b>	++HIGH; MODERATE; LOW; ++LOW (very low/low < 350 mm; Very high/high > 750 mm)

<b>MINIMUM TEMPERATURE AND INTERNATIONAL CLASSIFICATION</b>	<p>MINIMUM TEMPERATURES: DEGREES CELSIUS</p> <p><b>CLASSIFICATION ACCORDING TO EUROPEAN REGULATION:</b> (SEE ATTACHED MAP)</p> <p>G2___ HOT GREENHOUSES IN SOUTHERN EUROPE</p> <p>G1___ COLD GREENHOUSES IN SOTHERN EUROPE</p> <p>H5___ THE PLANT SUPPORTS MINIMUM TEMPERATURES FROM 0°C TO -5°C</p> <p>H4___ THE PLANT SUPPORTS MINIMUM TEMPERATURES FROM -5°C TO -10°C</p> <p>H3___ THE PLANT SUPPORTS MINIMUM TEMPERATURES FROM -10°C TO -15°C</p> <p>H2___ THE PLANT SUPPORTS MINIMUM TEMPERATURES FROM -15°C TO -20°C</p> <p>H1___ THE PLANT SUPPORTS MINIMUM TEMPERATURES FROM -20 °C</p> <p><b>CLASSIFICATION INTERNATIONAL REGULATIONS.</b> ACCORDING TO MINIMUM TEMPERATURE RANGES</p> <p>Z1___ SUPPORT MINIMUM TEMPERATURES OF -50°C</p> <p>Z2___ SUPPORT MINIMUM TEMPERATURES OF -50°C TO -40°C</p> <p>Z3___ SUPPORT MINIMUM TEMPERATURES OF -40°C TO -30°C</p> <p>Z4___ SUPPORT MINIMUM TEMPERATURES OF -30°C TO -20°C</p> <p>Z5___ SUPPORT MINIMUM TEMPERATURES OF -20°C TO -10°C</p> <p>Z6___ SUPPORT MINIMUM TEMPERATURES OF -10°C TO -0°C</p> <p>Z7___ SUPPORT MINIMUM TEMPERATURES OF -0°C TO 10°C</p> <p>Z8___ SUPPORT MINIMUM TEMPERATURES OF 10°C TO 20°C</p> <p>Z9___ SUPPORT MINIMUM TEMPERATURES OF 20°C TO 30°C</p> <p>Z10___ SUPPORT MINIMUM TEMPERATURES OF 30°C TO 40°C</p> <p>Z11___ SUPPORT MINIMUM TEMPERATURES OF MORE THAN 40°C</p>
<b>EXPOSURE TO SUN</b>	FULL SUN, FULL-SHADE, PART SHADE, SHADE
<b>DROUGHT RESISTANT</b>	SI; NO; MODERATE
<b>FROST RESISTANT</b>	YES, NO, MODERATE
<b>PH</b>	ALL TYPES, NEUTRAL, ACIDIC, BASIC OR ALKALINE (OR INTERVAL OF PH)
<b>FERTILITY</b>	FERTILE, MODERATE, POOR
<b>TEXTURE SOIL</b>	SANDY, SILT OR LOAM; CLAY, SANDY LOAM, CLAY LOAM, ALL TYPES
<b>DRAINAGE</b>	HIGH, MODERATE, LOW
<b>SALT RESISTANT</b>	SI, NO, MODERATE
<b>LIME RESISTANT</b>	SI, NO, MODERATE
<b>USES</b>	
<b>RESISTANCES</b>	
<b>COASTAL</b>	1 <sup>st</sup> LINE, 2 <sup>nd</sup> LINE, NO, MODERATE
<b>POLLUTION</b>	HIGH, MODERATE, LOW
<b>WIND</b>	HIGH, MODERATE, LOW

APPLICATIONS	
<b>INTERIOR IN LINES ON RIVERBANKS AS WINDBREAKERS IN SCREENS IN GROUPS ISOLATED</b>	YES, NO
SPACING	
<b>SPACING</b>	MINIMUM RECOMMENDED DISTANCE BETWEEN PLANTS: METERS; CENTIMETERS
PLANTING AND PLANT HEALTH	
<b>PLANTING AND PLANT HEALTH</b>	
CALENDARS	
<b>CHROMATIC DATASHEET</b>	FOLIAGE, FLOWERING, FRUITING SEASON: the color white represented with grey or black cell
<b>CULTIVATION</b>	SOWING, PLANTING, PRUNING
<b>TREATMENT</b>	FUNGICIDES, PESTICIDES, FERTILIZERS, HERBICIDES
COMMERCIALIZATION	
<b>PRESENTATION</b>	RD (BARE ROOT); CT (CONTAINER or POT (in liters); CE (ROOT BALL); CEY (ROOT BALL IN GYPSUM), YEARS, ROOT BALL IN MESH
<b>DIMENSION OF CONTAINER</b>	LITERS
<b>TOTAL HEIGHT TRUNK HEIGHT</b>	CM or M CM or M



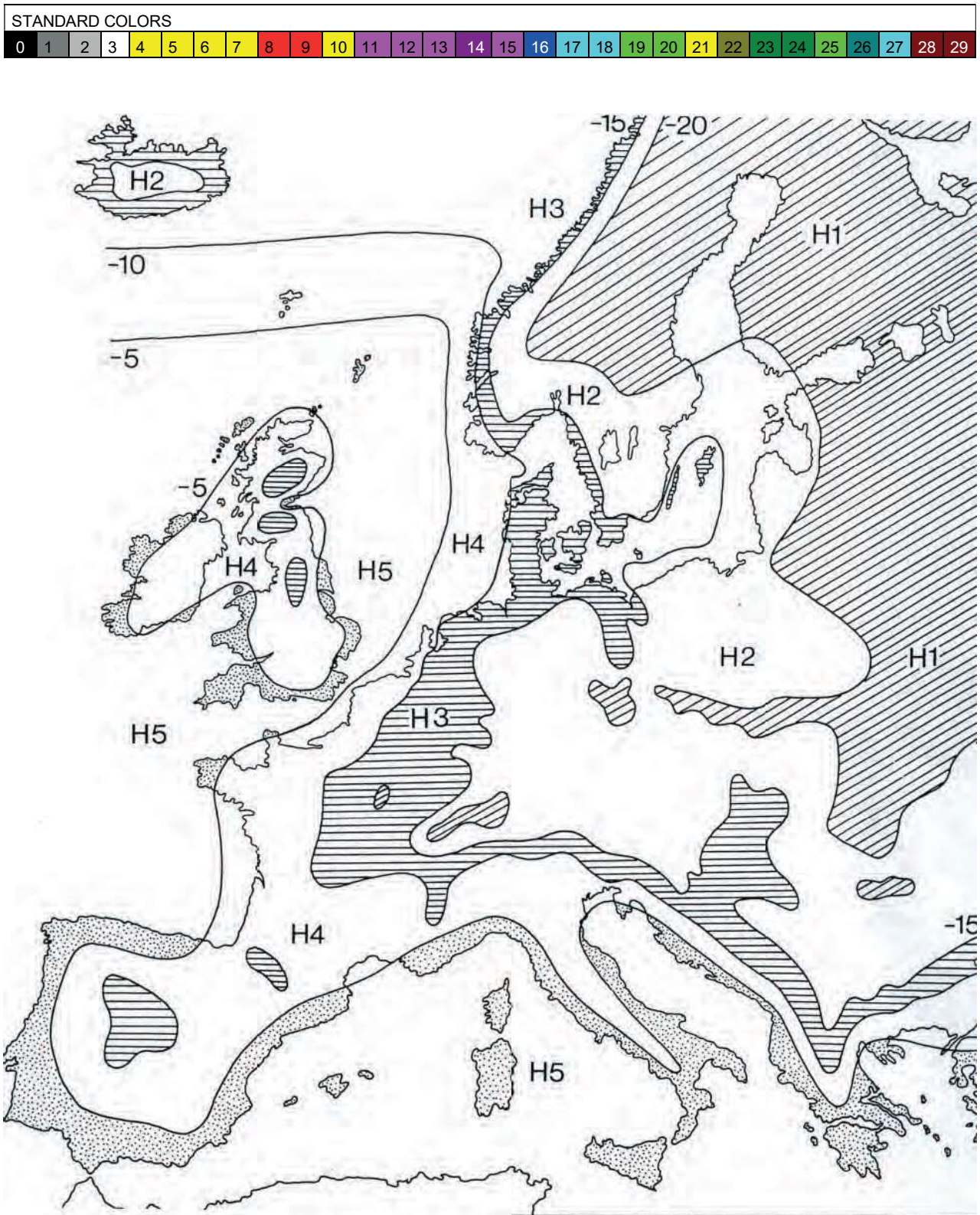


Figure 4.2.1: Thermal classification map according to European regulations

**LIST OF PALMACEA, CYCADCEA AND ZAMIACEA PLANTS DESCRIBED IN THE BOTANIC DATASHEET**

1. *Brahea armata*
2. *Butia capitata*
3. *Chamaerops humilis*
4. *Copernicea alba*
5. *Cyca revoluta* (cycadácea)
6. *Dioon spinulosum* (zamiácea)
7. *Howea fosteriana*
8. *Jubaea chilensis*
9. *Livistona australis*
10. *Livistona chinensis*
11. *Livistona decipiens*
12. *Phoenix canariensis*
13. *Phoenix dactylifera*
14. *Phoenix reclinata*
15. *Phoenix roebelinii*
16. *Sabal palmeto*
17. *Sygarus ramanzoffianum*
18. *Trachycarpus fortunei*
19. *Washingtonia filifera*
20. *Washingtonia robusta*

**BRAHEA**

*Brahea armata* S. Watson

**PALM**

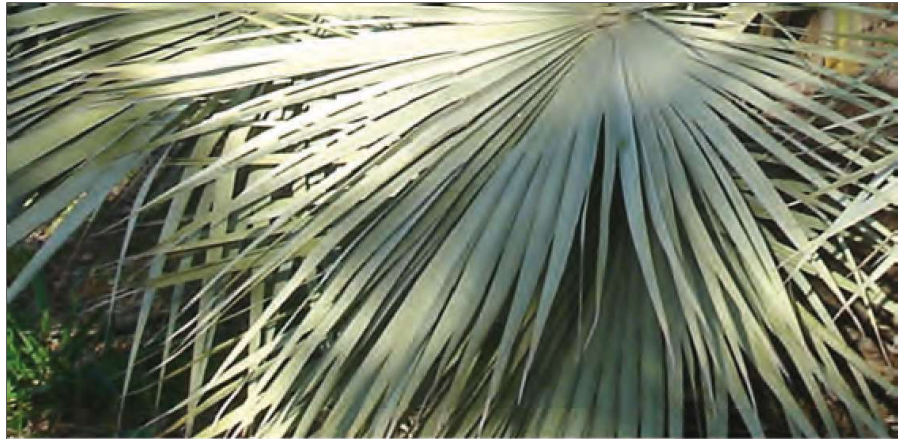
PALMA AZUL SPANISH VALENCIAN BLUE HESPER PALM ENGLISH PALMIERE BLEU DU MEXIQUE FRENCH

STRUCTURE		
Growth habit SINGLE TRUNK	Height 9-12 M	Diameter 6-8 M
Habitat DESERT	Crown YES	Root NORMAL

<b>DIVISION:</b>	SPERMATOPHYTES
<b>SUBDIVISION:</b>	ANGIOSPERMS
<b>TYPE:</b>	MONOCOT
<b>ORDER:</b>	ARECALES
<b>FAMILY:</b>	ARECACEAE

VARIETIES

MORPHOLOGY		
<b>Trunk</b>	Size STRAIGHT, THIN	Diameter 40-50 CM
	Surface + Fibers NAKED (-)	Leaf scars++ SPINES: NO
<b>Leaf</b>	Petiole DENTATE	Leaflet arrangement FRAYED
	TYPE: PALMATE SIZE: Leaf: 3-4M TEXTURE: SMOOTH	Leaflet shape ALMOST ENTIRE Threads YES Upper side BLUE GREEN Lower side BLUE GREEN
<b>Inflorescence</b>	Type HERMAPHRODITE	Reproduction HERMAPHRODITE
	TYPE: SPATHE POSITION: INTERFOLIAR/LONG	Leaflet 4-6 M Fragrant NO
<b>Fruit</b>	Type BERRY	Color LIGHT BROWN
	SIZE: 18-24 MM	Edible NO Fruiting season DEC-FEB
<b>Growth</b>	Rate SLOW	Longevity +100 YEARS



ECOLOGY		
<b>Climate</b>	Temperature -8 A -10°C; H5, Z6	Drought resistant LOW
	ALTITUDE: 400-1200 M IRRIGATION: MODERATE	Sun exposure FULL SUN Frost resistant YES
<b>Soil</b>	pH: - FERTILITY: MODERATE	Texture SANDY Salt resistant NO Drainage HIGH Lime resistant YES

USES			
<b>Resistances</b>	COASTAL: 1ST LINE	INTERIOR: YES	LINE: YES
	POLLUTION: MODERATE	RIVERANKS: -	WINDBREAKER: -
	WIND: MODERATE	GROUPS: -	ISOLATED: YES

**POINTS OF INTEREST**

Native to the Island of Guadalupe (Mexico), off the coast of Baja California and in deep and thermophilic ravines. This species is characteristic for its blue green color and its discontinuous flowering, that is, after blooming for a year it does not do so again for another five years or so.

SPACING: 4-6M

**PLANTING AND PLANT HEALTH**

Propagation by seed. It is a species that is difficult to transplant, which must be done in spring/summer. This species is resistant to pests and diseases.

CHROMATIC CALENDAR											
FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Sowing	■	Transplanting	■	Pruning	■	X					
TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Fungicides	■	Pesticides	■	Fertilizers	■						

COMMERCIALIZATION		
Presentation	Liters	TOTAL HEIGHT(CM)
CT	3	
CT	7	
CT	10	
CT	30	60/80
CT	65	100/120
CT	90	120/140
CT	100	140/160
CT	100	160/180
CT	120	180/200

**BUTIA**  
**PALM**

*Butia capitata* (Martius) Beccari

BUTIA SPANISH BUTIA VALENCIAN JELLY PALM ENGLISH PETIT COCIOTIER CAPITE FRENCH

STRUCTURE		
Growth habit SINGLE TRUNK	Height 5 M	Diameter 5-8 M
Habitat COASTAL	Crown YES	Root NORMAL

**DIVISION:** SPERMATOPHYTES  
**SUBDIVISION:** ANGIOSPERMS  
**TYPE:** MONOCOT  
**ORDER:** ARECALES  
**FAMILY:** ARECACEAE

**VARIETIES**  
*BUTIA CAPITATA* var. *STRICTOR* (Naked stipe)

MORPHOLOGY		
<b>Trunk</b>	Size STRAIGHT	Diameter 40-50 CM
	Surface+ Fibers COVERED + HESSIAN FABRICS	Leaf scars NO
<b>Leaf</b>	Sheath ENTIRE,PARTIAL	Spines: NO
	Petiole DENTATE	Leaflet arrangement IRREGULAR
	Leaflet shape LANCEOLATE	Threads NO
	Leaf: 3-4M SIZE: Leaflet:1-1.5M TEXTURE: HARD	Upper side BLUE GREEN
<b>Inflorescence</b>	Type UNISEXUAL	Reproduction MONOECIOUS
	TYPE: SHEATH POSITION: INTERFOLIAR	Size 50-70 CM
<b>Fruit</b>	Type DRUPE	Color PURPLE
	Edible YES	Fruiting season SEPT.-OCT.
<b>Growth</b>	Rate MODERATE	Longevity > 200 YEARS



ECOLOGY		
<b>Climate</b>	Temperature -8°C,H4,Z6	Drought resistant MODERATE
	ALTITUDE: 300-800 M IRRIGATION: MODERATE	Sun exposure FULL SUN
<b>Soil</b>	Texture SANDY	Salt resistant NO
	pH: 6.5 - 8.5 FERTILITY: NORMAL	Drainage MODERATE
		Lime resistant YES

USES		
<b>Resistances</b>	<b>Applications</b>	
COASTAL: YES	INTERIOR: NO	LINE: YES
POLLUTION: NO	RIVERANKS: -	WINDBREAKER: NO
WIND: YES	GROUPS: YES	ISOLATED: YES

**POINTS OF INTEREST**  
Two characteristics make this palm especially striking; its airy, arched pinnate palms with a bluish hue and the persistent sheaths that surround the stipe confining a very orderly spiral. Jelly is made from the edible fruits, hence the English name "Jelly Palm".

SPACING: 5-7M

**PLANTING AND PLANT HEALTH**  
Propagation by seeds taking approximately six months to germinate. This species is difficult to transplant even under optimum conditions.

CHROMATIC CALENDAR											
FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
[Color-coded bars for foliage, flowering, and fruiting seasons]											
CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
[Color-coded bars for sowing, transplanting, and pruning]											
Sowing	Transplanting		Pruning		X						
TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
[Color-coded bars for fungicides, pesticides, and fertilizers]											
Fungicides	Pesticides		Fertilizers								

COMMERCIALIZATION		
Presentation	Liters	Total Height (cm)
CT	3	
CT	10	
CT	15	
CT	30	
CT	50	100/120
CT	90	120/140
CT	110	140/160
CT	130	160/180
CT	130	180/200
CT	160	200/235
CT	160	235/270

**CHAMAEROPS**

*Chamaerops humilis* L.

PALM

PALMITO  
SPANISH

NARGALLO  
VALENCIAN

EUROPEAN FAN PALM  
ENGLISH

PALMIER NAIN  
FRENCH

STRUCTURE		
Growth habit	Height	Diameter
MULTIPLE TRUNK	6 M	2-3 M
Habitat	Crown	Root
UNDERSTOREY	YES	NORMAL

**DIVISION:** SPERMATOPHYTES  
**SUBDIVISION:** ANGIOSPERMS  
**TYPE:** MONOCOT  
**ORDER:** ARECALES  
**FAMILY:** ARECACEAE

**VARIETIES**  
*CHAMPAEROPS HUMILIS* var. *ELAITOR* (single trunk)  
*CHAMPAEROPS HUMILIS* var. *ABOESCENS* multiple trunk - 3)  
*CHAMPAEROPS HUMILIS* var. *GRACILIS* (base with hanging pts)  
*CHAMPAEROPS HUMILIS* var. *GLAUCSCENS* (blue leaves)

MORPHOLOGY		
<b>Trunk</b>	Size	Diameter
	STRAIGHT, THIN	5 to 18 CM
Surface + Fibers COVERED AND INTERLACED	Sheath	Leaf Scars + +
	ENTIRE, PARTIAL	Spines: NO
<b>Leaf</b> PALMATE SIZE: Leaf: 70-100 CM Leaflet: 10-15 CM TEXTURE: CORIACIOUS	Petiole	Leaflet arrangement
	DENTATE	BILOBED
	Leaflet shape	Threads
	DIVIDED 1/4	NO
	Upper side	Lower side
LIGHT GREEN	LIGHT GREEN	
<b>Inflorescence</b> COVERED/INTERLACED POSITION: INTERFOLIAR	Type	Reproduction
	UNISEXUAL	DIOECIOUS
	Leaflet	Fragrant
15-20 CM	NO	
<b>Fruit</b> SIZE: 2 CM	Type	Color
	BERRY	GRAY
	Edible	Fruiting season
YES	JUL-SEPT	
<b>Growth</b>	Rate	Longevity
	VERY SLOW	>200 YEARS



ECOLOGY		
<b>Climate</b> ALTITUDE: 0-100 M IRRIGATION: MODERATE	Temperature	Drought resistant
	-13°C, H3, Z5	YES
Soil	Sun exposure	Frost resistant
	FULL SUN	MODERATE
pH: 6.5-8.5 FERTILITY: POOR	Texture	Salt resistant
	LOAMY/SANDY	YES
Drainage	Lime resistant	
	HIGH	YES

USES		
<b>Resistances</b> COASTAL: 1ST LINE POLLUTION: MODERATE WIND: HIGH	<b>Applications</b>	
	INTERIOR: YES	LINE: -
	RIVERBANKS: -	WINDBREAKER: -
	GROUP: YES	ISOLATED: YES

**POINTS OF INTEREST**

It is the only spontaneously growing palm tree in Europe. As an ornamental plant it can be used in groups or isolated in rockeries, terrace pots or corners of the garden. The palm leaves are used to make brooms, baskets and mats. The spearleaf is edible, with a pleasant flavor, used in salads and referred to as the shepherd's date.

SPACING: 3-5M

**PLANTING AND PLANT HEALTH**

It propagates by seed or sucker. Transplanting is easy. This species is prone to diseases and pests caused by insects or fungi.

**CHROMATIC CALENDAR**

FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
█	█	█	█	█	█	█	█	█	█	█	█
CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
█	█	█	█	█	█	█	█	█	█	█	█
Sowing	█	Transplanting	█	Pruning	█	X					
TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Fungicides	█	Pesticides	█	Fertilizers	█						

**COMMERCIALIZATION**

Presentation	Liters	Total Height(cm)
CT	2	
CT	3	40/60
CT	7	60/80
CT	30	80/100
CT	50	80/100
CT	50	100/125
CT	65	80/100
CT	85	100/125
CT	85	125/150
CT	100	150/175
CT	120	175/200

**COPERNICEA**

*Copernicea alba*

**PALM**

PALMA COLORADA  
SPANISH

VALENCIAN

CARNAUBA WAX PALM  
ENGLISH

LE CARANDAY  
FRENCH

STRUCTURE		
Growth habit SINGLE TRUNK	Height 10-18 M	Diameter 4-7 M
Habitat TROPICAL, COASTAL	Crown YES	Root ADVENTITIOUS

<b>DIVISION:</b>	SPERMATOPHYTES
<b>SUBDIVISION:</b>	ANGIOSPERMS
<b>TYPE:</b>	MONOCOT
<b>ORDER:</b>	ARECALES
<b>FAMILY:</b>	ARECACEAE

VARIETIES		

MORPHOLOGY		
<b>Trunk</b>	Size STRAIGHT	Diameter 10-30 CM
	Surface + Fibers COVERED(-)	Sheath ENTIRE,PARTIAL
<b>Leaf</b>	Petiole SPINES	Leaflet arrangement BILOBED
	Leaflet shape DIVIDED 1/2	THREADS NO
	Upper side GREEN /GRAY	Lower side GREEN/GRAY
<b>Inflorescence</b>	Type HERMAPHRODITE	Reproduction HERMAPHRODITE
	Size 2 M	Fragrant —
<b>Fruit</b>	Type DRUPE	Color BLACK
	Edible —	Fruiting season —
<b>Growth</b>	Rate MODERATE	Longevity —



ECOLOGY		
<b>Climate</b>	Temperature -2°C, H5, Z6	Drought resistant NO
	Sun exposure SUNIPARTIAL SHADE	Frost resistant MODERATE
<b>Soil</b>	Texture SANDY/OTHERS	Salt resistant YES
	Drainage HIGH	Lime resistant MODERATE

USES		
Resistances	Applications	
COASTAL: 2ND LINE	INTERIOR: NO	LINE: YES
POLLUTION: —	RIVERBANK: YES	WINDBREAKER: NO
WIND: —	GROUPS: YES	ISOLATED: YES

**POINTS OF INTEREST**

Spectacular palm tree with a very large population in Central and South America. It has great possibilities in gardening. Its spreading is slowed down by its reduced initial growth. Among all Coperniceas species, it has the highest level of resistance to cold. Younger plants have leaves with a bluish tint. Its leaves are sharp and have thorns, so it must be handled with care. Palm tree of great beauty both isolated and in groups. Careful pruning allows the base of the leaf to be maintained, lending additional interest to the slender stipe.

SPACING: 3- 4 M

**PLANTING AND PLANT HEALTH**

Fresh seeds germinate easily 3-6 months after sowing if kept in water for 7 days. They can also germinate in artificial media such as agar (gelatinous substance). When collecting the seeds, it is advisable to remove the fleshy cover before storing them.

CHROMATIC CALENDAR											
FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
					X	X	X				
Sowing											
TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Fungicides											

COMMERCIALIZATION		
Presentation	Liters	Total Height(cm)

CYCA

*Cyca revoluta*

CYCADACEAS

CICA, Palma de Iglesia  
SPANISH

CICA  
VALENCIAN

SAGO PALM  
ENGLISH

CYCA DU JAPON  
FRENCH

STRUCTURE		
Growth Habit SINGLE TRUNK	Height 1-3 M	Diameter 1-1.5 M
Habitat —	Crown YES	Root FASCICULATE

<b>DIVISION:</b>	SPERMATOPHYTES
<b>SUBDIVISION:</b>	GYMNOSPERMS
<b>TYPE:</b>	CYCADOPSIDA
<b>ORDER:</b>	CYCALES
<b>FAMILY:</b>	CYCADACEAS

VARIETIES

MORPHOLOGY		
<b>Trunk</b>	Size STRAIGHT	Diameter 20-30 CM
	Surface COVERED	Leaf scars+ Spines: NO
<b>Leaf</b>	Petiole NO SPINES	Leaf arrangement REGULAR 1 PLANE
	Leaflet shape LINEAR/LANCEOLATE	Thread NO
	Upper side DARK GREEN	Lower side LIGHT GREEN
<b>Inflorescence</b>	Type UNISEXUAL	Reproduction DIOECIOUS
	CONE ♂/M: CYLINDER 50-70CM/STRAIGHT CONE ♀/F: ROUND 30CM/SMOOTH/VELVET)	Fragrant —
<b>Fruit</b>	Type PSUEDODRUPE	Color ORANGE
	Edible POISONOUS	Fruiting season —
<b>Growth</b>	Rate SLOW	Longevity 100 YEARS



ECOLOGY		
<b>Climate</b>	Temperature -5°C; H5; Z6	Drought resistant MODERATE
	ALTITUDE: 0-400 m IRRIGATION: HIGH	Sun exposure SUN/PARTIAL SHADE
<b>Soil</b>	Texture LIGHT	Salt resistant NO
	pH: 6-8 FERTILITY: FERTILE	Drainage HIGH

USES		
<b>Resistences</b>	Applications	
	COASTAL: 2ND LINE POLLUTION: MODERATE WIND: MODERATE	INTERIOR: NO RIVERBANKS: — GROUPS: YES
	LINE: NO WINDBREAKER: NO ISOLATED: YES	

**POINTS OF INTEREST**  
Native to China, Japan and Indonesia. It grows in monospecific groups in the mountainous areas of Papua. It is the most rustic species of the Cyca genus. Despite requiring good soil moisture, waterlogging will turn it yellow. It can be planted isolated or in groups. This species cannot tolerate pruning. Its leaves are used in flower arrangements. The leaves have 1 central vein. It contains a mealy pith (sago) with which a kind of bread is made in Japan. The seeds are poisonous.

SPACING: 1-2 M

**PLANTING AND PLANT HEALTH**  
Easy propagation by stem cuttings in spring. Easy transplant in summer.

CHROMATIC CALENDAR											
FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Sowing	■	Transplanting	■	Pruning	■	X					
TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Fungicides	■	Pesticides	■	Fertilizers	■						

COMMERCIALIZATION		
Presentation (L)	Total Height (cm)	Trunk Height(cm)
CT (14)	40/60	
CT (20)	50/60	
CT (22)	50/60	
CT (30)	70/80	10
CT (40)	80/90	25
CT (50)		40/45
CT (50)		65/70
CT (85)		70/75
CT (85)		80/85
CT (110)		90/95
CT (110)		95/100

**DIOON**

*Dioon spinulosum*

ZAMIACEAS

PALMA DE VIRGINIA  
SPANISH

VALENCIAN

GIANT DIOON, GUM PALM  
ENGLISH

FRENCH

STRUCTURE		
Growth Habit SINGLE TRUNK	Height 1.5-15 M	Diameter 1-3 M
Habitat —	Crown YES	Root FASCICULATE

<b>DIVISION:</b>	SPERMATOPHYTES
<b>SUBDIVISION:</b>	GYMNOSPERMS
<b>TYPE:</b>	CYCADS
<b>ORDER:</b>	CYCADALES
<b>FAMILY:</b>	ZAMIACEAS

VARIETIES

MORPHOLOGY		
<b>Trunk</b>	Size STRAIGHT	Diameter 20-25 CM
	Surface COVERED	Leaf scars:++ Spines: NO
<b>Leaf</b>  TYPE: PINNATE SIZE: Leaf: 2 M Leaflet: 7 CM <small>TEXTURE: SMOOTH (HARY WHEN YOUNG)</small>	Petiole NO SPINES	Leaflet arrangement REGULAR 1 PLANE
	Leaflet shape LINEAR/LANCEOLATE	Threads NO
	Upper side DARK BLUE/GREEN	Lower side DARK BLUE/ GREEN
	<b>Inflorescence</b>	Type UNISEXUAL
	CONE ♂/M: SUBSPHERICAL GRAY (WOOLLY)	Fragrant —
	CONE ♀/F: OVOID - VERY WOOLLY	—
<b>Fruit</b>	Type PSEUDODRUPE	Color —
	Edible YES	Fruiting season —
<b>Growth</b>	Rate VERY SLOW	Longevity —



ECOLOGY		
<b>Climate</b>  ALTITUDE: 0-100 IRRIGATION: MODERATE	Temperature 5 ° C; G1/H5; Z7	Drought resistant YES
	Sun exposure SUN	Frost resistant NO
<b>Soil</b>  pH: 5-7 FERTILITY: FERTILE	Texture LIGHT	Salt resistant NO
	Drainage HIGH	Lime resistant —

USES			
<b>Resistances</b>	<b>Applications</b>		
COASTAL: 2ND LINE	INTERIOR: —	LINE: NO	
POLLUTION: —	RIVERBANKS: —	WINDBREAKER: NO	
WIND: —	GROUPS: —	ISOLATED: YES	

**POINTS OF INTEREST**

Native to Mexico (from Yucatan to Tuxla). Like other species of the cycadales order, it has a morphological resemblance to palm trees and ferns. Among the cycads, only the *Cyca media* (Australian species) exceeds it in height. Its pinnate leaves have numerous longitudinal veins and include more than 100 leaflets per leaf, each with 5 to 8 spines on the blade. This species is closest to the fossil forms. The seeds and the trunk produce an edible starch, which is why it is also known as the gum palm. Pruning is done only to remove dead leaves.

SPACING: 1-2 M

**PLANTING AND PLANT HEALTH**

Propagation by seeds.

CHROMATIC CALENDAR											
FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
█	█	█	█	█	█	█	█	█	█	█	█
CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
█	█	█	█	█	█	█	█	█	█	█	█
Sowing	█	Transplanting	█	Pruning	█	X					
TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
█	█	█	█	█	█	█	█	█	█	█	█
Fungicides	█	Pesticides	█	Fertilizers	█						

COMMERCIALIZATION		
Presentation(L)	Total height (cm)	Trunk height(cm)
CT (30)	35/40	
CT (50)	40/45	
CT (50)	45/50	
CT (50)	50/55	



**HOWEA**

*Howea forsteriana*

**Palm**

QUENTIA  
SPANISH

QUENTIA  
VALENCIAN

HOWE'S ISLAND PALM  
ENGLISH

KENTIA  
FRENCH

STRUCTURE		
Growth Habit SINGLE TRUNK	Height 10-15 M	Diameter 4-6 M
Habitat TROPICAL, COASTAL	Crown YES	Root ADVENTITIOUS

<b>DIVISION:</b>	SPERMATOPHYTES
<b>SUBDIVISION:</b>	ANGIOSPERMS
<b>TYPE:</b>	MONOCOT
<b>ORDER:</b>	ARECALES
<b>FAMILY:</b>	ARECASEAE

VARIETIES	

MORPHOLOGY		
<b>Trunk</b>	Size STRAIGHT	Diameter 8-15 CM
	Surface + Fibers COVERED (-)	Sheath ENTIRE,PARTIAL
<b>Leaf</b>	Petiole NO SPINES	Leaflet arrangement REGULAR 1 PLANE
	TYPE: PINNATE	Leaflet shape LINEAR/LANCEOLATE
	SIZE: Leaf: 2 M Leaflet: 75CM	Threads NO
<b>Inflorescence</b>	Type UNISEXUAL	Reproduction MONOECIOUS
	POSITION: INTRAFOLIAR	Size 90 CM
<b>Fruit</b>	Type CLUSTER BERRY	Color GREEN/RED
	SIZE: 1.5 M	Edible —
<b>Growth</b>	Rate FAST	Longevity 100 YEARS



ECOLOGY		
<b>Climate</b>	Temperature -2°C; H5; Z7	Drought resistant NO
	ALTITUDE: 0-200	Sun exposure PARTIAL SUN/ SHADE
<b>Soil</b>	IRRIGATION: HIGH	Frost resistant MODERATE
	pH: 5-7.5	Texture LIGHT
FERTILITY: FERTILE	Drainage HIGH	Salt resistant YES
		Lime resistant NO

USES		
<b>Resistances</b>	COASTAL: 2ND LINE	Applications
	POLLUTION: —	INTERIOR: YES
	WIND: MODERATE	RIVERBANKS: —
		GROUPS: YES
		LINE: NO
		WINDBREAKER: YES
		ISOLATED: YES

**POINTS OF INTEREST**

Species belonging to a genus native to Lord Howe Island where it grows in extensive colonies. This species does well indoors; requiring little shade and care. It can support full sun from 5 years. It grows well in coastal areas due to its good resistance to saline winds. It can be planted both isolated and in groups. Pruning is done only to remove old leaves. Flowering occurs in specimens over 6 years old.

SPACING: 1-2 M

**PLANTING AND PLANT HEALTH**

Propagation by seed. This species is difficult to transplant and should be done in spring or summer preferably with grown specimens and with abundant irrigation after transplanting.

CHROMATIC CALENDAR											
FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
CULTVIATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Sowing	■	■	■	■	■	■	■	■	■	■	■
Transplanting	■	■	■	■	■	■	■	■	■	■	■
Pruning	■	■	■	■	■	■	■	■	■	■	■
TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Fungicides	■	■	■	■	■	■	■	■	■	■	■
Pesticides	■	■	■	■	■	■	■	■	■	■	■
Fertilizers	■	■	■	■	■	■	■	■	■	■	■

COMMERCIALIZATION		
Presentation (L)	TOTAL HEIGHT(cm)	TRUNK HEIGHT(cm)
CT (3)	0	
CT (10)	100-120	
CT (30)	120-160	
CT (35)	160-220	
CT (40)	160-250	
CT (80)	350-400	100-120
CT (80)	400-450	200-220
CT (230)	500-700	230-250

# JUBAEA PALM

## Jubaea chilensis

COQUITO SPANISH PALMERA DE XILE VALENCIAN CHILEAN WINE PALM ENGLISH JEBEE REMARQUABLE FRENCH

STRUCTURE		
Growth habit SINGLE TRUNK	Height 10-33 M	Diameter 4-6 M
Habitat COASTAL	Crown YES	Root NORMAL

<b>DIVISION:</b>	SPERMATOPHYTES
<b>SUBDIVISION:</b>	ANGIOSPERMS
<b>TYPE:</b>	MONOCOT
<b>ORDER:</b>	ARECALES
<b>FAMILY:</b>	ARECACEAE

VARIETIES

MORPHOLOGY		
<b>Trunk</b>	Size STRAIGHT/STOUT	Diameter 1-2 M
Surface + Fibers NAKED	Texture SMOOTH	Leaf scars: + Spines: NO
<b>Leaf</b>	Petiole SHORT BARE STEM	Leaflet arrangement REGULAR 1 PLANE
	Leaflet shape PINNATE	Threads NO
TYPE: PINNATE SIZE: Leaf: 4-5 M Leaflet: 60 CM TEXTURE: SMOOTH	Upper side DARK GREEN	Lower side LIGHT GREEN
<b>Inflorescence</b>	Type UNISEXUAL	Reproduction MONOECIOUS
	SIZE: 1-1.5 M POSITION: INTERFOLIAR	Fragrant NO
<b>Fruit</b>	Type BERRY	Color ORANGE
	SIZE: 3.5 CM	Edible YES
<b>Growth</b>	Rate VERY SLOW	Longevity >600 YEARS



ECOLOGY		
<b>Climate</b>	Temperature -10°C; H4; Z6	Drought resistant YES
	ALTITUDE: 0-1500 M IRRIGATION: MODERATE	Sun exposure SUN/PARTIAL SHADE
<b>Soil</b>	Texture SANDY	Frost resistant MODERATE
	pH: 6.5-8.5 FERTILITY: MODERATE	Drainage HIGH
		Salt resistant NO
		Lime resistant YES

USES		
<b>Resistances</b>	<b>Applications</b>	
COASTAL: 2ND LINE POLLUTION: MODERATE WIND: MODERATE	INTERIOR: NO RIVERBANKS: - GROUPS: YES	LINE: YES WINDBREAKER: NO ISOLATED: YES

**POINTS OF INTEREST**

This Palm species is native to Chile and highly appreciated for its sugary sap from which a characteristic wine is made. Its seed is an edible fruit called *coquito*. Its pulp is attached to the shell. It is easily confused with *Coco nuccifera* due to its texture and flavor.

SPACING: 4-6M

**PLANTING AND PLANT HEALTH**

Propagation by seed. Transplanting is difficult and carried out in spring-summer. In general, this palm is resistant to pests and diseases. However, if grown in the Mediterranean area it can be delicate as in its first three years of life, it can be prone to fungi and bacteria.

CHROMATIC CALENDAR											
FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
█	█	█	█	█	█	█	█	█	█	█	█
CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
█	█	█	█	█	█	█	█	█	█	█	█
Sowing	█	Transplanting	█	Pruning	█	█	█	█	█	█	█
TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
█	█	█	█	█	█	█	█	█	█	█	█
Fungicides	█	Pesticides	█	Fertilizers	█	█	█	█	█	█	█

COMMERCIALIZATION		
Presentation (L)	Total Height (cm)	Trunk height(cm)
CT (60)	210	60

**LIVISTONA**

*Livistona australis* (Brown) Mart.

**PALM**

PALMERA DE ABANICO DE AUSTRALIA  
SPANISH

LIVISTONA DAUSTRALIA  
VALENCIAN

AUSTRALIAN FAN PALM  
ENGLISH

PALMIER ÉVENTAIL  
FRENCH

STRUCTURE		
Growth habit SINGLE TRUNK	Height 23-26 M	Diameter 4 M
Habitat EMERGENT	Crown YES	Root NORMAL

<b>DIVISION:</b>	SPERMATOPHYTES
<b>SUBDIVISION:</b>	ANGIOSPERMS
<b>TYPE:</b>	MONOCOT
<b>ORDER:</b>	ARECALES
<b>FAMILY:</b>	ARECACEAE

VARIETIES
<i>LIVISTONA AUSTRALIS</i> var. <i>LATANIA A.</i>
<i>LIVISTONA AUSTRALIS</i> var. <i>CORYPHA</i>

MORPHOLOGY		
<b>Trunk</b> Surface + Fibers NAKED/SMOOTH (VELVET)	Size STRAIGHT, THIN	Diameter 35-60 CM.
	Texture SMOOTH	Leaf scars: ++ Spines: NO
<b>Leaf</b> Costapalmate SIZE: Leaf: 2-3 M. TEXTURE: ROUGH	Petiole DENTATE	Leaflet arrangement ENTIRE
	Leaf shape DIVIDED1/2	Threads YES
	Upper side DARK GREEN	Lower side DARK GREEN
<b>Inflorescence</b> TYPE: SPATHE POSITION: INTERFOLIAR	Type UNISEXUAL	Reproduction MONOECIOUS
	Size 1-1,25 M.	Fragrant NO
<b>Fruit</b> SIZE: 1.5-2 CM.	Type BERRY	Color RED
	Edible NO	Fruiting season SEPT-NOV
<b>Growth</b>	Rate SLOW	Longevity + 100 YEARS



ECOLOGY		
<b>Climate</b> ALTITUDE: 0-200 M IRRIGATION: MODERATE	Temperature -8°C; H5; Z6	Drought resistant NO
	Sun exposure FULL SUN	Frost resistant MODERATE
<b>Soil</b> pH: 5.5-8.5 FERTILITY: HARDY	Texture SANDY	Salt resistant NO
	Drainage MODERATE	Lime resistant YES

USES		
<b>Resistances</b> COASTAL: 2ND LINE POLLUTION: MODERATE WIND: MODERATE	<b>Applications</b>	
	INTERIOR: YES	LINE: YES
	POTS: YES	WINDBREAKER: NO
	GROUPS: YES	ISOLATED: YES

**POINTS OF INTEREST**

This is an excellent palm species to use as street trees and in groups.

SPACING: 5-7 M

**PLANTING AND PLANT HEALTH**

Propagation by seed.  
Transplanting is easy and should be done in spring-summer.  
This species is resistant to pests and diseases.

**CHROMATIC CALENDAR**

FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
[Color-coded bars representing seasonal activity]											

CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
[Color-coded bars for Sowing, Transplanting, Pruning]											
Sowing [Red] Transplanting [Orange] Pruning [X]											

TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
[Color-coded bars for Fungicides, Pesticides, Fertilizers]											
Fungicides [Green] Pesticides [Blue] Fertilizers [Light Blue]											

**COMMERCIALIZATION**

Presentation	Liters	Total height (cm)
CT	2	25
CT	3	35
CT	7	45
CT	15	60
CT	30	75
CT	50	90
CT	140	125
CT	230	255

# LIVISTONA

# *Livistona chinensis* (Jacquin) Martius

## PALM

PALMA DE ABANICO DE CHINA SPANISH    LIVISTONA DE LA XINA VALENCIAN    CHINESE FAN PALM ENGLISH    PALMIER EVENTAIL CHINOIS FRENCH

STRUCTURE		
Growth habit SINGLE TRUNK	Height 8-10 M	Diameter 3 M
Habitat DESERT	Crown YES	Root NORMAL

<b>DIVISION:</b>	SPERMATOPHYTES
<b>SUBDIVISION:</b>	ANGIOSPERMS
<b>TYPE:</b>	MONOCOT
<b>ORDER:</b>	ARECALES
<b>FAMILY:</b>	ARECACEAE

VARIETIES
<i>L. CHINENSIS</i> var. <i>BONINENSIS</i> (Pear-shaped fruit)

MORPHOLOGY		
<b>Trunk</b>	Size STRAIGHT/STOUT	Diameter 20-30 CM
	Surface NAKED/SMOOTH/VELVET +	Leaf scars: ++ Spines: NO
<b>Leaf</b>	Petiole DENTATE	Leaflet arrangement BILOBED
	Leaflet shape DIVIDED1/4	Threads YES
	Upper side LIGHT GREEN	Lower side LIGHT GREEN
<b>Inflorescence</b>	Type UNISEXUAL	Reproduction MONOECIOUS
	Size 1.8 M	Fragrant UNPLEASANT
	Type DRUPE	Color OLIVE GREEN
<b>Fruit</b>	Edible NO	Fruiting season SEPT-NOV
	Rate SLOW	Longevity +100 YEARS



ECOLOGY		
<b>Climate</b>	Temperature -7°C; H5; Z6	Drought resistant NO
	Sun exposure PARTIAL SHADE	Frost resistant MODERATE
<b>Soil</b>	Texture SANDY	Salt resistant NO
	Drainage MODERATE	Lime resistant YES

USES		
Resistances	Applications	
COASTAL: 2ND LINE	INTERIOR: -	LINE: YES
POLLUTION: MODERATE	POTS: YES	WINDBREAKER: NO
WIND: HIGH	GROUPS: YES	ISOLATED: YES

### POINTS OF INTEREST

This species can be used both in and outdoors. If outdoors, its leaves are smaller and more curved. It is a very interesting palm for shaded areas or low light. The tips of the leaflets are straight, although not as straight as *L. decipiens*. It is an excellent plant for pots and as an indoor plant.

### PLANTING AND PLANT HEALTH

Propagation by seeds although not long lasting. After harvest, they must be dried and the outer shell removed. It should be sown in substrates with a lot of organic matter, with an average soil temperature of 28°C. Repotting is easy from a pot or container during the warm months, more difficult if done from the ground. This species is resistant to pests and diseases.

### CHROMATIC CALENDAR

FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
[Color-coded bars representing seasonal cycles]											

CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
[Color-coded bars for Sowing, Transplanting, Pruning]											
Sowing [ ] Transplanting [ ] Pruning [X]											

TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
[Color-coded bars for Fungicides, Pesticides, Fertilizers]											
Fungicides [ ] Pesticides [ ] Fertilizers [ ]											

### COMMERCIALIZATION

Presentation	Total height(cm)	Trunk height(cm)
CT (25L)	40-50	
CT (50L)	100-120	10-20
CT (50)	175-200	30-40
CT (80)	275-300	180-200

**LIVISTONA**

*Livistona decipiens* Becc.

**PALM**

PALMA LLORONA  
SPANISH

VALENCIAN

RIBBON FAN PALM  
ENGLISH

LATANIER PLEUREUR  
FRENCH

STRUCTURE		
Growth habit SINGLE TRUNK	Height 10-15 M	Diameter 3-5 M
Habitat MANGROVE	Crown YES	Root NORMAL

<b>DIVISION:</b>	SPERMATOPHYTES
<b>SUBDIVISION:</b>	ANGIOSPERMS
<b>TYPE:</b>	MONOCOT
<b>ORDER:</b>	ARECLAES
<b>FAMILY:</b>	ARECACEAE

VARIETIES

MORPHOLOGY		
<b>Trunk</b>	Size STRAIGHT, THIN	Diameter 20-25 CM
	Surface + Fibers NAKED (-)	Texture SMOOTH
<b>Leaf</b>	Petiole SPINES	Leaf scars: ++ Spines: NO
	Leaflet shape DIVIDED 3/4 LEAF	Leaflet arrangement ENTIRE
	Leaflet shape DIVIDED 3/4 LEAF	Threads YES
<b>Inflorescence</b>	Type UNISEXUAL	Reproduction MONOECIOUS
	TYPE: SPATHE POSITION: INTERFOLIAR	Size 1 M
	Type DRUPE	Color -
<b>Fruit</b>	Edible -	Fructing season -
	Rate FAST	Longevity -



ECOLOGY		
<b>Climate</b>	Temperature -8°C; H5; Z6	Drought resistant NO
	Sun exposure FULL SUN	Frost resistant MODERATE
<b>Soil</b>	Texture VARIOUS	Salt resistant NO
	pH: 5 to 8 FERTILITY: MODERATE	Drainage HIGH

USES		
Resistances	Applications	
COASTAL: MODERATE	INTERIOR: NO	LINE: YES
POLLUTION: YES	RIVERBANKS: YES	WINDBREAKER: YES
WIND: YES	GROUPS: YES	ISOLATED: YES

**POINTS OF INTEREST**

This species of palm is of ornamental interest as it is easy to plant and for its characteristic weeping leaves where its leaflets fall from middle part of the leaf. The trunk is of rough texture.

SPACING: 4-6M

**PLANTING AND PLANT HEALTH**

Propagation by seeds which germinate quite easily.

CHROMATIC CALENDAR											
FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Sowing	■	Transplanting	■	Pruning	■	x					
TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Fungicides	■	Pesticides	■	Fertilizers	■						

COMMERCIALIZATION		
Presentation	Liters	Height (cm)
CT	50	150

# PHOENIX

# *Phoenix canariensis* Hort. ex Chabaud

## PALM

PALMERA CANARIA SPANISH PALMERA DE CANARIAS VALENCIAN CANARY IS. DATE PALM ENGLISH DATTIER DES CANARIES FRENCH

STRUCTURE		
Growth habit SINGLE TRUNK	Height 15-20 M	Diameter 4-6 M
Habitat COASTAL	Crown YES	Root NORMAL/AERIAL

<b>DIVISION:</b>	SPERMATOPHYTES
<b>SUBDIVISION:</b>	ANGIOSPERMS
<b>TYPE:</b>	MONCOT
<b>ORDER:</b>	ARECALES
<b>FAMILY:</b>	ARECACEAE

VARIETIES

MORPHOLOGY		
<b>Trunk</b>	Size STRAIGHT	Diameter 50-70 CM.
	Surface + Fibers COVERED/PERSISTANT FIBERS	Leaf scars: ++ Spines: NO
<b>Leaf</b>	Petiole SPINE	Leaflet arrangement REGULAR
	Leaflet shape LANCEOLATE	Threads NO
	Upper side LIGHT GREEN	Lower side LIGHT GREEN
	Leaf: 3-7M Leaflet: 15-20CM TEXTURE: SMOOTH	
<b>Inflorescence</b>	Type UNISEXUAL	Reproduction DIOECIOUS
	Size 1-1.5 M	Fragrant NO
<b>Fruit</b>	Type DRUPE	Color ORANGE
	Edible NO	Fruiting season SEPT-NOV
<b>Growth</b>	Rate MEDIUM/SLOW	Longevity + 100 YEARS



ECOLOGY		
<b>Climate</b>	Temperature -8°C; H4; Z6	Drought resistant YES
	Sun exposure FULL SUN	Frost resistant MODERATE
<b>Soil</b>	Texture SANDY/OTHERS	Salt resistant YES
	Drainage MODERATE	Lime resistant YES
ALTITUDE: 300-700 m. IRRIGATION: MODERATE pH: 5.5-9 FERTILITY: HARDY		



USES			
<b>Resistances</b>	COASTAL: 1ST LINE	INTERIOR: YES	LINE: YES
	POLLUTION: HIGH	RIVERBANKS: -	WINDBREAKER: YES
	WIND: HIGH	GROUPS: YES	ISOLATED: YES

**POINTS OF INTEREST**

Native to the Canary Islands. It has great ornamental appeal due to its leafy crown and thick, straight trunk. Adult specimens will embellish any garden. It is one of the most hardy palms (in some cases withstanding temperatures of up to -15°C and lose their leaves but without dying). The first fruits appear in specimens that are 15 years old or more and their taste is less pleasant than *Phoenix dactylifera* and used for livestock. Using the leaves, a palm honey called *gomera* from the island of La Gomera is made. The palms most tender leaves are used for salad.

SPACING: 8-12 M

**PLANTING AND PLANT HEALTH**

Propagation by seed. It transplants easily (during the summer season) although it is a very delicate process and therefore a good root pruning must be ensured. Extremely sensitive to the attack of the red palm weevil (*Rhynchophorus ferrugineus*). Special care must also be taken with the vascular disease Lethal Yellowing produced by phytoplasmas (decimates up to 90% of the population), still found in the Iberian Peninsula, and with *Graphiola phoenicis*, which produces "scabs" on the leaves when these are collected to obtain palms for Holy Week.

CHROMATIC CALENDAR											
FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Sowing	■	Transplanting	■	Pruning	■	x					
TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Fungicides	■	Pesticides	■	Fertilizers	■						

COMMERCIALIZATION		
Presentation	Liters	Height(cm)
CT	3	
CT	5	100/120
CT	15	125/150
CT	45	160/190
CT	85	200/250
CT	100	250/300
CT	160	T40/50
CT	230/350	T50/60
CT	285/350	T60/80
CT	500/700	T80/100

**PHOENIX**

*Phoenix dactylifera*

**PALM**

PALMERA DATILERA SPANISH PALMERA DE DATILS VALENCIAN DATE PALM ENGLISH DATTIER FRENCH

STRUCTURE		
Growth Habit MULTIPLE TRUNK	Height 20-50 M	Diameter 7 M
Habitat DESERT	CROWN YES	Root NORMAL/AERIAL

**DIVISION:** SPERMATOPHYTES  
**SUBDIVISION:** ANGIOSPERMS  
**TYPE:** MONOCOT  
**ORDER:** ARECALES  
**FAMILY:** ARECACEAE

**VARIETIES**

MORPHOLOGY		
<b>Stipe</b>	Size STRAIGHT/THIN	Diameter 40-60 CM.
	Surface + Fibers COVERED/OCHREA ATTACHED	Annular rings/scars: + SHEATH: ENTIRE/PARTIAL Spine: NO
<b>Leaf</b> TYPE: PINNATE SIZE: Leaf: 6-7 M Leaflet: 30-60CM TEXTURE: SMOOTH	Petiole SPINES	Leaflet arrangement REGULAR
	Leaflet shape LANCEOLATE	Threads NO
	Upper side MEDIUM GREEN	Lower side MEDI/LIGHT GREEN
	<b>Inflorescence</b> TYPE: SPATHE POSITION: INTERFOLIAR	Type UNISEXUAL
<b>Fruit</b> SIZE: 2.5-7 CM.	Size 1-2 M	Fragrant NO
	Type DRUPE	Color DARK BROWN
<b>Growth</b>	Edible YES	Fruiting season SEPT-NOV
	Rate SLOW	Longevity +100 YEARS



ECOLOGY		
<b>Climate</b> ALTITUDE: 0-200 M. IRRIGATION: MODERATE	Temperature -8C; H4; Z6	Drought resistant YES
	Sun exposure FULL SUN	Frost resistant MODERATE
<b>Soil</b> Ph: 5.5,-8.5 FERTILITY: MODERATE	Texture SANDY/OTHERS	Salt resistant YES
	Drainage HIGH	Lime resistant YES

USES			
<b>Resistances</b> COASTAL: 1ST LINE POLLUTION: HIGH WIND: HIGH	<b>Applications</b>		
	INTERIOR: NO	LINE: YES	
	RIVERBANKS: YES	WINDBREAKER: NO	GROUPS: YES

**POINTS OF INTEREST**

It is the best known palm tree and is also widespread in warm areas for its cultivation of dates. It can reach up to 600 years of age although it dies earlier due to wind breakage. A special feature that distinguishes it from the *Phoenix canariensis* is the emission of suckers from its base. The fruiting of this palm tree can be appreciated in specimens of 15 years with the fruit developing from 4 years.

MINIMUM EQUIDISTANCE: 3 or 4 M

**PLANTING AND PLANT HEALTH**

Propagation by seeds and suckers. Transplanting is easy during the summer time. It has low resistant to diseases caused by insects and fungi. This species is prone to the red palm weevil (*Rhynchophorus ferrugineus*).

**CHROMATIC CALENDAR**

FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
[Color-coded bars for foliage, flowering, and fruiting seasons]											
CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
[Color-coded bars for sowing, transplanting, and pruning]											
Sowing	Transplanting		Pruning		x						
TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
[Color-coded bars for fungicides, pesticides, and fertilizers]											
Fungicides	Pesticides		Fertilizers								

**COMMERCIALIZATION**

Presentation	Liters	Height (cm)
CT (3l)	60	
CT (7L)	80	
CT (10L)	100	
CT (15L)	120	
CT (30L)	140	
CT (50L)	150/175	
CT (50L)	175/200	
CT (70L)		20/30
CT (90L)		T30/40
CT (160/230L)		T60/80
CT (350L)		T100/125
CT (700L)		T175/200
CT (1000/1500L)		T450/500

**PHOENIX**

*Phoenix reclinata*

**Palm**

PALMERA DE SENEGAL SPANISH PALMERA DE SENEGAL VALENCIAN SENEGAL DATE PALM ENGLISH DATTIER DU SENEGAL FRENCH

STRUCTURE		
Growth habit MULTIPLE TRUNK	Height 6-10 M	Diameter 6-10 M
Habitat TROPICAL, COASTAL	Crown YES	Root ADVENTITIOUS

<b>DIVISION:</b>	SPERMATOPHYTES
<b>SUBDIVISION:</b>	ANGIOSPERMS
<b>TYPE:</b>	MONOCOT
<b>ORDER:</b>	ARECALES
<b>FAMILY:</b>	ARECACEAE

VARIETIES

MORPHOLOGY		
<b>Trunk</b>	Size CURVED, THIN	Diameter 10-18 CM
	Surface + Fibers Covered (-)	Sheathe ENTIRE/PARTIAL
<b>Leaf</b>	Petiole SPINES	Leaflet arrangement REGULAR
	TYPE: PINNATE Leaf: 6-7 M	Leaflet shape LANCEOLATE
	SIZE: Leaflet: 30-60 CM	Threads NO
	TEXTURE: SMOOTH	Upper side INTENSE GREEN
<b>Inflorescence</b>	Type UNISEXUAL	Reproduction DIOECIOUS
	TYPE: SPATHE POSITION: INTERFOLIAR	Size 90 CM
		Fragrant NO
<b>Fruit</b>	Type DRUPE	Color BROWN/RED
	SIZE: 2.5-7 CM	Edible YES
		Fruiting season SEPT-NOV
<b>Growth</b>	Rate MODERATE	Longevity +100 YEARS



ECOLOGY		
<b>Climate</b>	Temperature 1°C; G1/H5; Z7	Drought resistant YES
	ALTITUDE: 0-200 M. IRRIGATION: MODERATE	Sun exposure SUN/PARTIAL SHADE
<b>Soil</b>	Texture SANDY/OTHERS	Salt resistant YES
	pH: 5.5-8.5 FERTILITY: MODERATE	Drainage HIGH

USES			
<b>Resistances</b>	COASTAL: 2ND LINE	INTERIOR: NO	LINE: NO
	POLLUTION: MODERATE	RIVERBANK: YES	WINDBREAKER: NO
	WIND: HIGH	GROUP: YES	ISOLATED: YES

**POINTS OF INTEREST**

This species of palm has multiple curved trunks which are separated from each other. Its base has numerous basal shoots that form a rosette around the trunks. Native to Tropical Africa and usually found on riverbanks and near coasts. Suckers can be removed so that the rest of the tree can grow faster. It is important to remove old leaves. Pruning can be done throughout most of the year, although at the beginning of summer it is especially advisable. Its fruits are edible but bitter.

SPACING: 7-8 M

**PLANTING AND PLANT HEALTH**

Propagation by seed and suckers.  
Transplanting is easy and carried out in the summer months.

CHROMATIC CALENDAR											
FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC

CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
					X	X	X				
Sowing		Transplanting		Pruning							

TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Fungicides		Pesticides		Fertilizers							

COMMERCIALIZATION		
Presentation (L)	Total Height (cm)	Trunk Height (cm)
CT (3)		
CT (15)		
CT (30)		
CT (50)	150/200	
CT (85)	200/250	



**PHOENIX**

*Phoenix roebelenii* O'Brien

**PALM**

PALMERA DATILERA ENANA  
SPANISH

PALMERA NANA  
VALENCIAN

DWARF DATE PALM  
ENGLISH

DATTIER NAIN  
FRENCH

STRUCTURE		
Growth habit <small>SINGLE/MULTIPLE TRUNK</small>	Height 2-3 M	Diameter 2-2.5 M
Habitat <small>INFERIOR STRATUM</small>	Crown YES	Root NORMAL

<b>DIVISION:</b>	SPERMATOPHYTES
<b>SUBDIVISION:</b>	ANGIOSPERMS
<b>TYPE:</b>	MONOCOT
<b>ORDER:</b>	ARECALES
<b>FAMILY:</b>	ARECACEAE

VARIETIES

MORPHOLOGY		
<b>Trunk</b>	Size <small>CURVED/THIN</small>	Diameter 15-CM
	Surface+ Fibers <small>COVERED (-)</small>	Sheathe <small>ENTIRE/PARTIAL</small>
<b>Leaf</b>	Petiole <small>SPINES</small>	Leaflet arrangement <small>ALMOST REGULAR</small>
	Leaflet Shape <small>ACCUMINATE</small>	Threads YES
	Upper side <small>INTENSE GREEN</small>	Lower side GREEN
<b>Inflorescence</b>	Type <small>UNISEXUAL</small>	Reproduction <small>DIOECIOUS</small>
	Size 0.5 M	Fragrant NO
<b>Fruit</b>	Type <small>DRUPE</small>	Color GRAY
	Edible YES	Fruiting season <small>SPET-NOV</small>
<b>Growth</b>	Rate SLOW	Longevity >200 YEARS



ECOLOGY		
<b>Climate</b>	Temperature 5°C.G1.H7	Drought resistant YES
	Sun exposure <small>SUN/SHADE</small>	Frost resistant NO
<b>Soil</b>	Texture <small>SANDY/OTHERS</small>	Salt resistant NO
	Drainage <small>HIGH</small>	Lime resistant YES

USES		
Resistances	Applications	
COASTAL: 2ND LINE	INTERIOR: YES	LINE: YES
POLLUTION: MODERATE	RIVERBANKS: NO	WINDBREAKER: NO
WIND: LOW	GROUPS: YES	ISOLATED: YES

**POINTS OF INTEREST**

This is an excellent potted palm when young. In its adult stage, it can be grouped in different heights giving a unique set to the garden. Pruning can be done to remove old or dead leaves.

SPACING: 2M

**PLANTING AND PLANT HEALTH**

Propagation by seed. Transplanting is carried out during the summer season. Sensitive to diseases caused by insects and fungi.

CHROMATIC CALENDAR											
FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Sowing	■	■	■	■	■	■	■	■	■	■	■
Transplanting	■	■	■	■	■	■	■	■	■	■	■
Pruning	■	■	■	■	■	■	■	■	■	■	■
TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Fungicides	■	■	■	■	■	■	■	■	■	■	■
Pesticides	■	■	■	■	■	■	■	■	■	■	■
Fertilizers	■	■	■	■	■	■	■	■	■	■	■

COMMERCIALIZATION		
Presentation	Liters	Height (cm)
CT	3	
CT	7	25
CT	10	40
CT	12	50
CT	12	60/80
CT	15	80/100
CT	35	90/110
CT	60	150/175

**SABAL**  
PALM

*Sabal palmetto*

SABAL, PALMETO SPANISH VALENCIAN PALMETTO ENGLISH PALMIER DE FLORIDE FRENCH

STRUCTURE		
Growth habit SINGLE TRUNK	Height 6-20 M	Diameter 5-8 M
Habitat SUBTROPICAL, COASTAL	Crown YES	Root ADVENTITIOUS

<b>DIVISION:</b>	SPERMATOPHYTES
<b>SUBDIVISION:</b>	ANGIOSPERMS
<b>TYPE:</b>	MONOCOT
<b>ORDER:</b>	ARECALES
<b>FAMILY:</b>	ARECACEAE

VARIETIES	

MORPHOLOGY		
<b>Trunk</b>	Size STRAIGHT	Diameter 30-50 CM
	Surface+ Fibers COVERED (-)	Leaf scars: THIN Spines: NO
<b>Leaf</b> COASTAL PALMATE SIZE: Leaf: 2.5 - 3 M Leaflet: 50-60 CM TEXTURE: SMOOTH	Petiole NO SPINES	Leaflet arrangement NOTCHED
	Leaflet Shape DIVIDED 2/3	THREAD YES
	Upper side DARK GREEN	Lower side GREEN / GRAY
<b>Inflorescence</b> TYPE: PANICLE POSITION: INTERFOLIAR	Type HERMAPHRODITE	Reproduction HERMAPHRODITE
	Size 2.5 M	Fragrant YES
<b>Fruit</b> SIZE: 8-14 MM	Type DRUPE	Color BLACK
	Edible —	Fruiting season SEPT-NOV
<b>Growth</b>	Rate MEDIUM/SLOW	Longevity 100 YEARS



ECOLOGY		
<b>Climate</b> ALTITUDE: 0-400 IRRIGATION: MODERATE	Temperature -8°C; H5; Z6	Drought resistant YES
	Sun exposure FULL SUN	Frost resistant MODERATE
<b>Soil</b> pH: 6-7 FERTILITY: HARDY	Texture ALL TYPES	Salt resistant YES
	Drainage INDIFFERENT	Lime resistant YES

USES		
<b>Resistances</b> COASTAL: 1ST LINE POLLUTION: — WIND: YES	<b>Applications</b>	
	INTERIOR: NO	LINE: YES
	RIVERBANK: YES	WINDBREAKER: NO
	GROUPS: YES	ISOLATED: YES

**POINTS OF INTEREST**

This is a variable and widely distributed palm tree in tropical and subtropical zones. It grows in different habitats: coastal dunes, flood plains, riverbanks, etc. It is one of the few palm trees that resists flooding. It can develop tall new roots looking for fertile and moist soil and as a consequence, raise pavements. This palm accepts pruning. It can be used in coastal dune areas. It is the official tree of the state of Florida (USA).

SPACING: 5-6 M

**PLANTING AND PLANT HEALTH**

Propagation by suckers and reproduction by sowing mature seeds that germinate in 2-3 months. Difficult to transplant and should be carried out in the summer months. This species is resistant to pests and diseases.

**CHROMATIC CALENDAR**

FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC

CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
					X	X	X				
Sowing		Transplanting		Pruning							

TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Fungicides		Pesticides		Fertilizers							

**COMMERCIALIZATION**

Presentation (L)	Total height (cm)	Trunk height (cm)
CT (45)	250-275	
CT (70)	250-275	40
CT (80)	300-350	160-170
CT (80)	400-450	200-220
CT (80)	400-450	240

# SYAGRUS

# Syagrus romanzoffianum

## PALM

PALMERA DE LA REINA  
SPANISH

PALMERA DE LA REINA  
VALENCIAN

QUEEN PALM  
ENGLISH

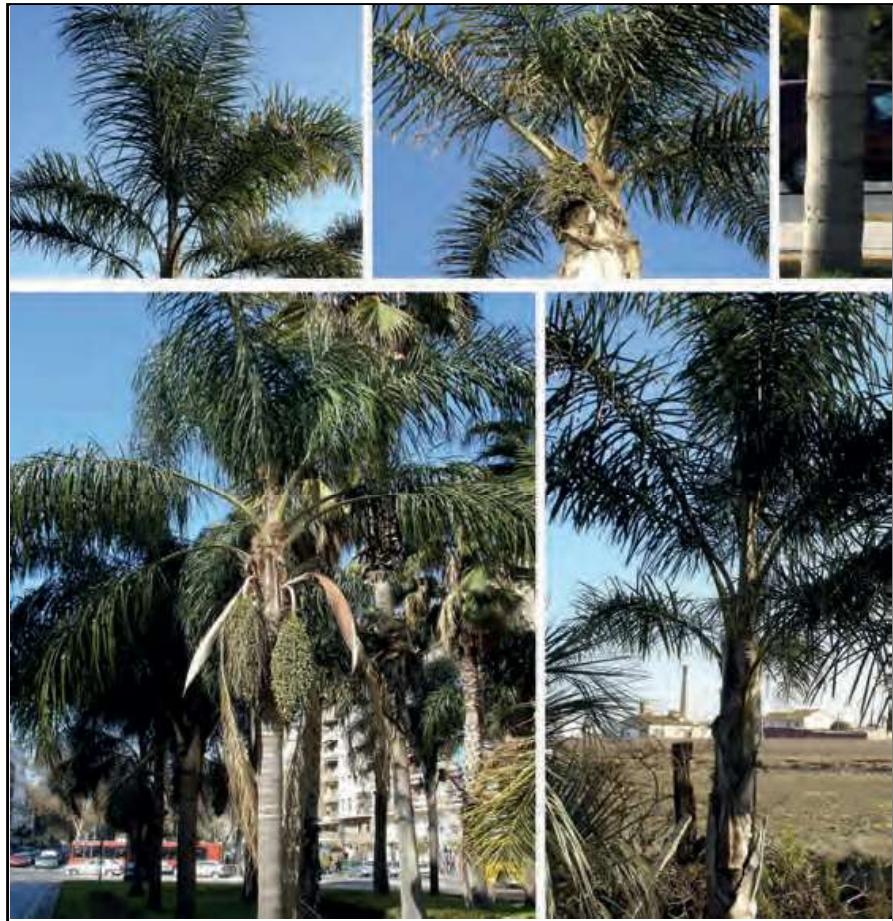
COCOTIER DE ROMANZOFF  
FRENCH

STRUCTURE		
Growth habit SINGLE TRUNK	Height 15-18 M	Diameter 4-6 M
Habitat COASTAL	Crown YES	Root NORMAL

<b>DIVISION:</b>	SPERMATOPHYTES
<b>SUBDIVISION:</b>	ANGIOSPERMS
<b>TYPE:</b>	MONOCOT
<b>ORDER:</b>	ARECALES
<b>FAMILY:</b>	ARECACEAE

VARIETIES

MORPHOLOGY		
<b>Trunk</b>	Size STRAIGHT, THIN	Diameter 30-60 CM
	Surface + Fibers NAKED/OVERLAPPED ORCHEA	Leaf scars SMOOTH /FISSURED
<b>Leaf</b>	Petiole SHORT BARE STEM	Leaflet arrangement REGULAR, DROOPING
	Leaflet Shape LANCEOLATE	Threads YES
	Upper side LIGHT GREEN	Lower side DARK GREEN
<b>Inflorescence</b>	Type UNISEXUAL	Reproduction MONOECIOUS
	Size 1.5-2 M	Fragrant NO
<b>Fruit</b>	Type DRUPE	Color ORANGE
	Edible WHEN TREE IS MATURE	Fruiting season AUG-NOV
<b>Growth</b>	Rate FAST	Longevity + 100 YEARS



ECOLOGY		
<b>Climate</b>	Temperature -8°C; H4; Z6	Drought resistant MODERATE
	Sun exposure FULL SUN	Frost resistant YES
<b>Soil</b>	Texture LOAMY/SANDY	Salt resistant NO
	Drainage MODERATE	Lime resistant YES

USES		
<b>Resistance</b>	<b>Applications</b>	
COASTAL: 1ST LINE	INTERIOR: -	LINE: YES
POLLUTION: MODERATE	RIVERBANKS: -	WINDBREAKER: No
WIND: HIGH	GROUPS: YES	ISOLATED: No

### POINTS OF INTEREST

Its feathery or frayed appearance is the result of numerous leaflets found on each leaf and therefore similar to the coconut palm (*Cocos nuccifera*). It is an excellent palm in alignments. It adapts to interiors with half light.

SPACING: 4-6 M

### PLANTING AND PLANT HEALTH

Propagation by seeds. Transplanting is easy at any size during the spring and summer months. Although in the Mediterranean area it is a disease-resistant palm, in other areas such as New Guinea and Australia, it is seriously affected by the caterpillar of the Palm Dart Butterfly (*Cephrenes spp*) causing serious damage to the leaves. This can be solved with carbaryl treatment at the dose recommended by the manufacturer. Two fungi affect the vigor and color of this species; *Phytophthora cinnamomii* and *Pestoliopsis spp.* (to prevent fungi, avoid waterlogging and treat with copper products when conditions are favorable for the disease).

### CHROMATIC CALENDAR

FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Sowing	■	Planting	■	Pruning	■	X					
TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Fungicides	■	Pesticides	■	Fertilizers	■						

### COMMERCIALIZATION

Presentation	Liters	Trunk Height (cm)
CT	10	
CT	30	
CT	50	
CT	70	
CT	160	180/200
CT	160	200/225
CT	230	225/250
CT	285	250/280

**TRACHYCARPUS**

*Trachycarpus fortunei* (Hooker) Wendland

**PALM**

PALMITO ELEVADO  
SPANISH

PALMERA EXCELSA  
VALENCIAN

HEMP PALM  
ENGLISH

PALMIER A CHANVRE  
FRENCH

STRUCTURE		
Growth habit SINGLE TRUNK	Height 10-13 M	Diameter 2-3 M
Habitat INFERIOR STRATUM	Crown YES	Root NORMAL

<b>DIVISION:</b>	SPERMATOPHYTES
<b>SUBDIVISION:</b>	ANGIOSPERMS
<b>TYPE:</b>	MONOCOT
<b>ORDER:</b>	ARECALES
<b>FAMILY:</b>	ARECACEAE

VARIETIES

MORPHOLOGY		
<b>Trunk</b>	Size STRAIGHT/THIN	Diameter 30-20 CM
	Surface + Fiber COVERED/SMOOTH/VELVET	Leaf scars:+ Spines: NO
<b>Leaf</b>	Petiole A LITTLE DENTATE	Leaflet arrangement BILOBED
	Leaflet shape DIVIDED 1/2	Threads YES
	Upper side DARK GREEN	Lower side LIGHT GREEN
<b>Inflorescence</b>	Type UNISEXUAL	Reproduction MONOECIOUS
	Size 20/30 CM	Fragrant NO
<b>Fruit</b>	Type BERRY	Color BLUE/GRAY
	Edible NO	Fruiting season OCT-NOV
<b>Growth</b>	Rate SLOW	Longevity >150 YEARS



ECOLOGY		
<b>Climate</b>	Temperature -17° C; H3, Z5	Drought resistant YES
	Sun exposure FULL SUN	Frost resistant YES
<b>Soil</b>	Texture SANDY/OTHERS	Salt resistant NO
	Drainage MODERATE	Lime resistant YES

USES		
<b>Resistances</b>	COASTAL: 2ND LINE	LINE: YES
	POLLUTION: HIGH	WINDBREAKER: NO
	WIND: LOW	ISOLATED: YES
	INTERIOR: NO	GROUPS: YES

**POINTS OF INTEREST**

Hessian fabric from its stipe or trunk is used in China as a lining material for hanging flower baskets.

SPACING: 150-200CM

**PLANTING AND PLANT HEALTH**

Propagation by seeds. Transplanting is carried out in spring or autumn. This species is resistant to pests and diseases.

CHROMATIC CALENDAR											
FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Sowing	■	Transplanting	■	Pruning	■	X					
TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Fungicides	■	Pesticides	■	Fertilizers	■						

COMMERCIALIZATION		
Presentation (L)	Trunk height (cm)	Total height(cm)
CT (2)		
CT (3)		
CT (7)		
CT (15)	60/80	60/80
CT (18)		T20/30
CT (24)		T30/40
CT (30)		T60/80
CT (75)		T80/100
CT (130)		T100/120
CT (160)		T120/140
CT (230)		T180/200

**WASHINGTONIA**

*Washingtonia filifera* (Linden) H. Wendland

**PALM**

PALMERA DE ABANICO DEL DESIERTO SPANISH PALMERA DE VENTALL VALENCIAN CALIFORNIA FAN PALM ENGLISH WASHINGTONIA FILAMENTEUSE FRENCH

STRUCTURE		
Growth habit SINGLE TRUNK	Height 15-20 M	Diameter 3-4 M
Habitat COASTAL	Crown YES	Root NORMAL

**DIVISION:** SPERMAOPHYTES  
**SUBDIVISION:** ANGIOSPERMS  
**TYPE:** MONOCOT  
**ORDER:** ARECALES  
**FAMILY:** ARECACEAE

**VARIETIES**

MORPHOLOGY		
<b>Trunk</b> Surface COVERED	Size STRAIGHT/STOUT	Diameter 60-80 CM
	Sheathe ENTIRE/PARTIAL	Leaf scars: THIN Spines: NO
<b>Leaf</b> PALMATE SIZE: Leaf: 1.5 M TEXTURE: SMOOTH	Petiole DENTATE	Leaflet arrangement FRAYED
	Leaflet shape DIVIDED 1/2	Threads YES
	Upper side LIGHT GREEN	Lower side LIGHT GREEN
<b>Inflorescence</b> TYPE: SPATHE POSITION: INTERFOLIAR/LONG	Type HERMAPHRODITE	Reproduction HERMAPHRODITE
	Size 3.5 M	Fragrant YES
<b>Fruit</b> SIZE: 6 MM	Type DRUPE	Color BLACKISH
	Edible NO	Fruiting season DEC
<b>Growth</b>	Rate MEDIUM	Longevity +100 YEARS



ECOLOGY		
<b>Climate</b> ALTITUDE: 0-400 M IRRIGATION: MODERATE	Temperature -3°C; H5; Z6	Drought resistant YES
	Sun exposure FULL SUN	Frost resistant LOW
<b>Soil</b> pH: 5.5-9 FERTILITY: MODERATE	Texture LOAMY/SANDY	Salt resistant YES
	Drainage MODERATE	Lime resistant YES

USES			
<b>Resistances</b> COASTAL: 1ST LINE POLLUTION: MODERATE WIND: YES	<b>Applications</b>		
	INTERIOR: NO	LINE: YES	
	RIVERBANKS: -	WINDBREAKER: YES	
	GROUPS: YES	ISOLATED: YES	

**POINTS OF INTEREST**

This is a straight and stout palm species and thickened at its base (120 cm). It is usually found isolated and as a windbreaker where the plant is unpruned and in different sizes. Some species can be as old as 500 years.

SPACING: 3-6M

**PLANTING AND PLANT HEALTH**

Propagation by seeds.  
Transplanting is difficult even in the spring-summer season. This species is prone to fungal diseases and pests.

**CHROMATIC CALENDAR**

FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC

CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Sowing											

TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Fungicides											

**COMMERCIALIZATION**

Presentation(L)	Total height (cm)	Trunk height(cm)
CT (3)	60/80	
CT (7)	80/100	
CT (30)		T100/120
CT (30)		T120/140

# WASHINGTONIA

# Washingtonia robusta H. Wenland

## PALM

WASHINGTONIA MEXICANA  
SPANISH

WASHINGTONIA ROBUSTA  
VALENCIAN

MEXICAN FAN PALM  
ENGLISH

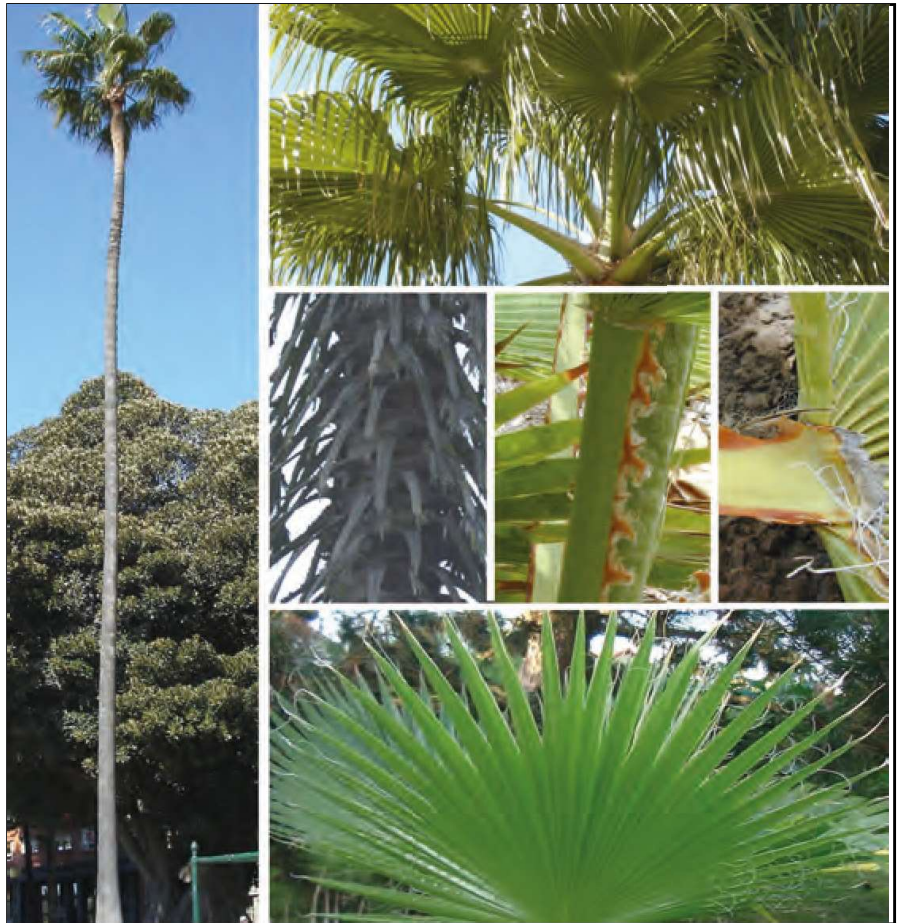
PALMIER DU MEXIQUE  
FRENCH

STRUCTURE		
Growth habit SINGLE TRUNK	Height 25-30 M	Diameter 2-4 M
Habitat EMERGENT	Crown YES	Root NORMAL

<b>DIVISION:</b>	SPERMATOPHYTES
<b>SUBDIVISION:</b>	ANGIOSPERMS
<b>TYPE:</b>	MONOCOT
<b>ORDER:</b>	ARECALES
<b>FAMILY:</b>	ARECACEAE

VARIETIES

MORPHOLOGY		
<b>Trunk</b>	Size STRAIGHT/THIN	Diameter 25-30 CM
	Surface + Fibers COVERED	Leaf scars: THIN Spines: NO
<b>Leaf</b>	Petiole DENATE	Leaflet arrangement BILOBED
	Leaflet shape DIVIDED 1/2	Threads YES
	Upper side GREEN	Lower side GREEN
<b>Inflorescence</b>	Type HERMAPHRODITE	Reproduction HERMAPHRODITE
	Size 2-3 M	Fragrance YES
<b>Fruit</b>	Fruit DRUPE	Color BLACKISH
	Edible NO	Fruiting season SEPT-NOV
<b>Growth</b>	Rate MEDIUM/FAST	Longevity + 100 YEARS



ECOLOGY		
<b>Climate</b>	Temperature -3°C; H5; Z6	Drought resistant YES
	Sun exposure SUN/SHADE	Frost resistant MODERATE
<b>Soil</b>	Texture ALL TYPES	Salt resistant YES
	Drainage INDIFFERENT	Lime resistant YES

USES		
<b>Resistances</b>	Applications	
	COASTAL: 1ST LINE	INTERIOR: NO LINE: YES
POLLUTION: MODERATE	RIVERBANKS: -	WINDBREAKER: YES
WIND: HIGH	GROUPS: YES	ISOLATED: YES

**POINTS OF INTEREST**  
Native to Northeastern Mexico and California. This species of palm is characteristic for its erect, thin trunk which becomes thicker at its base (reaching 110 cm in this particular species). It is used as a street tree and windbreakers where it can be found in groups of different heights and without pruning. It can reach more than 500 years in age. A differentiating element with other *Washingtonias* is the white tomentum at the beginning of the base of the petiole.

**PLANTING AND PLANT HEALTH**  
Seeds take 20 to 30 days to germinate. Transplanting is difficult even in spring-summer. This species is prone to fungal diseases.

CHROMATIC CALENDAR											
FOLIAGE, FLOWERING AND FRUITING SEASON											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
CULTIVATION CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Sowing	■	Transplanting	■	Pruning	■	x					
TREATMENT CALENDAR											
JAN	FEB	MAR	ABR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
■	■	■	■	■	■	■	■	■	■	■	■
Fungicides	■	Pesticides	■	Fertilizers	■						

COMMERCIALIZATION		
Presentation(L)	Liters	Height (cm)
CT (3)	60/80	
CT (7)	60/100	
CT (8)		T20/25
CT (15)		T25/30
CT (40)		T35/40
CT (45L)		T50/60
CT (70)		T60/80
CT (90)		T80/100
CT (100)		T100/125
CT (210)		T125/150
CT (240)		T150/170
CT (285)		T175/200
CT (350)		T200/500

**Subchapter 4.3 Commercialization, use and planting**

**COMMERCIALIZATION**

Palm trees can be commercialized in root ball or container.

**Presentation of root system**

Palm trees can be classified according to their ability to develop new roots. This classification is essential as it will determine the ease or complexity with which we can transplant palm trees (See Table 4.3.1). This classification must be considered as it will determine the most suitable marketing conditions for each species (in root ball or in container).

GROUP	SPECIES
VERY COMPLICATED TRANSPLANT	<i>Howea fosteriana</i>
COMPLICATED TRANSPLANT	<i>Brahea armata</i> <i>Butia capitata</i> <i>Juabaea chilensis</i> <i>Livistona australis</i> <i>Livistona chinensis</i> <i>Phoenix canariensis</i> <i>Sabal palmeto</i>
EASY TRANSPLANT	<i>Chamaerops humilis</i> <i>Phoenix dactylifera</i> <i>Phoenix reclinata</i> <i>Phoenix roebelenii</i> <i>Syagrus romanzoffianum</i> <i>Trachycarpus fortunei</i> <i>Washingtonia filifera</i> <i>Washingtonia robusta</i>

**Table 4.3.1: Palm tree species according to transplant complexity (NTJ 07P COITAPAC)**

*Field cultivation*

Depending on the type of palm tree, the root pruning operation will be essential, convenient, or not required according to the following Table 4.3.2:

<i>Brahea armata</i>	Essential
<i>Butia capitata</i>	Convenient
<i>Chamaerops humilis</i>	Not necessary
<i>Howea fosteriana</i>	Essential
<i>Livistona chinensis</i>	Convenient
<i>Phoenix canariensis</i>	Convenient
<i>Phoenix dactylifera</i>	Not required
<i>Syagrus romanzoffianum</i>	Not required
<i>Trachycarpus fortunei</i>	Not required
<i>Washingtonia filifera</i>	Not required
<i>Washingtonia robusta</i>	Not required

**Table 4.3.2: Root pruning for palm trees. (NTJ 07P COITAPAC)**

### *Container*

When palm trees are cultivated in containers, it is also essential to carry out a root pruning that will reduce the root ball.

The root pruning or change of container will be done every two years, except for very slow-growing palm trees.

When root pruning, instead of putting the plant in a container, it can also be placed in a ditch with sandy soil. This will keep the plant moist and encourage the development of new roots. With this system, the maximum storage time for a palm tree is two years.

### **Dimensions to consider in the supply and commercialization**

#### *Aerial part*

In palm trees with a single trunk, the height of the trunk must be measured, indicating whether or not it has a crown shaft.

In multiple trunk palms (clumped) or for groups of palms, the number of trunks or stipes thicker than 30 cm and the sum of the heights of all of them or the number of stipes and the total height of the group should be provided.

The thickness of the stipe will be measured at 1.30 m above the root neck.

#### *Underground part*

The size of the root ball must be proportional to the type of growth and structure of the species or variety, the development of the plant and the soil conditions.

Palm trees must be supplied with a root ball of minimum dimensions. The width of the root ball is measured using the distance between the outer face of the stipe (trunk) and the edge of the root ball, this minimum distance will be 20 cm. This is valid for specimens of single trunk palm trees with a stem height of less than 5 m.

For palm trees with a thick stem such as *Phoenix canariensis*, palm trees with a stem of more than 5 m and multiple trunk palms or groups, this minimum width distance of the root ball will be 30 cm. For small palm trees, the distance to be considered will be 15 cm.

The depth of the root ball will be equal to the diameter of the root ball.

$$\text{Depth of root ball (in cm)} = \text{Diameter of root ball (in cm)}$$

If the supply of palm trees is in a container, the minimum space between the stipe and the inner side of the container will be 25 cm. As in the previous case, if the palms have a thick stem, or have a stem height of more than 5 m, or are multiple trunk palms, or are a group, the distance between the stem and the interior of the container will be 35 cm.

The variations allowed in the height of the stipe in the supply of the palm trees will be +/- 5% of the height indicated on the delivery note.



**General supply specifications**

- Palm trees may only be marketed by authorized suppliers and must meet the conditions specified in this subchapter.
- A stout trunk is a sign of high quality (the thicker the trunk, the better). A palm tree that has very long leaves and a very thin trunk (etiolation) reveals that it has been grown in a very narrow plantation frame and it has grown lengthways seeking the light. This is a sign of inferior quality.
- The trunk must be straight and vertical, without the presence of wounds, cracks, or notches.
- If a batch is supplied, all specimens must be homogeneous in size and quality.
- The stipes may only be cleaned (shaved or skinned) once the final planting has been carried out.
- The conditions for the supply of plant material in NTJ 07A: CALIDAD GENERAL are applicable.

When a palm tree is supplied in a root ball, it must be covered with a biodegradable (within a year) material such as hessian fabric or similar; or with a material that can be removed at the time of planting, for example: metal mesh or plastic film.

The leaves are collected and tied up to facilitate the transport of the palm tree and protect the apical meristem (terminal bud). In some species all the leaves are surrounded by a wattle (*Phoenix dactylifera*). This bundle of leaves will be maintained until the palm tree has taken root and new leaves are seen sprouting.

Together with the tying of leaves, they are also shortened to reduce evapotranspiration and facilitate rooting.

GROUP	PERIOD BETWEEN ROOT PRUNING AND SUPPLY
VERY COMPLICATED TRANSPLANT	6 to 12 months
COMPLICATED TRANSPLANT	4 to 6 months
EASY TRANSPLANT	2 to 3 months

**Table 4.3.3: period of safety between root pruning and planting (NTJ 07P COITAPAC)**

The roots will be perfectly cut, without tears or rot.

Palms supplied in containers should be in a container large enough for the new roots to develop in such a way that the root ball maintains its shape on delivery and is compact when removed. The roots should not protrude through the drainage holes.

Container grown palms should be sold by plant size and container volume.

The container should be rigid enough to support the shape of the root ball, protecting the roots during transport.

Stipes	During loading and unloading, avoid strong pulling with the crane. Use nonmetallic straps or slings, which do not slip. Protect the attachments avoiding wounds, burns, and marks.
Multiple or branched stipes	Fasten them
Long and thin stipes	Once the root ball has been formed, try to place it on ground carefully, avoiding jerks and swaying. When loading and unloading, hold them with two straps or slings keeping the stipe horizontal. Fasten them with brackets to prevent breakage and tearing.
Inflorescence and infructescence	It is advisable to remove them
Leaves	Cut dry and damaged ones maintaining a balance between the crown and the root system. During transport, tie the leaves down with wet carp as protection against blows and drying out, without producing excessive pressure that could damage them.
Spear leaf and crown shaft	Avoid bumps and sudden movements. Protect the central bud or spear against excessive heat and drying out.
Root ball	Protect it against excessive heat and drying out.

Table 4.3.4: Conditions in supply and transport of palm trees. (NTJ 07P COITAPAC)

### Planting periods

The appropriate planting time, especially for palm trees supplied in root ball, will be the time of greatest biological activity of the plant, which in temperate climates coincides with the end of spring and summer. Although it is necessary to avoid planting in the hottest season.

FACTORS TO CONSIDER			PLANTING PERIOD											
Type of supply	Planting areas	Species	J	F	M	A	M	J	J	A	S	O	N	D
In container	Spain (including Canary Islands)	Any	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
With root ball and root pruned	Spain (including Canary Islands)	Any	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
With root ball not root pruned	Spain	<i>Chamaerops humilis</i> <i>Phoenix canariensis</i>					Green	Green	Green		Light Green			
		<i>Phoenix dactylifera</i> <i>Washingtonia sp.</i>					Green	Green	Green		Light Green			
		<i>Butia capitata</i> <i>Trachycarpus fortunei</i>				Green	Green	Green			Light Green	Light Green		
With root ball not root pruned	Canary Islands	In container	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green

Preferred time

Complementary

Table 4.3.5. Planting period. (NTJ 07P COITAPAC)

### Planting project

Follow the guidelines set out in chapter 1:

- Digging the planting pit
- Soil conditioning
- Placement
- Staking (if necessary)
- First irrigation
- Mulching (if necessary)

To guarantee successful planting these steps should be carried out as carefully as possible.

**Staking** is very important. If the palm tree is not stable, when the new roots develop, they will break and therefore rotting will not take place. The way to fix the plant is by placing three stakes arranged around the trunk in a reasonable way. One end will rest on the trunk and the other on the ground. To avoid slipping, plaster is used to fix them into place.

**Irrigation after planting.** Once the planting has been carried out, the planting pit should be filled with a large amount of water so that the root system is completely wet. The soil must be at field capacity. The supply of water must be done at low pressure so ensure no loss of soil. To ensure that the water reaches the base of the palm tree, a tube of corrugated plastic material can be placed while it is being planted, connecting the base of the root ball with the outside, thus ensuring water flow to the bottom of the pit.

**Untying of leaves.** As previously mentioned, once the new leaves appear, the crown of leaves can be untied, since the palm tree will have rooted correctly.

## Subchapter 4.4

## Maintenance

Maintenance operations are similar to those described in previous chapters of this book. Below is a detailed description of the pruning process since it is one of the most important maintenance operations for palm trees.

### PRUNING

Pruning is intended to eliminate dry or semi-dry leaves as well as shoots, inflorescences, and fruit (date) clusters.

The old leaves will be cut flush with the stipe. If the sheath and petiole do not come away easily, they should be preserved.

The distance from the pruning cut to the trunk should be uniform.



Figure 4.4.1 Different types of cuts. (NTJ 07P COITAPAC)

The cuts will be clean and will not cause tears. The cuts will be aimed directly at the palm tree, never from the side, to prevent injury to the pruner. In the case of leaf pruning, the cut will be made from the back to the front. In the case of profiling the crown shaft, the pruning will be carried out from the bottom to the top.

### Leaf removal

In adult palm trees, it is recommended to cut only the dry leaves, respecting the spherical shape of the crown as much as possible. The removal of too many leaves weakens the plant and makes it more prone to pests and diseases.

In palm trees located by the sea, it is advisable not to cut the semi-dry leaves as they protect the plant from saline winds.

When pruning green leaves for maintenance reasons, it is advisable to remove a ring of green leaves, but always from the area with mature ones, never from the area with adult or young leaves. See figure 4.4.2:

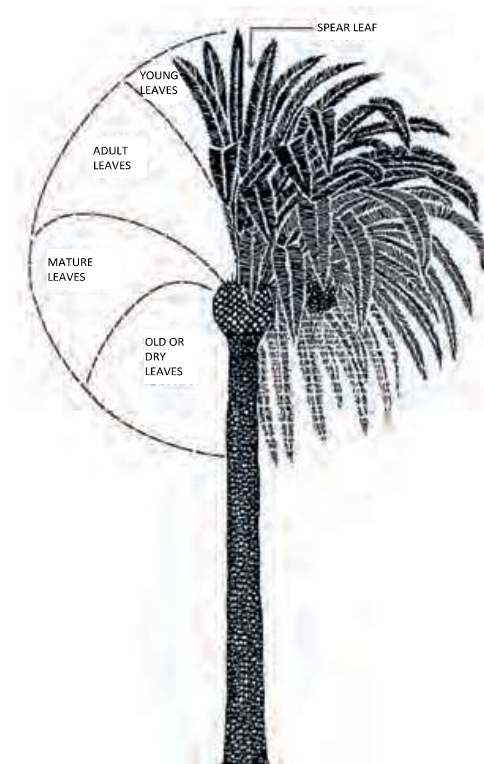


Figure 4.4.2: Area to eliminate leaves. (NTJ 07P COITAPAC)

When pruning in pedestrian or road areas:

- Hold the leaf with one hand and cut the petiole but not completely, so the leaf remains hanging and when making the definitive cut of the petiole, the leaf will fall without posing a safety risk.

When pruning young palm trees, the following operations will be considered:

- Adjustment of axillary buds so that they are kept at the same distance from the stipe.
- Removal of dead leaves.
- Reduction of the length of the unwanted green leaves to 1/3, instead of cutting them completely.
- Loosely tie the leaves but not too tight.

In addition, it must be considered that palm trees with a trunk height of less than 2 m should not be planted on public roads. They can be bothersome to passers-by. To avoid this, lower leaves might be removed but this might harm the growth of the pruned palm tree.

### Pruning tools

The pruning must be done by specialized professionals, especially large specimens due to the risks that this entails (height pruning).

In these cases, climbing equipment (see figure 4.4.3) clamp arches, or approved machinery (hydraulic platform, hydraulic ladder, crane with basket, lifting basket) will be used to reach the crown. Climbing spikes or cleats should never be used as they cause wounds in the stipe and therefore can spread diseases and damage the trunk.



Figure 4.4.3: Clamp arches

Chainsaws and handsaws are the main tools for pruning. In addition, specific tools can be used for some pruning operations (see figure 4.4.4).

- To cut pinnate leaves: cutters, hook, chainsaw.
- To cut palmate leaves: gardener’s handsaw, chainsaw.
- To eliminate inflorescence-infructescence of species with pinnate leaves: palm hook, pruning hook.
- To eliminate inflorescences-infructescence of species with palmate leaves: gardener’s saw.
- To shape the crown shaft: cutters, chainsaw.
- To eliminate suckers: cutters, gardener’s saw, chainsaw.
- To clean the stipe: cutters, chainsaw.



Figure 4.4.4: tool used for pruning palm trees (NTJ 07P COITAPAC)

### Shaping the crown shaft

In those species of palm trees that keep their leaves for 3 or 4 years, it is recommended to define the crown shaft in the pruning operation, even if its purpose is only ornamental.

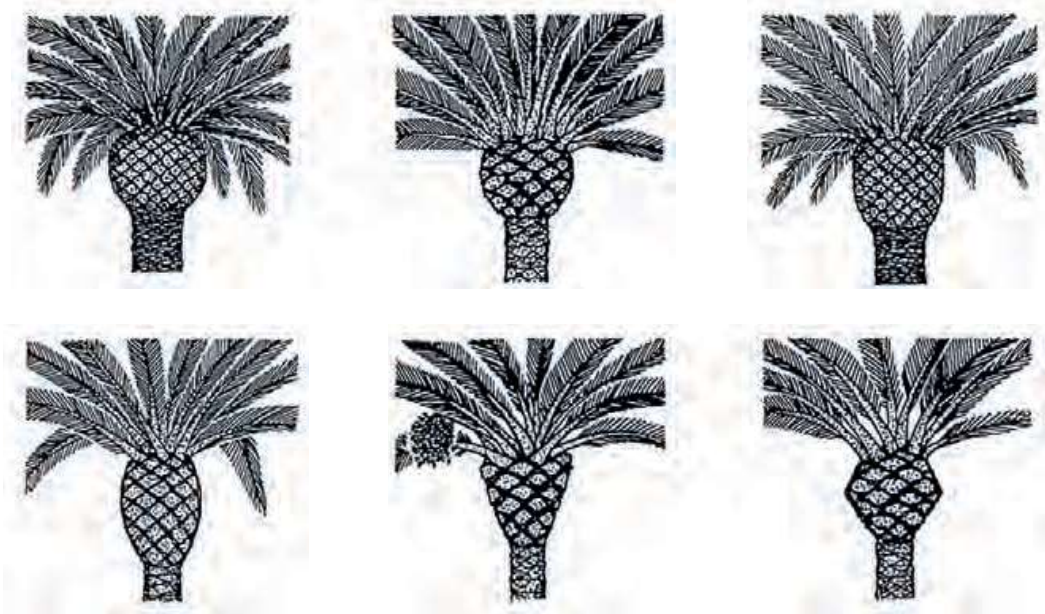


Figure 4.4.5: Different types of crown shafts (NTJ 07P COITAPAC)

Cuts used on crown shafts also depend on the geographic areas. See figure 4.4.6.

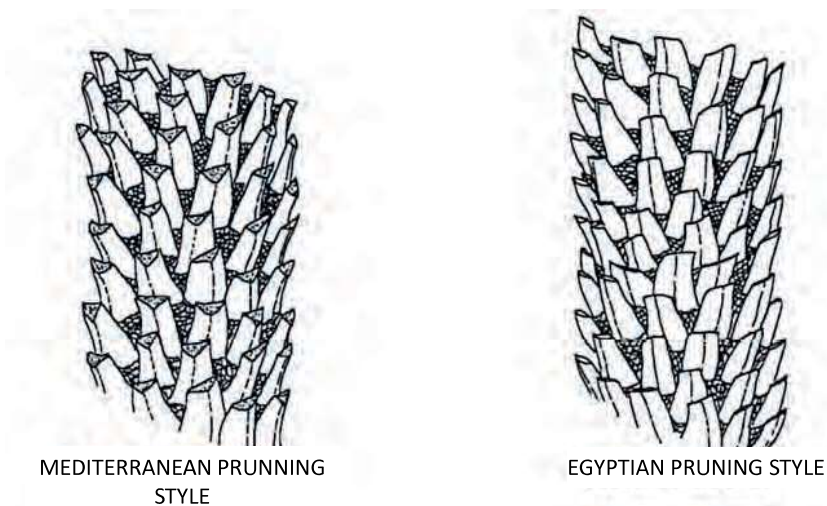


Figure 4.4.6: Types of cuts used for the crown shaft (NTJ 07P COITAPAC)

### Cleaning

The stipe is cleaned in species with persistent leaves for aesthetic and safety reasons or when the leaves have died, and the surface of the stipe is no longer uniform. In this case, peel the stipe from the base to the area where the leaves have fallen.

It is only recommended to clean the stipe when the dry petioles come off easily.

In *Phoenix dactylifera* this operation is not necessary since the dead leaves acts as a protective shield against environmental erosion and harsh weather.

In *Washingtonia robusta* the trunk is self-cleaning.

In *Trachycarpus fortunei* the hessian cloth should not be removed.

### Pruning frequency

For safety reasons (prevent leaves or fruits to fall over people), cleaning and pruning of palm trees in streets must be carried out more frequently than in gardens. On streets, pruning is recommended from 1 to 3 years and in green areas from 3 to 6 years. In general, pruning takes place when dry leaves may pose a safety risk or when aesthetics require it.

According to species, the frequency is as follows (see Table 4.4.1):

SPECIES	RECOMMENDED FREQUENCY	RECOMMENDED MINIMUM FREQUENCY
<i>Brahea armata</i>	2 – 3 years	5 – 6 years
<i>Butia capitata</i>	2 – 3 years	5 – 6 years
<i>Chamaerops humilis</i>	1 – 2 years	
<i>Jubaea chilensis</i>	1 – 2 years	
<i>Livistona australis</i>	2 – 3 years	5 – 6 years
<i>Phoenix canariensis</i>	2 – 3 years	4 – 5 years
<i>Phoenix dactylifera</i>	2 – 3 years	3 – 4 years
<i>Syagrus romanzoffianum</i>	2 – 3 years	4 years
<i>Trachycarpus fortunei</i>	2 years	3 years
<i>Washingtonia filifera</i>	2 years	3 years
<i>Washingtonia robusta</i>	2 years	3 years

Table 4.4.1: Pruning frequency. (NTJ 07P COITAPAC)

### OTHER MAINTENANCE OPERATIONS

- Improvement, fertilization, mulching replacement
- Weeding
- Irrigation



- Pest Control:

Due to its importance and severity as a pest, the characteristics and existing treatments for the red palm weevil or ferruginous curculionid (*Rhynchophorus ferrugineus* Olivier) are presented below. This species of beetle native to tropical Asia and Polynesia has spread rapidly throughout subtropical and temperate areas of the planet. In Spain it has been especially devastating with the Canary Islands palm (*Phoenix canariensis*) and, secondly, with the date palms (*Phoenix dactylifera*), although other palms such as *Butia capitata*, *Caryota maxima*, *Cocos nucifera*, *Livistona decipiens*, *Roystonea regia*, *Phoenix theophrasti*, *Phoenix sylvestris*, *Sabal umbraculifera*, *Trachycarpus fortunei*, *Washingtonia robusta* and *W. filifera* are equally susceptible.

The species have a characteristic reddish color, a size of 2 to 5 cm and a beak-shaped extension of the head, where the club-shaped antennae are located. Adults can fly long distances (up to 4-5 km) and access the trees by climbing the crowns, where the female deposits eggs (1 to 2 mm) in feeding galleries and move towards the center (the heart) of the palm of tree, making its detection difficult. The larvae can reach 5 cm in length, have a stocky shape, are ivory white to ocher in color with a brown head. Red weevil insects are legless and can excavate holes up to one meter long (3.3ft) thereby weakening and eventually killing the host plant. After living inside the trunk and at the bases of the palms, the larvae produce a brownish cocoon made of the fibers of the palm tree and transform into pupae. After a cycle lasting 3 to 4 months, they turn into adult beetles. This complete life cycle takes place in the same palm tree. It has been reported that the weevil is able to complete several generations in a year. Frequently, several generations can be passed in the same host tree before the tree collapses when they will fly to another tree and begin the process all over again.



Figures 4.4.7 and 4.4.8. *Phoenix canariensis* affected by the red palm weevil or ferruginous curculionid (left) and adult red palm weevil or ferruginous curculionid (right). (source: Regional Ministry of Agriculture, Fisheries and Food of the Valencian Region)

In all cases, and even though the infested palm tree initially does not show symptoms, the attack of the red weevil will kill the tree unless treatments or controls are carried out. If the attack occurs at the apex, it loses the arrow of young leaves, which are easily detached when pulled, and the palm tree dies quickly. These symptoms are very frequent in the Canary Islands palm tree.

Common symptoms include:

- Serrated (eaten) leaflets on the young and central leaves
- The presence of tilted leaves and/or with a drooping appearance
- As the attack progresses, the plume breaks and falls due to the wind

As a diagnostic test, it is observed that, when the affected leaves are pulled, they come away easily and the excavated holes made by the larvae are exposed. Frequently, the cocoons of the pupae give off a characteristic acidic odor.

Detection is key in controlling this pest. Once present, different methods can be used, although none of them have been proven completely effective to date.

### Chemical treatment

Authorized chemical products are available as a preventive and curative treatment. Combined with biological treatments with entomopathogenic nematodes, they offer interesting results in pest control and prevention. Currently the following active materials are authorized (see possible updates on the website of the Ministry of the Environment and Rural and Marine Environment):

ACTIVE MATTER	CULTIVATION OF ORNAMENTAL PALM TREES	PARKS AND GARDENS	OUTDOOR PRIVATE GARDENS
Clorpirifos (48%)	YES	YES	YES
Fosmet (50%)	YES	NO	NO
Imidacloprid (50%)	YES	YES	YES
Tiametoxan	YES	YES	YES

Table 4.4.2. Active materials used to fight the infestation the red weevil (Source: Ministry of Environment and Rural and Marine Environment, Government of Spain, 2010)

The season to carry out the treatments depends on the activity of the insect. In the coldest months (December to February) they lay dormant and become active again in March and reach a peak in population in spring and autumn. The application of the product must be carried out on the bud and the upper part of the trunk, with plenty of spray solution so that it penetrates deeply into the galleries. These products cannot, however, be applied to palm trees whose dates are intended for human consumption.

### Biological treatment

The *Steinernema carpocapsae* nematode is a microscopic organism that parasitizes living forms of *Rhynchophorus ferrugineus*, offering a valuable alternative or complementary tool to chemical insecticides, both in preventive and curative fights. Nematodes are sold in powder form and must be mixed in water for subsequent foliar application using a backpack with an agitator and a process that has guaranteed the cold chain of the product until the moment of application.

### Treatment Calendar

As a guide and in accordance with the indications of the Department of Agriculture, Fisheries and Food of the Valencian Community, the following calendar is suggested.

TREATMENT	TIME
<i>Imidacloprid 20%</i>	First week of March
<i>Clorpirifos 48%</i>	First week of April
<i>Clorpirifos 48%</i>	First week of May
<i>Steinernema carpocapsae</i>	Mid-June
<i>Steinernema carpocapsae</i>	End of July
<i>Imidacloprid 20%</i>	Mid-September
<i>Clorpirifos 48%</i>	Mid-October

**Table 4.4.3** Schedule for treatments against the red palm weevil or ferruginous curculionid  
(source: Regional Ministry of Agriculture, Fisheries and Food of the Valencian Region)

### Recommendations on pruning palm trees

Since the weevil attack often occurs due to existing wounds on the palm tree, it is not recommended to carry out pruning work on affected areas but if absolutely essential, only dry palms should be pruned.

The pruning of green palms should be avoided. Pruning will be carried out from January to February, avoiding severe pruning and applying an insecticide treatment after the cut or covering the cut areas with mastic or healing paste. These treatments will be significant in the case of pruning during the period of greatest insect activity (between May and December).

## Subchapter 4.5

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