

# Essential Palms

Palms are highly successful monocots, among the earliest flowering plants, and one of the most widespread type of plants on the globe. While most of them are native to tropical and subtropical climates, palms inhabit nearly every type of habitat, from rainforests to desert areas. Palms also exhibit an enormous diversity in physical characteristics, but most are distinguished by their large, compound, evergreen leaves arranged at the top of an unbranched stem. They can be climbers, shrubs, stemless, and tree-like. They are among the best known and most extensively cultivated plant families and have been important to humans throughout much of history. Many common products and foods are derived from palms. While palms appear to be trees, they are more closely related to grass, corn, and rice. Currently there are 181 genera with around 2600 known species.

## What makes a Palm a Palm?

- Palms are monocots, meaning they are closely related to grasses and bamboos. They are notable among monocots for their height and for the size of their seeds, leaves, and inflorescences (flowers).
- Palms have a single apical meristem often called a 'bud' or a 'heart'. They can grow very fast because they invest less energy in defending themselves against insect damage than deciduous trees.
- Palms also developed into very large 'trees' and are the biggest monocots. They tend to grow to their maximum diameter and then grow tall.

## Natural History

Palms are among the earliest of all flowering 'trees.'

- They appeared around 80 million years ago during the Late Cretaceous Period (time of the dinosaurs). By 60 million years ago (mya) they had spread across the world with many of the modern genera of palms already widespread and common.
- In evolutionary terms, this early arrival gave palm trees time to develop very complex lifestyles and reproductive strategies that include close relationships with specific insects.

## STRUCTURE

Palms exhibit a wide variety of overall forms and external structures (morphology) and internal structures (anatomy).

## Leaves

The leaves are the best place to start when trying to identify a palm.

- Palm leaves are evergreen and range from small to gigantic. They grow from the top of the stem, which is referred to as the crown or canopy.

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- Fronds can take three to five years to mature. As an old frond dies, a new one emerges from the bud area of the crown and consists of a tubular sheath at the base that usually splits open on one side at maturity.
  - An entire frond is composed of a single leaf. Fronds come in two main types: Fan leaved (palmate) and feather leaved (pinnate).
  - **Palmate** fronds are shaped like a fan with the leaves spreading out from a single point on the leaf stalk. These leaves give palm trees their descriptive name because they are shaped like a hand, with a center structure known as a stem or petiole.
    - **Palmate:** fan shaped leaves radiate from a single stalk/petiole
    - **Costapalmate:** fan shaped leaves where the petiole extends into the leaf
    - **Entire:** fronds are unsegmented and form a large single leaf
  - **Pinnate** fronds have leaflets or sections arranged along both sides of a long leaf stalk, like a feather or fishtail. Leaflets can be arranged in opposite, alternate, or (in rare cases) spiral patterns.
    - **Pinnate:** individual leaflets branch off the main stalk
    - **Bipinnate:** each individual leaflet has several sub-leaflets giving the frond a fern-like or fishtail appearance
    - **Entire:** fronds are unsegmented and form a large single leaf

### Stems or Trunks

Palm stems (trunks) vary considerably in dimensions and appearance among species.

- A typical palm stem is composed of hundreds to thousands of conducting strands scattered in softer ground tissue. The central region is larger and softer than the outer region, which often is composed of densely packed fibers. Such a construction accounts for the ability of palms to withstand winds that break ordinary trees.
- Unlike the trunks of broadleaf (dicot) and coniferous (Gymnosperm) trees, palms do not have classic bark.
  - The surface of the trunks may be smooth to extremely rough and knobby, and may be armed with sharp spines.
  - Some species display prominent and often attractive leaf scars on their stems, which were points where leaves were attached to the stem.
- Palm stems/trunks are characterized by having a single apical meristem or growing point, which is also referred to as the bud or heart. All new growth develops from the apical meristem.
  - Death of the apical meristem in a palm results in the death of that stem in clustering species and death of the entire palm in single-stem species.
- Palms may be single stemmed or multi-stemmed (clustering) as a result of branching from axillary buds low on the stem.

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## Roots

- Contrary to urban legends, palm tree roots do not grow to equal the height of the plant's stem. Instead, they grow in a root ball and roots regularly regenerate from the root ball and jut out in all directions, drawing nourishment and water from a wide swath of ground.
- Most roots are underground but, in some palms, adventitious roots may form a mound above ground or appear at intervals along the stem. Stout prop roots forming a dense or open cone are found at successive nodes along the stem of certain varieties of palms. These roots tend to grow straight down.

## Flowers, Fruits, and Reproduction

Reproduction in palm trees is complicated.

- Depending on the species, it takes palms anywhere from three to 40 years to flower for the first time.
- Palms reproduce both sexually (with flowers and seed) and vegetatively (by producing new shoots from near the base of the trunk that can root to become new plants).
- In flowering palms, male and female flowers are sometimes on the same individual (hermaphrodite) plant, but more often they are on separate male and female plants.
  - The flowers are very diverse in structure, size, and color and are usually based on a three-part plan.
  - Even when the flowers are easily overlooked, the structures (rachillae) that bear the flowers are usually big and obvious.
- The majority of palm fruits are inedible, but many palm species have a flesh around the seeds that is tasty to wildlife or to humans. When the fruits are eaten, the fleshy exterior gets digested, and the seed passes through the digestive tract unharmed, often far away from the parent plant.

## Human History (Ethnobotany)

Many of the approximately 2,800 known species of palms are economically important. Palms furnish food, shelter, clothing, timber, fuel, building materials, fibers, starch, oils, waxes, wines, and a host of minor products for indigenous populations in the tropics.

- For centuries they have provided most of the necessities of life for humans. Within rainforests and along their borders, whole communities have depended on palms for their livelihood.
- These many products can be divided into a dozen major classes including beverages, building materials, chemicals and industrial products, cosmetics and hygiene, feeds, fertilizers, food, fuel, handicrafts, medicines and rituals, ornamental plants, and structure and shelter.
  - Handicrafts can be divided into agricultural implements, clothing, furniture, games and toys, household items, jewelry, musical instruments, stationery and books, and weapons and hunting tools.

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- Apart from commercial or local uses, palms are extensively planted for ornament in warm regions or indoors when a tropical effect is desired. Several hundred species are used as ornamentals in outdoor gardens as well.
- In tropical forest ecosystems palms are important in many ways. Breathing roots help aerate waterlogged soils. The large cavities that are formed when palms in a population die result in considerable soil turnover. Many palms accumulate leaf litter in their crowns, presumably trapping important nutrients. Some palms contribute large amounts of dry matter which, when recycled, adds to soil fertility.
- Few plants are as versatile as the coconut.
  - The husk of the fruit is the source of coir, used for ropes and mats; the hard inner fruit layer (endocarp) is used as fuel and to make charcoal, cups, bottles, and trinkets; coconut "juice" or "water" (liquid endosperm) is a tasty beverage; the flesh (solid endosperm) is eaten raw or dried to form copra, a source of oil (widely used for food preparation and industrial purposes) and oil cake (cattle feed); the flesh may also be grated, mixed with water, and pressed to obtain coconut milk, used in food preparation and as a substitute for cow's milk.
  - The sap obtained from tapping the inflorescence, or flower stalk, is drunk unfermented or fermented (toddy) and is a source of sugar, alcohol, and vinegar.
  - Trunks are used in construction and furniture making, and leaves are used in a variety of ways in domestic economies.

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