

# Mangrove Palm

## A Versatile Unique Palm

**P**ALMS are valued because of their beauty and economic value. On hearing the word "Palm", we usually think of the coconut palm (*Cocos nucifera*), oil palm (*Elaeis guineensis*) and date palm (*Phoenix dactylifera*). The Palmaceae family has many members, including the Royal palm (used for landscaping) and the red palm.

All Palmaceae members have some common features like an upright stem, trunkless and monopodial growth (in an upward direction from one point). Plants with monopodial growth (in contrast to sympodial growth) have one stem or trunk, and they add leaves to the apex as they grow. There are genera that show sympodial growth patterns like Rattans. Almost all genera of palms with large evergreen palmately ('fan-leaved') or pinnately ('feather-leaved') compound leaves. All leaves have a tubular sheath at the base. The inflorescence (arrangement of flowers on the plant, in relation to its shoot system) is a panicle (irregularly branched and where each branch has a terminal flower) or spike surrounded by one or more bracts or spathes that



Nipa palms in Sunderbans

(Source: [http://www.banglapedia.org/httpdocs/HT/F\\_0107.HTM](http://www.banglapedia.org/httpdocs/HT/F_0107.HTM))

Perhaps very few of us have come across mangrove palms. Nipa (*Nypa fruticans*) is one such palm. It occurs between the latitudes of 25°N and 20°S, on the tidal shores and estuaries of Sri Lanka, the Ganges Delta, the Malay Peninsula and archipelago, and Pacific islands (from northern Australia to the Solomons), Philippines and the Ryukyus. It is known by different names in different countries: *attap palm* (Singapore), *buah atap* (Indonesia), *buah nipah* (Malaysia), *ging pol* (Sri Lanka), *gol pata* (Bangladesh), and *dani* (Burma).

Nipa is the only palm found in the mangrove habitat. This species is found on the landward side of a mangrove forest that is subject to frequent tidal inundation and is exposed to saline water at high tide but freshwater at low tide.

Even though the plant is not common in India except in the Sunderbans and Andaman and Nicobar Islands, fossil pollen grains of the palm genus Nipa described under *Spinizonocolpites* have been reported from the west coast of India in the tertiary sediments of the Warkalli and Quilon formations in Kerala, and in the sediments of the Ratnagiri Beds in Maharashtra. The only extant species of this monotypic genus is *Nypa fruticans* (Thunberg) Wrumb. The fossil evidence proves that it is one of the most ancient angiosperms and probably the oldest species of palm.

Nipa is a monoecious palm with special characteristics. Like other vegetation that live in mangroves, Nipa thrives in river estuaries and brackish water environment. It also lacks an upright stem, which is a characteristic feature of the palms. The palm also exhibits a colonial growth habit, forming thick stands or a mono-specific fringe along the coastline. The trunk or stem of the Nipa palm is under the mud; only the leaves project upwards. For the observer, the large fronds appear to rise up from the surface of the mud.

*Nypa fruticans* has a horizontal trunk that grows beneath the ground and only the leaves and flower stalk grow upwards above the surface. The leaves can extend up to nine meters (30 feet) in height. Erect, the spirally inserted leaves are borne near the apex of a horizontal stem which divides at intervals. The younger leaves appear from the middle of the crown and push the older leaves aside before they dry and fade away, leaving bulbous leaf bases or scars behind. Any leaf may subtend an inflorescence. The flowers are a globular

Generally, seedlings are raised on nursery beds regularly inundated by tidal water.



Fossil of a Nipa drupe

(Source: [http://www.sheppeyfossils.com/pages/plant\\_material.htm](http://www.sheppeyfossils.com/pages/plant_material.htm))

inflorescence of female flowers at the tip with catkin-like red or yellow male flowers on the lower branches.

Pollination is carried out by a variety of insects and wind, although drosophilid flies are particularly important. Fertilised flowers develop into fibrous, chestnut-brown fruit and form a large spherical infructescence (ensemble of fruits derived from ovaries of an inflorescence) upon maturation.

The fruit is a woody nut (drupe) arranged in a cluster compressed into a ball up to 25 cm (10 inch) across on a single stalk. The infructescence is usually composed of fertile fruits as well as partially



Female inflorescence of *Nypa fruticans*

(Source: [http://wiki.trin.org.au/pub/Mangroves/Nypa\\_fruticans](http://wiki.trin.org.au/pub/Mangroves/Nypa_fruticans))



Infructescence of *Nypa fruticans*

(Source: <http://www.flickr.com/photos/joylah/2630141155/>)



*Nypa fruticans* growing in the palmetum of Kerala Forest Research Institute, Peechi

developed but sterile carpels. Each fruit consists of a unilocular endocarp covered with a fibrous mesocarp and a smooth, outer epicarp. The distal end of the fruit bears an umbo (knob-like protrusion that

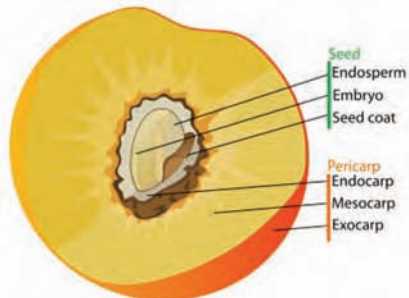
occasionally germinating while still water-borne. The mangrove palm exhibits a unique phenomenon known as cryptovivipary, in which the embryo grows to break through the seed coat but not the fruit wall before it splits open.

coastal ecosystems of India to generate revenue for the rural folk. In 2002, the India Posts released a Commemorative stamp on *Nypa fruticans* to signify the importance of this plant.

Today, the *Nypa* vegetation in the Sundarbans is under great stress due to changes in geomorphic and ecological conditions. The western and southwestern regions of this delta have been raised, shifting the main delta towards Bangladesh. This geomorphic evolution has an adverse effect on the *Nypa* vegetation due to lack of freshwater supply from the Ganges distributaries that are essential to leach out excessive salt contents from the soil. A distinctive decrease in natural regeneration is probably due to overall increase in salinity in the Indian part of Sundarbans.

Urgent measures are needed to protect the remaining population of the species in the Indian subcontinent. Both *in vitro* and *ex vitro* techniques can be used for the purpose. *Nypa* regenerates naturally in the mangrove. It can also be propagated artificially by planting seedlings along the muddy banks of mangrove forests and also in exposed shorelines.

Generally, seedlings are raised on nursery beds regularly inundated by tidal water. Usually two months old seedlings attaining height of about 25 cm are suitable for planting. The Kerala Forest Institute, Peechi has successfully raised *Nypa* in its palmetum by providing the appropriate soil pH and continuous inundation.



Schematic diagram of a Drupe

(Source: <http://en.wikipedia.org/wiki/Drupe>)

arises from the hinge of a bivalve shell or near the scale tip of a seed-bearing cone). Commonly, the fruit is ridged longitudinally and may show some angularity. These angled edges are caused by the growth of adjacent fruits tightly abutted against one another in the dense infructescence.

The individual fruits are dispersed by the tides and currents. As an adaptation for the submerged environment, the fruit is designed to float, and this buoyancy is attributed to its thick fibrous mesocarp and endocarp. The ripe nuts separate from the ball and float away on the tide,

### Uses

In Bangladesh and India, *Nypa fruticans* is used mainly for roof thatching, food, fuel, fence making, medicine, cigarette wrapping, molasses, wine, fishing etc. The kernels of immature fruits are used as food. The juice is used for making jaggery and alcohol. Newly developed shoots are reported to be used as a vermicide. Ash from the palm is used as an analgesic for tooth pain and headache, and for treating Herpes. Dry leaves, petiole, stem wood, fruit residues etc. are used as fuel.

The rhizomes of the palm are extensively used in fishing, and they facilitate the fishing net to float over the water surface. Farmers also report that *Nypa* floating in the river or sea attracts deep-water fish. Sap from *Nypa* is used for fattening livestock. In Nigeria, dye from the fruits is used to dye fishing nets to make them less conspicuous to the fish and improve fish catch. In some villages in Nigeria, the seeds are used for making jewellery and hair clips. Leaves are also used as roofing mats and to make hats.

The Food and Agricultural Organization (FAO) describes *Nypa* palm as a non-threatened and underutilized palm in South Asia. In the Sundarban Reserve Forest, it is believed that traditional forest-users collect an average of 60000 metric tons of fronds each year. Large amounts of biomass are produced in this particular environment and its characterization will create new unexploited raw materials for fuels and chemicals. The plant can be judiciously introduced into the other degraded

The authors belong to the Department of Plant Biotechnology, Mar Athanasios College for Advanced Studies (MACFAST), Tiruvalla-689101, Kerala; Email: [biju@macfast.org](mailto:biju@macfast.org)



Commemorative stamp on *Nypa fruticans*