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MANGROVES

A GUIDE FOR
PLANTING AND
MAINTENANCE



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Florida Cooperative Extension
Marine Advisory Bulletin



MANGROVES — A GUIDE FOR PLANTING AND MAINTENANCE

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INTRODUCTION

Mangroves are tropical trees or large shrubs adapted for survival in sheltered, saline habitats along the seashore. They play an extremely important role in maintaining the quality and productivity of coastal waters. However, development along Florida's coastline often has reduced the area occupied by mangroves.

Many citizens have questions about the importance of mangroves and how existing mangrove areas can be maintained or enhanced. The purpose of this pamphlet is to help answer these questions. It provides biological information and includes guidelines for planting and maintenance.

Currently, pruning of established mangrove stands seaward of the mean high tide line is prohibited. Also, in some cases, local county ordinances regulated management of mangroves. Therefore, we recommend that no pruning or transplanting be undertaken without first contacting the Department of Environmental Regulation and local county authorities. Transportation and cultivation of aquatic plants (e.g. mangroves) is being permitted by the Florida Department of Natural Resources, Bureau of Aquatic Plant Research and Control.

BIOLOGY

Mangroves occur around the world in tropical and subtropical estuarine habitats.

They cannot tolerate temperatures much below freezing and are replaced by salt tolerant marsh grasses as the dominant shoreline vegetation in more temperate climates.

The ability of mangroves to obtain fresh water from salt water sets them apart from most other plants. They are able to keep the salt content within their tissues considerably lower than the salt content in the soil, either by secreting excess salt through specialized salt glands or by "filtering" salt out with their roots, or both. Their thick, spongy leaves have a waxy covering to help prevent loss of their fresh water supply. Mangroves can live in fresh water but normally occupy tidal areas where fresh water plants cannot live.

Mangroves have evolved other interesting adaptations for survival in a habitat which is periodically flooded. Their root systems are submerged in poorly aerated soils, but oxygen is obtained through aerial roots which grow down into the sediment from branches, or by pneumatophores (finger-like projections) arising from underground roots and extending well above the soil.

Many mangroves, including the red and black, are viviparous, which means the seeds germinate while still attached to the parent plant. The seedlings (or propagules) are adapted for floating and can be widely dispersed by water currents.

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ECOLOGICAL IMPORTANCE

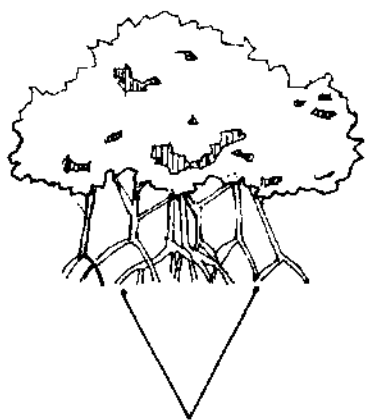
The extensive root systems help stabilize the shoreline and reduce inland flooding during severe storms. Mangroves preserve water quality and reduce pollution by filtering suspended material and assimilating dissolved nutrients. The maze of roots provides excellent habitat and cover for fish and invertebrates. As they decompose, leaves which fall into the water provide an extremely

important food source for a wide variety of animals. The cover and food they provide make mangroves an excellent nursery area; the majority of commercially valuable fish and shellfish spend at least a part of their life in mangrove or other estuarine habitats. Many waterbirds, such as the brown pelican, white ibis, and great blue heron, rely on the mangrove system for nesting.

IDENTIFICATION OF LOCAL MANGROVES

Red Mangrove (Rhizophora mangle) - The red mangrove is easily identified by its characteristic arching prop or aerial roots which extend downward from the trunk and lower branches. The long, pencil-shaped seeds are also distinctive. (Actually, these are seedlings which germinate within the fruit

while still attached to the parent plant.) The shiny leaves are thick, leathery, and dark green. Red mangroves occur in Florida as far north as the Crystal River area on the Gulf Coast and Daytona Beach on the Atlantic. They are often found seaward of the other species, growing in more frequently flooded areas.



Prop or Aerial Roots



Fruit

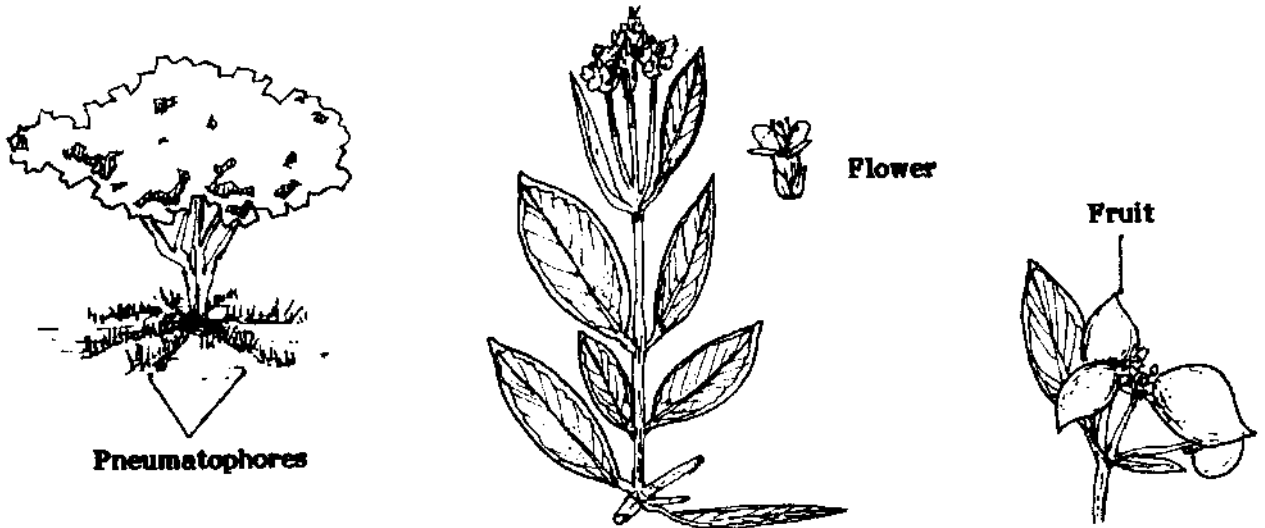


**Seedling
(propagule)**

Black Mangrove (*Avicennia germinans*) -

This species is easily identified by the numerous pneumatophores, finger-like projections which extend upwards above the mud from the submerged root system. The leaves are narrow and oblong, dark green above but distinctively pale and silver-green

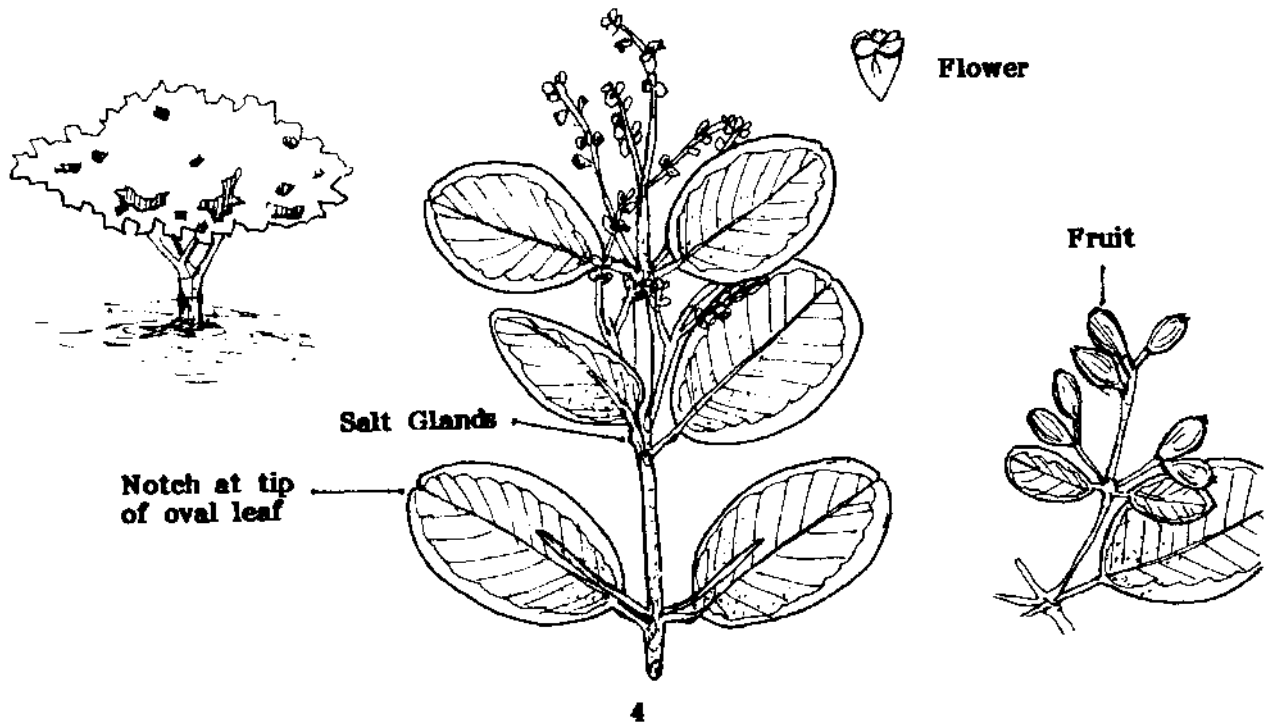
underneath. Their surface is often coated with salt crystals. The black mangrove is the most cold-hardy mangrove in Florida and grows as far north as the Cedar Key area on the Gulf Coast and St. Augustine along the Atlantic.



White Mangrove (*Laguncularia racemosa*)

This species usually grows on higher land, behind red and black mangroves, although all three may intermix. It lacks prop roots and pneumatophores, and it is easily distinguished by its leaves, which are thicker and more oval than those of the other two species and often have a small notch at the tip. Each leaf also

has two small salt glands, visible as two small bumps, one on either side of the stem just below the blade. The white mangrove is the least cold-hardy of the three and does not grow much further north than Tampa Bay on the Gulf Coast or Cape Canaveral on the Atlantic.



PLANTING SEEDLINGS

Mangroves can be successfully planted only in sheltered areas where they will not be exposed to heavy wave action. If they are planted directly on the Gulf or any other relatively high energy shoreline where they will be exposed regularly to moderately heavy waves, the plants will not last long; they will soon be uprooted and washed away.

Although commercially grown mangrove seedlings are not widely available, they can be found occasionally in nurseries which specialize in native or salt tolerant plants.

For persons interested in starting their own plants, red and black mangrove seedlings often can be found floating or washed up along the shoreline in early fall, from August through November. It is usually desirable to plant the seedlings in containers and allow them to develop healthy root systems before setting them out. When unrooted seedlings are planted in bare areas directly on the site, they are often washed away. Red mangrove seedlings may be secured with stakes to help reduce this problem.

Seedlings may be planted and grown in any sort of container with holes for drainage, and a variety of potting materials may be used, including peat moss or sand. A mixture of one part organic material to two parts sand works well. Red mangrove seedlings should be planted vertically, with the thicker end down and about one-third their length inserted into the potting medium. Black mangrove seedlings should be placed just below the surface but not completely covered; you should still be able to see a part of each plant. There is a high success rate in growing red mangrove seedlings, often over 90%, but black mangroves are more difficult, with only about half the seedlings usually surviving.

The plants should be watered often enough to keep them moist, but salt water is not required. Black mangrove seedlings, especially, should not be allowed to dry out. Pots can be placed in shallow water to ensure

that moisture is constantly drawn up. Fertilizer is not needed, but if plants are kept for over six months some fertilizer should be applied.

Mangroves can be planted in the ground when they are one to two years old. It is usually recommended that organic matter such as decaying sea grass leaves be added to the hole prior to planting. Since wave action can disturb seedlings or wash them away, the plants should be placed near or just above the high tide line. This gives the mangroves a chance to become established and spread outward. Red mangroves are more tolerant of flooding and therefore may be placed lower in the tidal zone than black and white mangroves. If there are existing mangroves in the area, they should be used as a guide for placing the new plantings relative to the water line.

The best planting time is early spring, after the last cold front. Well established seedlings over a year old may be planted about three feet apart, but seedlings less than a year old should be spaced about two feet apart. Non-rooted seeds should be planted a foot apart to allow for mortality and wash-out.

TRANSPLANTING

Transplanting already established mangroves is often desirable, since this approach greatly reduces the time required to establish a healthy stand.

Transplanting of all mangrove species up to 4½ feet tall is a relatively easy process. (Plants this size are usually 4 to 6 years old, although nursery stock this size may be only 2 to 3 years old.) Top and side branches should be pruned to two-thirds their original height shortly before or immediately after transplanting. Pruning before transplanting is best. This reduces loss of water through the leaves and aids recovery. The root ball should be as large as possible in diameter, but a depth of 8 to 10 inches is adequate since the

root system is near the surface. It is important to keep the root ball intact and disturb it as little as possible in transplanting. Don't shake off soil.

The root ball should be watered and the soil packed or stamped down while replanting to ensure good contact between the rootball and the sides of the hole. Care should be taken not to cover or damage proproots or pneumatophores. Slow release organic fertilizer, such as composted manure, may be worked into the hole before planting to aid the recovery process. If the plants are above the high tide line, some watering may be necessary until they become reestablished.

AIR-LAYERING

Air-layering is a commonly used horticultural technique in which a short section of bark and underlying soft tissue is stripped from the hard inner core of the branch, after which the exposed area is wrapped with damp sphagnum moss and covered with plastic wrap or aluminum foil to retain moisture. This stimulates the production of roots at the injured point and allows for subsequent removal and planting of the branch. Air-layering could reduce the time required to establish a mangrove planting, since it might take 2 to 4 years for seedlings to reach the size of rooted air-layers. It could also reduce damage to existing mangrove stands, because in contrast to transplanting it would not be necessary to remove entire plants.

Stimulation of root formation in mangrove air-layers has met with some success (particularly with the white mangrove). However, additional work is needed to determine just how practical this method will prove to be.

PRUNING

Mangroves can be pruned, and even maintained as sheared hedges, making it

possible to retain the mangrove fringe while allowing the property owner an unobstructed view of the water.

There are two acceptable ways in which mangroves can be pruned in order to control their size and increase the visual access to the water: hedging (or topping), and selective limb removal (or understory pruning).

Hedging or topping, as the name suggests, is a way of reducing the height of the trees by cutting back their main trunks and tallest branches. Selective limb removal, on the other hand, is a means of providing visual access through large trees by removing entire branches at their base, flush with the trunk; the overall height of a tree remains unchanged, but the canopy is raised and reduced in size by the removal of lower and middle branches.

The various mangrove species respond in different ways to pruning, so they must be considered separately when the job is planned and treated differently when the work is done.

Black and white mangroves are more tolerant of extreme pruning than are red mangroves. Red mangroves are the most easily damaged by improper pruning and slowest to recover from any pruning at all, but they can be pruned safely if the work is done correctly.

Red mangroves will not sprout from pruned stubs over one inch in diameter but will continue to die back. Therefore, restrict all pruning to branches under one inch in diameter whenever possible. If it is necessary to prune large or moderate-sized branches, cut all the way back to the trunk or to side branches so that no bare stubs remain. In no case should a red mangrove be cut back to less than two-thirds its original height, nor should more than half the foliage be removed when the tree is pruned.

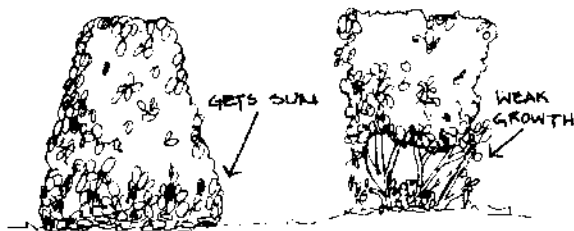
If red mangroves are to be lowered to half their original height, the work should be done

in at least two stages. In the first stage, when the most severe pruning will be done, reduce the height by about a third. Prune again about two years later, reducing them somewhat further in height, so that they ultimately form dense shrubs of medium height. They can then be maintained at the desired height by light pruning every one or two years.

Black mangroves can also be maintained as a hedge by topping them, but larger trees are often pruned by selective limb removal, with the understory rather than the tops of the trees removed. When the lower and middle limbs are removed, it is usually possible to view the water beneath the canopy, and the trees make beautiful specimens as silhouettes against the horizon.

A couple of points should be kept in mind if the mangroves are to be maintained as a formal hedge. First, trim frequently. If too much is trimmed at any one time it will result in exposure of bare branches which detract from the appearance of the hedge. Second, it is best to trim the hedge so the base is wider than the top. This exposes the sides of the hedge to sunlight and helps maintain a green leafy appearance.

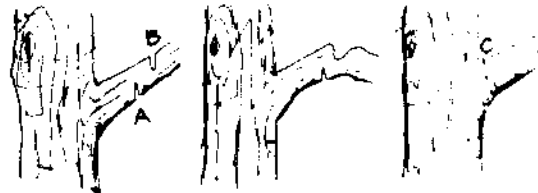
Informal pruning, in which the mangroves are allowed to develop into their natural shape with just enough annual pruning to maintain desired height and width, requires much less effort and produces an attractive natural effect.



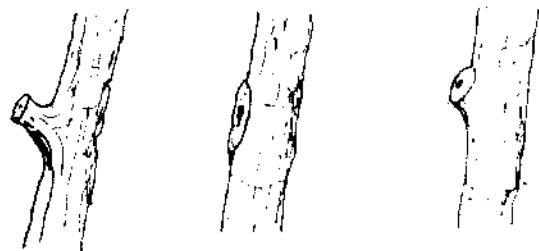
Right

Wrong

When pruning large branches, care must be taken that the weight of the branch does not cause it to break before the cut is completed, consequently producing a large tear in the side of the tree. This requires three cuts. The first cut is made on the lower side of the branch about 15 inches away from the trunk and 1/3 up through the branch (usually about the time the saw begins to bind). The second cut is made downward on top of the branch about 2 to 3 inches beyond the first cut, so that the limb falls without tearing the bark down the trunk. The remaining stub is easily supported with one hand while it is cut from the tree. This cut should be nearly flush with the trunk, with the lower edge of the cut further away from the trunk than the top. Such a cut will form a smaller wound than a flush cut and the healing will be more rapid.



Removing a large tree branch-
First cut at (A), second cut at (B),
and final cut at (C).



Not close enough

Too close

Correct

Correct pruning cut

Light pruning may be done any time of year, but heavy pruning is best done in the spring and should be avoided in the fall and early winter, from October through January. Treating the cut surfaces with pruning paint is unnecessary, and if paint is used for cosmetic reasons, only a very thin coat should be applied.

COMPETING PLANTS

Australian pines and Brazilian pepper trees should be removed whenever they are found growing among mangroves. Otherwise, these two imported trees may grow faster than the more desirable native mangroves and choke them out.

POSSIBLE SOURCES OF MANGROVES

For information on the location of nurseries where mangrove seedlings can be obtained, contact the marine advisory agent at local Cooperative Extension Offices.

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