

Plant Guide



Avicennia germinans
Black Mangrove

United States Department of Agriculture



Golden Meadow Plant Materials Center
438 Airport Road
Galliano, LA 70354



Nomenclature

Scientific Name – *Avicennia germinans* (L.) L.

Common Name – Black Mangrove

Pre-varietal Source – Pelican germplasm

Similar Species – Red Mangrove (*Rhizophora mangle*) and White Mangrove (*Luguncularia racemosa*)

Description

Black mangrove is a subtropical woody shrub that grows in salt marshes. Mangroves are very hardy, having become adapted to harsh environments where water and salinity levels fluctuate. Pneumatophores, or breather roots, form a network collecting silt and debris and controlling erosion. Plant height will vary from 4 to 9 feet. Leaves are 1 to 5 inches long, elliptical, opposite, thick, leathery, dark green, glabrous (smooth) above, and grayish with a tight felt-like pubescence beneath. Glands on the underside secrete salt. Clusters of small sessile flowers with white petals, approximately ½ inch in diameter, are borne on the leaf axils or growing tips on the twigs. The fruits are flat, approximately 1 inch long, dark green and glabrous beneath a velvety pericarp. The bark on the black mangrove is thick, dark brown or blackish, with rough irregular flattened scales. Twigs are grayish in color and smooth, with enlargements at the joints. Mangrove detritus (dead leaves and twigs) in water feeds microorganisms that provide food for young marine animals.

Black mangrove is a unique plant species that, when established properly and under applicable conditions, has provided land stabilization due to the easy transport of seedlings, quick aerial root production, underground root systems which increase sediment holding capabilities. This plant also provides for wildlife and marine habitats.



Use

Black mangrove is used primarily for wildlife habitat along protected shorelines, intertidal salt marshes, and marshy barrier islands. Black mangrove is also an effective land stabilizer used on interior tidal mudflats, dredge-fill, and other artificial sites associated with wetland restoration. When established on a barrier island, black mangrove provides habitat for birds and marine organisms. Establishing to protected shorelines, black mangrove provides an effective buffer that dissipates low wave energies, reduces shoreline erosion, and traps suspended sediments and other solids with their pneumatophores. Dense stands of mangroves produce significant amount of organic matter. The cumulative effects of organic matter production, sediment trapping, and erosion control not only provide shoreline protection but also accelerate sediment accumulation. Consequently, black mangrove is a sustainable and renewable restoration resource, and when properly established, and in the appropriate habitat, will persist and potentially remain effective indefinitely.

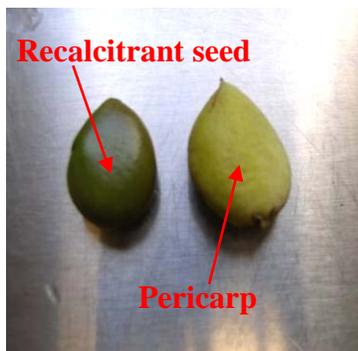
Habitat

Black mangrove is a woody shrub adapted to intertidal salt marsh and marshy barrier islands. It is described as a facultative halophyte; that is, it will tolerate salt, but salt is not a requirement for its growth. The ideal salinity range for establishing and growing black mangrove is 25 parts per thousand but it can tolerate a wide range of salinities up to 60 parts per thousand. Black mangrove can only persist where there is adequate protection from wave action. It is adapted to sandy, silty clay loam, and muck soils. It is sensitive to cold weather, which limits its use to the more southerly coastal areas and barrier islands.

Establishment

Black mangrove can be established successfully from container grown plants propagated by seed, vegetative cuttings, or air layering. Stands can be established by direct seeding on site, but survival has generally been poor. The most common method of planting black mangrove commercially is by seeds germinated and grown in a controlled greenhouse environment.

Black mangrove seeds are usually harvested from November through December. Seeds are desiccant sensitive and should not be allowed to dry out. This is referred to as recalcitrant seed. For best results, plant freshly harvested seed. Germination declines in relation to duration of storage. Remove the fresh pericarp before planting by soaking seed in water up to 24 hours. If planting cannot be accomplished soon after harvesting seed, place seeds in a wet cool environment and plant as soon as possible.



Black mangrove can be produced in a number of container sizes, but trade-gallons ($\frac{3}{4}$ gallon) are the most widely used. Trade-gallon containers have a higher per unit cost compared to smaller containers or direct seeding. A trade-gallon will have one plant

per container that will grow to an average of 15 to 25 inches in height. Although black mangrove does not produce new plants by underground roots, a well-developed root mass is critical to the survival and productivity of the transplants. Trade-gallon pots are the most commercially available.

Cone pots are the easiest type of container to grow mangroves and transport. The pot will contain one plant per container that will grow to an average of 8 to 12 inches in height. Direct seeding is another means of planting but studies show survival has generally been poor.

Planting Date – As a general rule, black mangrove seeds can be planted from November 1 to December 31. Black mangrove plants should be transplanted in early spring. Some additional considerations include the following:

- Black mangrove seeds are desiccant sensitive and should not be allowed to dry out.
- Seeds should be soaked in water up to 24 hours to remove the fleshy pericarp. If planting is delayed, seeds should be floated in water (fresh or saline) with seed no greater than 3 inches thick.
- Plants should be grown in protected environment (e.g. greenhouse, etc.) with climate controlled temperature to keep cold temperatures and frost off of plants.
- Black mangrove plants can be transplanted anytime past last frost date.

Planting Location – It is critically important to remember that black mangrove is cold sensitive and must be planted in areas where it does not readily freeze. Black mangrove can be used for erosion control along protected shorelines and is an effective soil stabilizer when used on marshy barrier islands, interior tidal mudflats, dredge-fill sites, and other areas of loose and unconsolidated soils associated with marsh restoration. Also, black mangrove can be used for wildlife and marine habitat.

Protected Shoreline Plantings – Protected shoreline plantings are typically planted as a single row parallel to the shoreline. Transplants should be planted at mid-point between the high and low tide elevations. Plant spacing within the row will vary

according to the size of the transplant materials being used and the rate at which full coverage is desired. Trade-gallons generally are planted on 5 to 8 foot centers and cone pots on 2 to 5 foot centers. Under desirable site conditions, black mangrove will spread by dropping seed, filling spaces between plants and nearby areas, and will grow to its highest and lowest elevation. It is not uncommon for black mangrove to establish itself in other areas where seeds may have floated in.



Interior Plantings – In addition to planting protected shorelines, black mangrove can be planted on mudflats and dredge-fill sites. The planting configuration should be designed to provide maximum coverage. Planting large areas generally will require a significantly large number of plants. Where applicable, cone pots can be used and placed in a row-column configuration. The row and plant spacing can vary from a few feet to many, depending on the objective of the planting, the target rate for coverage, and available resources. Direct seeding can also be done by flying it over with a plane or broadcasting it over the desired area. However, this method is not readily used because plant survival has generally been poor.



Marshy Barrier Islands – Marshy barrier island planting are typically planted for wildlife and marine habitat. Although plant configuration may vary, typically it is planted similar to interior plantings.

Planting Methods – When planting trade-gallons place transplants in a dug hole. Post-hole diggers,

gas drills with modified bits, or any other method of digging are satisfactory. The planting hole should be the same size or only slightly larger than the root ball and only deep enough so that the top of the root ball is flush or slightly below ground. The top of the root ball should not protrude above, nor be more than 2 inches below, normal ground. The planting hole should be tightly sealed around the plant to prevent the plant from wobbling and to close air pockets around roots. Plants should remain erect after planting.

Planting sites where plants may have a tendency to wash out may require the addition of a plant anchor. A plant anchor consists of ¼ inch mild steel re-bar bent into a crosier hook (candy-cane shape) and pushed down into the soil so that the hook lies across the root ball pinning it to the ground. Anchors are generally about 30 inches in overall length and will add to the cost of the planting. However, anchors are generally necessary at unusually problematic sites to prevent plants from washing out.

When planting cone pots, place transplants in a dug hole. Dibbles bars, gas drills with modified bits, or any other method of making a small hole in the ground is satisfactory. The planting hole should be the same size or slightly larger than the top of the root ball and only deep enough so that the top of the root ball should not protrude above nor be more than 2 inches below normal ground. The planting hole should be tightly closed around the plant to prevent the plant from wobbling and to close air pockets around roots. Plants should remain erect after planting. Typical plant anchors are not usually used on cone pots because they are usually too large in relation to the plant and may cause damage to the plant.

Fertilization – There is no clear consensus on the effectiveness of fertilizer when used in saturated and/or anaerobic soils. However, the additional cost of fertilizer is a small investment given the overall cost involved in vegetative restoration. High nitrogen slow-release fertilizer tablets will add approximately .08 to .10 cents to the cost of an individual plant.

Slow-release fertilizer tablets are commercially available in a range of weights and analyses.

Recommended tablet weight should be between 15 to 25 grams and have a nitrogen content of not less than 15% or more than 30%. When using tablets with trade-gallon plants, push the tablet into the top 3 inches of the root ball immediately before or immediately after planting the transplant. The resulting hole should be pinched closed. When using tablets with cone pots, set the plant and then place the tablet either along side or on top of root ball.

Plant Materials Source – Plant materials are generally obtained from two sources, a donor wetland site or commercial nurseries. The use of donor plant materials from a wetland site is not recommended because young plants will affect the health and vigor of the donor stand or community and plant mortality is generally high. Best results are collecting and using seed. In addition, the removal of plant materials without the applicable permits may be in violation of state and federal regulations. Removing plant materials from donor stands is not typically recommended.

Nursery-grown stock is generally the most reliable and ecologically appropriate way to obtain plant materials. A number of commercial nurseries produce and maintain black mangrove transplants. Trade-gallon and cone pots are the two most common sizes, but most nurseries will contract for other container sizes.

Vegetative specifications should be used to tailor plant material quality and quantity to a specific project. These specifications should include acceptable sources, cultivars, ecotypes, plant size, and height, container specifications, and extent of root development. In addition, other requirements such as climatic hardening are commonly included.

A list of commercial wetland plant nurseries and assistance in developing plant material specifications is available from the Natural Resources Conservation Service.

Other Considerations – There are a number of other site-specific elements that should be considered when working with black mangrove. These conditions represent extremes and should be thoroughly investigated before committing to a significant project if any of these conditions occur.

- **Soil load-bearing properties** – It is not uncommon for soils (especially in dredge deposit sites) to be fluid to the point that they physically will not support the weight of plants. This is an indicator of soils with a very high water-to-mineral ratio.
- **Shoreline configuration** – Abrupt and steep cut-banks are indications of high wave energy and/or highly erodible soils. Special precautions may be required to keep transplants from dislodging before becoming established.
- **Smothering** – Precautions should be taken when planting in areas of heavy floating debris. Both mechanical damage to the plants from surf trash and smothering from other plants are common detriments to black mangrove.

If any of these conditions are present, consult with a wetland specialist for additional information and/or possible alternatives.

For Additional Information
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For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

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