Melaleuca quinquenervia (Cav.) S.T. Blake

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MYRTACEAE (MYRTLE FAMILY)

Melaleuca leucodendron (L.) L.

Aceite de cayeput, balsamo de cayeput, belbowie, bottlebrush tree, broad-leaved paperbark, broad-leaved tea-tree, cajeput-tree, capeputi, corcho, five-veined paperbark, melaleuca, numbah, paperbark, paperbark-tree, punk-tree, tea-tree, white bottlebrush

Melaleuca quinquenervia was grouped with nine other species under the name of *M. leucodendron* until 1968. Therefore, precise information about the species before 1968 is limited. The native habitat of *M. quinquenervia* ranges from a latitude of 8 to 34° S. on the east coast of Australia, Papua New Guinea, Irian Jaya, and New Caledonia. In North America, it has become naturalized on a significant scale in southern Florida. Because this species can be an aggressive invader in environments similar to its native habitat, the risk of escape should be assessed before introducing it to a new area (Geary 1998).

Melaleuca quinquenervia is an evergreen tree, commonly 8 to 12 m in height. However, on good plantation sites trees average 18 m in height and 50 cm d.b.h., and the biggest trees reach 24 m in height and 90 cm d.b.h. On dry sites, stands may exist as shrubs. Trunks are moderately straight to crooked. The white bark is thick and spongy and peels in layers. Leaves are entire, narrowly elliptic, 4 to 9 cm long, 2 to 3.5 cm wide, and pungently aromatic, with five faint, nearly parallel veins. The tree is fire tolerant and thrives in continuous to periodically flooded sites (Geary 1998).

In Australia, *M. quinquenervia* grows in level to gently undulating topography along streams and estuaries and in marshes and seasonal swamps, sometimes forming pure stands. The species can grow on a wide variety of soils. In Australia it occurs most frequently on sandstone-derived soils, in Papua New Guinea on highly organic, alluvial clays, and in New Caledonia on well-drained slopes and ridges in the uplands. In Florida, naturalized stands are found on Psammaquents, Aquods, and Saprist soils, which are often shallow and underlain by limestone. Planted trees in Hawaii grow well on calcareous beach sand and on soils derived from basalt ash and lava rock of pH 4.5 to 5.5 (Geary 1998). In its native habitat, *M. quinquenervia* is found mainly from sea level to 100 m, but in New Caledonia extensive stands exist in uplands to an elevation of 1000 m. Mean annual rainfall, which has a summer maximum over most of its habitat, ranges from 900 to 1250 mm. Mean monthly temperatures range from 5 to 32 °C. In the southernmost part of its range, a few light frosts occur per year. As an exotic, the tree grows successfully in plantations where rainfall is 5000 mm and where rainfall with winter maximum occurs (Geary 1998).

Little information is available on racial variation in the species, but the nine related species suggest a great deal of variation that might be exploited through crosses. Variation in the volatile oils is noteworthy (Geary 1998).

The medium-density wood is difficult to season and tends to warp, but it finishes well as a cabinet wood. Without preservative treatment it makes a poor fence post. A major deterrent to use is the high bark-to-wood ratio. Its abundant leaf oil has been used commercially as an essential oil and medicine in its native countries. The bark is useful for its insulating properties and as a mulch. The small crown and distinctive bark have made it a popular ornamental tree. In Florida, the abundant flowering crop has been important to the apiary industry to sustain bee colonies and as a source of honey. Because of its invasive habit in wetlands, the tree is regarded as a pest in Florida and efforts have been made to eradicate it (Geary 1998).

Melaleuca quinquenervia flowers prolifically, and in Florida flowering occurs by age 3. Seedlings less than 1 m tall may bloom. In Florida, some trees are flowering in every month but February, March, and April. Individual trees bloom two to five times a year and pronounced flowering occurs regionally at least twice a year. The insect-pollinated flowers

are showy, cream-white spikes in the form of 3 to 8 cm long, 2.5 to 4 cm wide bottlebrushes. The seeds are produced in short, sessile, hard, cylindric capsules, which are aggregated in tightly packed files around the branches. Several seed-bearing sections may alternate with foliage along a branch axis. Seed production is prodigious. On average, 30 seed capsules are produced by one spike of flowers. A branch may hold 8 to 12 of the seed-bearing sections and the capsules may hold seeds for up to 10 years without release. A single capsule may contain 200 to 350 seeds. Seeds are tiny and average 30 million per kg. Capsules release seeds only when subjected to fire, frost, wind breakage, natural pruning, or other damage that disrupts the capsules' vascular systems, causing them to dehisce (Geary 1998).

Published information, if any exists, on seed collection, extraction, cleaning, storage, germination tests, nursery practices, and seedling care is not readily available. However, procedures for another genus of Myrtaceae, *Eucalyptus*, which has similar seed capsules, have been used successfully in Florida for *M. quinquenervia* by the author (Geary and others 1983). Seed collection can be done at any time of year, because individual trees have a wide range of seed ages due to multiple flowering in a year and the retention of seeds for years. Aggregates of seed capsules are clipped from branches and placed in kraft paper bags to dry. This is best accomplished in a hot drying room with low humidity. After the capsules open, the seeds are shaken from them. An efficient method for doing this is to put the capsules in a stovepipe-like cylinder that fits snugly inside a U.S. Standard soil sieve (sieve opening size determined by trial and error). A pan is put on the bottom of the sieve and a lid on the top of the cylinder, and the unit is shaken. The tiny seeds collect in the pan and are free of major debris. No additional cleaning is needed to broadcast sow the seeds, nor is stratification needed because freshly collected seeds germinate.

Seeds stored in sealed containers at 7 °C for several years remain viable. To test germination, a tiny, known weight of seeds is sprinkled on standard blue germination blotters, which are placed in closed plastic boxes lined on the bottom with tissue paper for extra water storage. Germination results are expressed as number of germinations per mg of seed. These results are used to decide the quantity of seeds needed for broadcast sowing.

Seedlings are easy to grow in containers of 47 to 78 cc volume, filled with a potting mix of peat and vermiculite. A very tiny amount of seeds is sown in a container and the seeds are covered with a thin layer of vermiculite. The sown containers are then placed under a plastic or shade cloth shelter for protection from torrential wind or rain. Once seedlings are 3 to 5 cm tall, the shade can be removed and the seedlings thinned back to one per container. Watering depends on local climate. The key to success is to keep the potting mix moist at all times. A 20-20-20 liquid fertilizer is applied frequently to speed growth of the seedlings. After germination, seeds grown in mid-March in southern Florida take about 20 weeks to reach a planting height of about 30 cm. While bareroot seedling production in open beds was not tested, the probability that it can be done successfully is high because natural regeneration of this species on bare, moist soil is easy.

At planting time, seedlings are pulled from the containers at the nursery and packed in vented, waxed-cardboard boxes for transport to the field. A seedling's roots and the potting mix form a firm plug that usually remains intact from seedling pulling through planting.