



Hawaiian Native Plant Propagation Database



Santalum freycinetianum

Alternative Botanical Names

Santalum involutum
Santalum lanaiense
Santalum longifolium
Santalum majus
Santalum pyrularium

Common Names

'Iliahi
Sandalwood

Family

Santalaceae

Potential or Traditional Uses

Landscape
Wood



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Description

Santalum freycinetianum varies in size and habit from a 3 foot tall shrub to a 40 foot tree; it is considered to be somewhat parasitic on the roots of a variety of native and introduced plants. It often has drooping branches. The leaves have a papery or leathery texture, are oval to round with smooth untoothed edges, and range in size from 1 1/2 to 4 1/2 inches long. The mature leaves are green, but the young leaves often have a purple tinge.

The flowers of *Santalum freycinetianum* are slightly fragrant and grow in loose bunches mostly at the ends of the branches. The flower buds are red to yellow. The flowers are about 1/4 inch in diameter with 4 petals. The outside of the bell-shaped flowers is dark red to greenish yellow; the inside is dark red. The tube of the flower is yellowish to white when the flowers open, but turns to red as the flowers age.

Wagner *et al* currently recognize 3 varieties of *Santalum freycinetianum*. Var. *freycinetianum* is endemic to O'ahu and Moloka'i, var. *lanaiense* is found on Lana'i and Maui and var. *pyrularium* is from Kaua'i. (Bornhorst 1996; Wagner 1990)

Habitat and Geographic Range

Santalum freycinetianum is an endemic Hawaiian plant and one of its three

varieties, var. *lanaiense*, is endangered. It most often grows on ridges and slopes in moist or wet forests, but also occurs in the dry forests of Lana'i. It generally grows at elevations ranging from 1,300 to 2,100 feet and is found on all the main Hawaiian islands except Hawai'i. (Wagner 1990)

Propagation by Seeds

The fleshy fruits of *Santalum freycinetianum* are oval with a distinct ring at the end. They range in size from 3/8 to 5/8 inch long, are reddish purple to black when ripe, and contain a single seed.

The seeds need to be removed from the fruit pulp. Lilleeng-Rosenberger (1998) and Stratton *et al* recommend ripening the fruits in a plastic bag. This softens the pulp making the seeds easier to clean. After softening, the fruit flesh can be removed by either placing the fruits in a colander or strainer under running water, or breaking up the fruit by hand in a bowl of water. The lighter pulp will float and can be poured off. The seeds should then be washed thoroughly and air dried on a paper towel.

Best results are obtained with fresh seed. Before planting, soak the seeds in room temperature water for 24 hours. Discard any seeds that float. The seeds rot easily and Stratton recommends soaking the seeds for 5 minutes in fungicide and then air drying them.

Santalum freycinetianum is difficult to propagate from seed. Generally, only a few seeds will sprout and these take a long time to germinate. Stratton *et al* give germination times of 1 month to 1 year with germination rates ranging from 10 to 50%. Lilleeng-Rosenberger' notes (1996) document a germination time of 3 months with a 30% germination rate for fresh seed that was soaked in room temperature water for 24 hours.

The treatment described by Koebele, on the other hand, results in 90% germination rate for fresh seed and has good results even for 7 month old seeds. In this process, the seeds are removed from the fruit as described above and air dried for about 1 week. After this, a small portion of the seed coat is removed from the pointed end of the seed. Koebele recommends a forceps or medium grit sandpaper for this process. The embryo should be visible in the area where the seed coat has been removed, but care should be taken not to damage the embryo. These seeds are then soaked in 0.05% giberellic acid (GA) in a shallow container for five days. The GA solution should be changed daily. After the seeds are removed from the GA solution, they should be dusted with a 1 to 1 mixture of powdered sulfur and Captan to inhibit fungal infection.

Koebele recommends planting the treated seeds in a covered tray in sterile (unused) moist vermiculite. The seeds will germinate in 1 to 3 weeks. When the root emerges from the seed, it should be planted in a small container in a 1 to 1 mixture of fine cinder (not black sand) and vermiculite.

Other sources recommend planting the seeds in shallow containers in a well-draining mix such as 3 parts #2 perlite to 1 part Sunshine Mix #4. The medium should be kept moist and the containers put in a shaded, covered area until

germination. The cover will allow better control of soil moisture and prevent rain damage.

If it is necessary to store the seed, put the cleaned, air dried seed into a paper bag or envelope inside an airtight container with dessicant. The container should be stored in a cool place at 25% relative humidity. (Bornhorst 1996; Koebele 1999; Lilleeng-Rosenberger 1996; Lilleeng-Rosenberger 1998; Stratton 1998; Wagner 1990)

Propagation by Cuttings

No information located to date.

Propagation by Division

Not applicable

Propagation by Air Layers

No information located to date.

Propagation by Grafting

No information located to date.

Propagation by Tissue Culture

No information located to date.

References

Bornhorst, Heidi L. 1996. *Growing native Hawaiian plants: a how-to guide for the gardener*. Honolulu: The Bess Press. p. 67-69.

Koebele, Bruce P. 1999. Breaking seed dormancy in Hawaiian *Santalum* species with giberellic acid. *Newsletter of the Hawaiian Botanical Society* 38 (3/4):52.

Lilleeng-Rosenberger, Kerin. 1996. Plant propagation notebook. Unpublished materials: National Tropical Botanical Garden.

Lilleeng-Rosenberger, Kerin. 1998. Propagation techniques for native Hawaiian plants. *Newsletter of the Hawaiian Botanical Society* 37 (2):33-35.

Stratton, Lisa, Leslie Hudson, Nova Suenaga, and Barrie Morgan. 1998. Overview of Hawaiian dry forest propagation techniques. *Newsletter of the Hawaiian Botanical Society* 37 (2):13, 15-27.

Wagner, Warren L., Darrel R. Herbst, and S. H. Sohmer. 1990. *Manual of the flowering plants of Hawai'i*. 2 vols., Bishop Museum Special Publication 83. Honolulu: University of Hawaii Press and Bishop Museum Press. p. 1221-1222.

Notes

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Last updated:
16 September 2001

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Hawaiian Native Plant Propagation Database

*Sophora chrysophylla***Alternative Botanical Names**

Edwardsia chrysophylla
Edwardsia unifoliata
Sophora grisea
Sophora lanaiensis
Sophora unifoliata

Common Names

Mamane
Mamani

Family

Fabaceae

Potential or Traditional Uses

Lei (Flower or Seed)
Wood



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Description

Sophora chrysophylla is a large shrub or medium sized tree up to 50 feet tall. The branches are golden brown with ridges running along them. Each leaf consists of 6 to 10 pairs of oval leaflets. The light green leaflets range in size from 3/8 to 2 inches long and 1/4 to 1 inch wide.

The pea-like yellow flowers form loose bunches at the bases of leaves or the ends of branches. Flowering occurs in winter and spring; Woolliams noted a March flowering at Waimea Arboretum on O'ahu. (Culliney 1999; Lamb 1981; Wagner 1990; Woolliams 1978)

Habitat and Geographic Range

Sophora chrysophylla is an endemic species found scattered throughout dry shrubland and dry to moist forests; it is also occasionally found in wet forests. It is the most common plant in the subalpine areas of East Maui and the island of Hawai'i. It grows at elevations ranging from 1,400 to over 10,000 feet. It is found on all the main Hawaiian islands except Ni'ihau and Kaho'olawe. (Wagner 1990)

Propagation by Seeds

The seeds of *Sophora chrysophylla* are contained in winged, woody pods shaped like strings of beads - the pods narrow between each seed. Culliney *et al* notes that the pods stay attached to the tree for most of the year. These brown or brownish

gray pods can be up to 6 inches long and are generally 1/2 inch wide. Wagner reports that the seeds are brown to grayish black; both Culliney and Lamb describe them as yellow or orange. Each flattened oval seed is about 1/4 inch long.

In his germination studies, Obata found that untreated seeds of *Sophora chrysophylla* had germination rates of less than 5%.

Culliney *et al* recommends scarification followed by soaking the seeds in water for 24 hours and reports germination times of 1 to 2 weeks. Scarification (penetration of the seed coat) can be done using a clippers, file or sandpaper, or by cracking the seeds with a hammer being careful not to damage the end where the seed will sprout.

The work done at NTBG (Ragone 1995 and Lilleeng-Rosenberger 1996) supports the recommendation for scarification. For most batches of seed documented, germination of scarified fresh seed began after 2 weeks and continued for 6 weeks. Germination percentages ranged from 26% to 100%.

Woolliams reports that 11 plants were obtained from 41 hot water treated seeds (27%). The first seeds germinated in a little more than 2 weeks and most of the plants were ready to be potted up in about 1 month. It took 3 years for these plants to flower at Waimea Arboretum. Culliney describes plants flowering in 4 years from seed.

Culliney *et al* recommend sowing the seed in moistened vermiculite. The seed pots should be placed in a shaded area protected from winds and rain.

When Akamine tested the effect of various storage conditions on seeds of *Sophora chrysophylla*, he found that the seeds are very long lived under all storage conditions. In his germination tests, fresh seed had a 100% germination rate and this did not decline significantly after 3 1/2 years in storage. Based on slight differences in germination rates, he concluded that the optimum storage conditions for *Sophora chrysophylla* seed would be in open containers at temperatures ranging 45 to 59 degrees F. Yoshinaga also found that seeds of *Sophora chrysophylla* store well at temperatures ranging from 45 to 84 degrees F and at relative humidities ranging from 30 to 90%. (Akamine 1951; Culliney 1999; Lamb 1981; Lilleeng-Rosenberger 1996; Obata 1967; Ragone 1995; Wagner 1990; Woolliams 1977; Woolliams 1978; Yoshinaga 1998)

Propagation by Cuttings

No information located to date.

Propagation by Division

Not applicable

Propagation by Air Layers

No information located to date.

Propagation by Grafting

No information located to date.

Propagation by Tissue Culture

No information located to date.

References

- Akamine, Ernest K. 1951. Viability of Hawaiian forest tree seeds in storage at various temperatures and relative humidities. *Pacific Science* 5:36-46.
- Culliney, John L., and Bruce P. Koebele. 1999. *A native Hawaiian garden: how to grow and care for island plants*. Honolulu: University of Hawai'i Press. p. 107-109.
- Lamb, Samuel H. 1981. *Native trees and shrubs of the Hawaiian Islands*. Santa Fe, New Mexico: Sunstone Press. p 50-51.
- Lilleeng-Rosenberger, Kerin. 1996. Plant propagation notebook. Unpublished materials: National Tropical Botanical Garden.
- Obata, John K. 1967. Seed germination in native Hawaiian plants. *Newsletter of the Hawaiian Botanical Society* 6 (3):13-20.
- Ragone, Diane, and Kerin Lilleeng-Rosenberger. 1995. *Hawaiian Rare Plant Conservation Project*. Unpublished report: National Tropical Botanical Garden.
- Wagner, Warren L., Darrel R. Herbst, and S. H. Sohmer. 1990. *Manual of the flowering plants of Hawai'i*. 2 vols, *Bishop Museum Special Publication* 83. Honolulu: University of Hawaii Press and Bishop Museum Press. p. 705-706.
- Woolliams, Keith. 1977. Report from Waimea Arboretum. *Newsletter of the Hawaiian Botanical Society* 16 (5):75-76.
- Woolliams, Keith. 1978. Propagation of some endangered Hawaiian plants at Waimea Arboretum. *Notes from Waimea Arboretum & Botanical Garden* 5 (1):3-4.
- Yoshinaga, Alvin. 1998. Storing seeds of some native rain forest plants: some simple methods. *Newsletter of the Hawaiian Botanical Society* 37 (2):28-32.
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16 September 2001

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Myoporum sandwicense

Alternative Botanical Names

Myoporum degeneri
Myoporum faurieri
Myoporum lanaiense
Myoporum saint-johnii
Myoporum stellatum
Myoporum tenuifolium
Polycoelium sandwicense

Common Names

Naio
 Bastard Sandalwood
 False Sandalwood
 Naeo
 Naieo

Family

Myoporaceae

Potential or Traditional Uses

Landscape



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Description

Myoporum sandwicense is quite variable and ranges in habit from a many-branched shrub to a small tree. At elevations above 2,500 feet, it can get to 45 feet tall with age, but generally it is much smaller. In cultivation, it generally grows to about 15 feet in height, but it can get up to 25 feet tall and 12 feet wide. It has dark gray, grooved bark.

The shiny or waxy green leaves vary in shape from long and narrow to elliptic and can be anywhere from 1 1/2 to 8 inches in length. *Myoporum sandwicense* blooms year round. The 1/4 inch bell-shaped flowers are fragrant. They are arranged close to the stems and range in color from white to pink. (Bornhorst 1996; Koob 1998; NTBG 1996; Rauch 1997; Wagner 1990)

Habitat and Geographic Range

Myoporum sandwicense is indigenous to Hawai'i and also occurs on Mangaia in the Cook Islands. It is found on all the main Hawaiian islands except, possibly, Kaho'olawe. It occurs in a variety of habitats including in shoreline vegetation, a'ala, and dry, moist, and wet forests. It is most common in subalpine forests. It

grows at elevations ranging from sea level to 7,700 feet. Currently, there are three accepted geographic subspecies. (Wagner 1990)

Propagation by Seeds

The fruits of *Myoporum sandwicense* are almost round, fleshy, and about 1/8 to 1/4 inch in diameter. When ripe, they range in color from greenish white to pinkish or purplish. Large, ripe, juicy fruits contain unusual multiple seeds; smaller fruits may have no seeds.

The seeds must be removed from the fruit pulp before planting. Stratton *et al* recommend ripening the seeds in a plastic bag. This softens the pulp making the seeds easier to clean. After ripening, the fruit flesh can be removed by either placing the fruits in a colander or strainer under running water or breaking up the fruit by hand in a bowl of water. Discard the fruit pulp and any seeds that float since they will not germinate. Wash the remaining seeds thoroughly and dry them on a paper towel.

Myoporum sandwicense seeds should be pretreated by soaking. The seeds should be covered with water which has been heated to no more than 120 - 135 degrees F. This temperature is hot to the touch, but not boiling. The seeds should be soaked for 12 to 48 hours. If seeds are soaked for the longer periods of time, the water should be changed daily. Stratton suggests that scarifying by sanding may decrease germination time.

The treated seeds should be planted in sterile potting mix or other well-drained medium such as a mixture of 3 parts #2 perlite to 1 part Sunshine Mix #4. Keep the medium moist and place the containers in a covered, shaded location to control soil moisture and eliminate rain damage.

The shortest germination time for *Myoporum sandwicense* seeds is obtained with fresh seed, but it is still highly variable. Stratton says that it can vary from 1 to 18 months; NTBG says that the seeds will germinate within 6 months; Koob states that the seeds will germinate "over a fairly long period of time"; Bornhorst indicates that they germinate sporadically; Mew gives a range of 6 to 15 months; Rauch writes that germination takes about 18 months. Germination rates also vary from 10 to 70% depending on the quality of the seed. In his germination studies, Obata found that untreated seeds of *Myoporum sandwicense* had germination rates ranging from 5 to 30%.

Viability decreases with storage. However, if seed must be stored, air dry cleaned seed and place it in a paper bag or envelope. Place this in an airtight container with a desiccant and place it in a cool place at 25% relative humidity. (Bornhorst 1996; Koob 1998; Mew 1987; NTBG 1996; Obata 1967; Rauch 1997; Stratton 1998)

Propagation by Cuttings

Myoporum sandwicense can be grown from 3 to 5 inch long soft or semi-hard wood cuttings. Reduce transpiration by cutting upper leaves in half. Use a mild rooting hormone (e.g. 0.05% IBA and 0.025% NAA) (Koob, email) and a well-drained rooting medium such as sand, vermiculite or perlite. Use of a mist system or humidity chamber will speed rooting. Rooting takes "many weeks." Stratton

indicates that success depends on the age of the parent plant. (Bornhorst 1996; Koob 1998; Stratton 1998)

Propagation by Division

Not applicable.

Propagation by Air Layers

Myoporum sandwicense can be air layered using standard techniques. Remove air layer from mother plant with roots are 3 to 4 inches long. (Koob 1998)

Propagation by Grafting

No information located to date.

Propagation by Tissue Culture

No information located to date.

References

- Bornhorst, Heidi L. 1990. Introduction to xerophytic native Hawaiian plants. *The Bulletin of the National Tropical Botanical Garden* 20 (3):49-54.
- Bornhorst, Heidi L. 1996. *Growing native Hawaiian plants: a how-to guide for the gardener*. Honolulu: The Bess Press. p. 42-43.
- Koob, Gregory A. 1998. Naio, or bastard sandalwood. *Hawai'i Horticulture* 1 (2):17-20.
- Koob, Gregory A. "Rooting Hormone Question." Personal email. Posted 28 January 1999.
- Mew, Randal K. T. 1987. Cultivation and propagation of selected coastal plants at the Waikiki Aquarium. *Newsletter of the Hawaiian Botanical Society* 26 (2):27-32.
- National Tropical Botanical Garden (NTBG). 1996. *Ten native Hawaiian trees for urban landscapes*. Lawai, Hawaii: Education and Plant Science Departments. National Tropical Botanical Garden.
- Obata, John K. 1967. Seed germination in native Hawaiian plants. *Newsletter of the Hawaiian Botanical Society* 6 (3):13-20.
- Rauch, Fred D., Heidi L. Bornhorst, Rhonda Stibbe, and David Hensley. 1997. *Naio, Ornamentals and Flowers OF-19*. Honolulu: Cooperative Extension Service, College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa. (Also available as a PDF file at [Free CTAHR Publications](#).)
- Stratton, Lisa, Leslie Hudson, Nova Suenaga, and Barrie Morgan. 1998. Overview of Hawaiian dry forest propagation techniques. *Newsletter of the Hawaiian Botanical Society* 37 (2):13, 15-27.

flowering plants of Hawai'i. 2 vols., Bishop Museum Special Publication 83.
Honolulu: University of Hawaii Press and Bishop Museum Press. p. 928-929.

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Last updated:
5 April 2001

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