



## Native Hawaiian Plants for Landscaping, Conservation, and Reforestation

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Native Hawaiian plants are those which came to the Hawaiian Islands by natural means such as jet stream air currents, on or in birds, or by floating to the islands borne by ocean currents.

Once these plants reached the Hawaiian Islands (which happened very rarely), and managed to survive and reproduce, they had an abundant range of different habitats to grow in. Adaptive radiation and speciation has occurred in Hawai'i's native flora over the millions of years since their arrival.

When the Hawaiians discovered the islands, they brought about 32 plants and 4 animals with them in their sailing canoes. Other people who later came to Hawai'i brought many more plants and animals. The landscape was and continues to be drastically altered. Some of the victims of this alteration are the native life forms. Many plants have become extinct or are rare and threatened. In populated areas, native Hawaiian plants are rarely seen. You need to go to rugged, inaccessible coasts or high in the mountains to see native plants.

The field of horticulture, which has cultivated and developed many rare, exotic, and "difficult to grow" plants such as orchids, has largely ignored native Hawaiian plants. A few private hobbyists and botanic gardens have brought native Hawaiian plants into cultivation.

Native Hawaiian plants have the reputation of being insignificant "weeds" or impossible to grow. This publication on the culture of native Hawaiian plants should support the following points:

- Native Hawaiian plants are beautiful and unique.
- They can be successfully grown and mass produced for private and public landscapes, as well as for reforestation of our native forests and watersheds.
- Many natives, especially those native to coastal and dry forest areas will help reach Hawai'i's goal of reducing wasteful watering practices (xeriphitic or drought-tolerant landscaping).
- Many native plants such as *Myoporum*, *Dodonaea*, *Vitex*, *Sida*, *Scaevola*, and *Sapindus* have a broad range of elevation adaptation. Thus they can be grown in coastal, inland, and upland Hawaiian gardens. Once established in the cooler, wetter areas, these plants have a minimal water requirement.
- They are excellent candidates for xeriphitic gardens.

With good, common-sense horticulture, including growing plants commercially from cultivated source material, native Hawaiian plants need not become extinct. People who grow native Hawaiian plants should not collect them from the wild. Plants should be brought into cultivation and be grown from cultivated source material. This is to ensure that plants in their wild habitat are not injured or depleted.

To initially bring the plants into cultivation, the proper permits should be acquired from the landowner and adhered to. Some plants are on the state or federal endangered species lists. People and nurseries who do not obtain permits have been fined. Hawai'i can have unique and distinct landscaping. Our hotels, parks, golf courses, and gardens do not need to be exact clones of other tropical areas.

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## Plant culture notes

### Transplanting

Transplanting seems hard to many people. It is easy once you know how to do it and get set up properly. Use a pot that is one size bigger than the one the plant is in. Get potting medium ready. A good permanent potting medium is a 1:1 mixture of peat moss and perlite. If the plant is from a dry or coastal area, add chunks of cinder or perlite. If the plant is from the wet forest, add more peat moss or compost. Be aware that certain plants are pH dependent. Carefully watch the amount of peat moss added, as it is very acidic.

If the plant will eventually be planted in the ground, make a 1:1:1 mix of peat moss, perlite, and soil. The soil should come from the area where the plant will eventually be planted. Slow-release fertilizer can be mixed into the potting medium at rates indicated on the fertilizer label.

Once you have pots, potting media, fertilizer, and watering can in hand, you are ready to start repotting. The most important rule is to keep the plant stem at the same depth as in the original pot.

Another important rule is to avoid putting the plant in too large a pot. If the pot is too large for the roots of the plant, the plant may not be able to take up all the water in the soil and it may “drown” and rot.

Mix your potting medium and add some slow-release fertilizer. Pre-wet the medium to keep the dust down and to lessen shock to the plant. Put some medium in the bottom of the new pot. Measure for correct depth in the new pot while the plant is still in its old pot. Make sure that there is from ½ inch to 1 inch from the top of the pot so the plant can get adequate water. Make sure that the medium is the same depth on the stem that it was before. Water the plant thoroughly as soon after transplanting as possible. This is why a filled watering can is a good thing to have on hand. You can water as soon as you repot each plant. A commercially available vitamin B<sub>1</sub> transplanting solution can help lessen transplant shock. This is useful when transplanting rare plants or if many roots were broken during transplanting.

Keep the plant in the same type of environment as it was before; for example, sun or shade. If a lot of roots were broken, trim off some of the leaves to compensate for the loss of roots.

### Planting out

Plant most native Hawaiian plants in a sunny location in soil that is well drained. Make the planting hole twice as wide as the root ball or present pot, and just as deep. If the soil is clay-like and drains slowly, mix in some coarse red or black cinder, coarse perlite, or coarse compost. Place some slow-release fertilizer in the bottom of the hole. Carefully remove the plant from the container and put it in the hole. The top of the medium should be at the same level as the top of the hole. If it is too high or too low, remove or add soil so the plant is at the right depth. Water thoroughly after you transplant.

In nursery and field tests run at the University of Hawai‘i at Mānoa, Honolulu Botanic Gardens, Halawa Xeriscape, Nature Conservancy of Hawai‘i nursery and preserves, other public landscapes, and in private gardens, the plants described below have proved to be the best in terms of propagation ease, longevity in the landscape, and aesthetic value.

## Groundcovers

### ‘Ākia

*Scientific name:* *Wikstroemia uva-ursi*

*Family:* Thymeliaceae (‘ākia family)

*Description.* ‘Ākia is a small, sprawling groundcover with oval, waxy, green leaves that are arranged in an imbricate pattern. Its flowers are small, four-part, yellow.



‘Ākia (*Wikstroemia uva-ursi*) is a groundcover plant with imbricately arranged leaves and four-part, yellow flowers that are followed by a red fruit. Here, it sprawls over a tile wall.

lowish green, and usually bloom in clusters. They are followed by orange-red berries. It can grow to a height of 1–3 feet but mainly spreads laterally. Some old plants are as wide as 10 feet across.

*Propagation.* ‘Ākia can be grown from seeds, cuttings, or air layers.

*Landscape uses.* ‘Ākia is a good groundcover or low shrub. To grow it as an effective groundcover, plant the young plants 1 foot on center (a foot apart) or closer. It is lovely sprawling over a stone wall, embankment, or rocks. Once established it is very drought and wind tolerant.

*Pests.* It has very few pests or problems.

*Other uses.* The flowers, the orange-red fruits, and some of the leafy twigs are prized for making haku lei.

### ‘Ilima papa

*Scientific name:* *Sida fallax*

*Family:* Malvaceae (hibiscus family)

*Description.* ‘Ilima papa is a low groundcover (about 6 inches to 1 foot tall). The bright yellow flowers look like miniature hibiscus, to which the ‘ilima papa is related.

*Propagation.* ‘Ilima papa is easily grown from seeds or cuttings.



‘Ilima (*Sida fallax*) has small, bright yellow flowers. It is a hibiscus relative. The flowers are made into the lei of O‘ahu.

*Culture.* It responds well to fertilizer, especially foliar types, while it is being grown in the nursery or landscape.

*Landscape use.* ‘Ilima papa makes a good groundcover in a hot, sunny location.

*Pests.* Sucking and chewing insects can sometimes be a problem if the plants are stressed. This can be handled with insecticides.

*Other uses.* The flowers are made into leis and represent the island of O‘ahu. It takes about 1000 of the delicate, ephemeral blossoms to make one strand of a lei.

### Pōhinahina, kolokolo kahakai, beach vitex

*Scientific name:* *Vitex rotundifolia*

*Family:* Vitaceae (lantana family)

*Description.* Pohinahina is a groundcover or sprawling shrub, 6 inches to 2 feet tall. It spreads laterally and grows rapidly once established. It has silvery, oval leaves that sometimes have a tinge of lavender near the margins.



Beach vitex (*Vitex rotundifolia*) is a creeping groundcover with silvery, oval leaves and clusters of lavender flowers.

The foliage has a spicy fragrance. Flowers are about an inch long, lavender, and are clustered near the tips of the stems.

*Propagation.* It can be propagated from seeds or cuttings, but cuttings are faster. It has been reported to grow by sticking cuttings directly in the ground and watering them daily with a soaker hose for about three weeks (this was in red sugarcane soil).

*Landscape use.* Kolokolo kahakai makes a good groundcover or potted specimen. It is wind and salt tolerant. It grows well in sandy soils. It does surprisingly well in red clay soils for a beach plant. It does well over a broad range of elevations. It makes a good plant for the inland/upland xeriscape. As it tends to sprawl, it is attractive cascading over rock walls or scrambling over boulders and rocks in the landscape. It is a good cover for fairly steep banks. It has been reported to do well in a large clay or cement pot on a sunny lānai. It needs full sun. As long as the soil is fairly well drained, it will thrive. Water well for the first few weeks and then taper off as the plant becomes established.

*Pests.* It has few pests or problems.

## Pā'ū o Hi'iaka

*Scientific name:* *Jacquemontia ovalifolia* subsp. *sandwicensis*

*Family:* Convolvulaceae (morning glory family)

*Description.* Pā'ū o Hi'iaka is a sprawling groundcover with pale blue or white blossoms. It usually stays low to the ground, with a height of 3–8 inches. The leaves are about 3 inches long and 1 inch wide. The flowers are about 1 inch wide.

*Propagation.* It is easy to propagate from cuttings or seeds. To grow it from cuttings, take a two- to three-node cutting (about 3 to 4 inches long), stick about a third of the cutting in a pot of potting medium, and water it daily. Most well-drained media will work for propagation. Rooting hormone is not needed for cuttings. To grow pā'ū o Hi'iaka from seeds, plant them (there are several tiny seeds to each brown, papery seed capsule) on firm, pre-moistened potting medium. Lightly cover



*Hibiscus calyphullus* in an attractive hotel landscape on Maui. Ma'o (*Gossypium tomentosum*) is in the foreground and pā'ū o Hi'iaka (*Jacquemontia ovalifolia*) is mixed in with the hibiscus. The plants are kept low with a string trimmer. Large, handsome, yellow flowers appear each morning to brighten the landscape.

the seeds with medium, firm the medium down with another clean pot, and water daily. Suggested potting medium is one part perlite, one part peat moss, and one part black or red cinder.

*Landscape uses.* Pā'ū o Hi'iaka makes a good and interesting groundcover, especially if interplanted with other native groundcovers like 'ilima, 'ohai, 'ākia, and pōhinahina (Figure 1c). It also does well in a large pot or a hanging basket.

*Pests.* Few pests and diseases have been reported on pā'ū o Hi'iaka.

*Notes of interest.* One day, according to ancient Hawaiian legend, Pele, the volcano goddess, took her favorite baby sister Hi'iaka with her to the beach. The waves were up and the fishing was good. Pele went out into the water, leaving baby Hi'iaka on the beach. The waves got bigger and better, the fish were biting like crazy, and Pele stayed out in the water. The sun was getting hotter and hotter too. On the beach, baby Hi'iaka was uncomfortable and getting *papa'a* (burnt). The gods and a little viny beach plant with blue flowers felt sorry for Hi'iaka. The vine quickly grew over Hi'iaka and protected her from the harsh Hawaiian sun. That is how it got the name pa'u (the skirt, or women's garment) of Hi'iaka.





Nehe (*Lipochaeta integrifolia*) is an easy-to-grow sprawling plant with yellow, daisy-like flowers.

## Nehe

*Scientific name:* *Lipochaeta integrifolia*

*Family:* Asteraceae (daisy family)

*Description.* Nehe is a small, sprawling plant, 6–8 inches tall, with small, succulent leaves and yellow, daisylike flowers. The leaves have a silvery grey appearance but can be quite green in a moist situation.

*Propagation.* Nehe is easy to grow from cuttings, with or without mist, in just about any well drained medium. Rooting hormone is not essential for successful propagation.

*Landscape uses.* Nehe makes an excellent groundcover. It has been suggested as a replacement for the over-used wedelia, but it is not as easy to grow.

*Pests.* Some sucking insects like mealybugs sometimes attack nehe. Standard insecticides may be used. A wettable powder formulation is best.



Hinahina (*Heliotropium anomalum*) growing on a mound of sand at the Maui Zoo and Botanical Garden.

## Hinahina

*Scientific name:* *Heliotropium anomalum*

*Family:* Boraginaceae (kou family)

*Description.* Hinahina is a small, coastal plant. It grows to 6–8 inches tall. The foliage is silvery (*hinahina* in the Hawaiian language), somewhat succulent, with the leaves clustered in tight rosettes. It has tiny, white, fragrant flowers that are arranged in a “helicoid cyme.”

*Propagation.* Hinahina can be grown by cuttings, with or without mist. A good potting mix is one part black or red cinder, one part peat moss, and two parts perlite.

*Landscape uses.* Hinahina makes a beautiful, silvery groundcover that is tolerant of drought, salt, and wind once established in the landscape. It is from 3–12 inches tall in cultivation. It seems to hold up well in the landscape. It requires full sun. Although hinahina grows naturally in very dry areas, it needs regular watering in cultivation, especially if grown in a pot. Although it will get more succulent and silvery with less water, do not let it get so dry that it wilts.

*Pests.* Mealybugs sometimes attack hinahina. Hinahina sometimes dies back. This might be from inconsistent watering or perhaps fungal or root disease.

*Other uses.* It is the flower and lei of the island of Kaho‘olawe. The flowers and leafy rosettes are prized for haku leis. The whole leafy tip of the plant, with or without the flowers, is plucked from the plant. There are so many people in Hawai‘i today who like to make hinahina lei that their gathering is threatening the plant they admire—hinahina is becoming increasingly rare at its native coastal sites. Happily, hinahina has proved fairly easy to grow.

*Places to see hinahina.* A good landscape to see it growing successfully in is along the beach at Waikīkī between the Hilton Hawaiian Village Hotel and Fort DeRussy. There is a public shower and restroom there with a beautiful planting of hinahina under the coconut trees. The Wailea Beach Hotel on Maui also has hinahina in the landscape. Both plantings have been in since about 1988 and are doing well.

## ‘Ihi

*Scientific name:* *Portulaca* species

*Family:* Portulacaceae (moss rose family)

*Description.* Portulacas are small, usually succulent herbs. There are seven native Hawaiian species. There is also a weedy portulacca found in Hawai‘i, the purslane (*P. oleracea*), and a cultivated one, the moss rose (*P. grandiflora*).



This groundcover or potted plant, ‘ihi (*Portulaca lutea*), has succulent leaves and single-petaled, bright yellow flowers.

*Portulaca lutea* has yellow, single-petaled flowers with one to three flowers blooming at the tips of the stems. The anthers of the flowers range in color from yellow to red. It is 3–12 inches tall. This species is indigenous. It is found on other Pacific islands in Polynesia and Micronesia, as well as on shores and coastlines of the Northwest Hawaiian Islands and on O‘ahu, Moloka‘i, Lana‘i, Maui, and Hawai‘i.

*Portulaca molokiniensis* is a recently described species and comes from the offshore islets Molokini and Pu‘ukoa‘e and from Kamōhio Bay, Kaho‘olawe. It was described by State of Hawai‘i forester Robert Hobdy, who did a survey of the flora of the offshore islands of Maui County. It has very succulent, imbricate leaves that give the plant an attractive and interesting appearance. The round, corky stems with their succulent leaves stand more upright than most other portulacas. The plants can reach a height of about 1 foot. The flowers are lemon yellow and are found in clusters at the tips of the stems. When the plant is going to flower, it sends a leafless, flower-bearing stem above the succulent leaves.



*Portulaca molokiniensis* forms a rosette of succulent leaves arranged in an imbricate pattern, which gives this specimen plant a highly ornamental appearance.

*Portulacca villosa* has pale, greyish green, narrow leaves. Three to six flowers are found at the tips of the stems. They are white, pink, or pink with white centers. They grow up to 12 inches tall but tend to have a lower, sprawling growth habit. They grow naturally on dry, rocky, clay, or coral sites on Nihoa, Ka‘ula, and all the main islands except Kaua‘i and Ni‘ihau.

*Portulaca sp. nova* (Olowalu ‘ihi) is an undescribed species that is very rare. It has been found only in Olowalu valley on the west side of Maui. This is a dry valley that is threatened by rampant development in the area. It has the same size and growth habit as *P. villosa*. It has pale pink flowers with a white center and yellow anthers.

**Propagation.** The Hawaiian portulacas are very easy to grow. The succulent cuttings root easily, so rooting hormones and mist systems are not necessary. Take cuttings 2–5 inches long, remove the lower leaves, and stick them in a container of potting mix. They root easily in a couple of weeks with daily watering. Portulacas can also be grown from seed. The seeds are very tiny, round, and brown or black. Sow them on a firmed, pre-moistened medium in a clean pot. Lightly cover the tiny seeds and firm the medium again. When watering, do so carefully as the tiny seeds are easily washed around.

**Landscape uses.** Portulacas make good groundcovers, either alone or mixed with other coastal groundcover plants to create a “Hawaiian tapestry” in your landscape. They grow well in pots of well drained medium set in a sunny location. ‘Ihi also make interesting specimens for a rock garden. They are good candidates for the xeriphytic, water-saving garden by virtue of their succulent nature. The ornamental portulacas are heavy feeders. They require regular fertilizer applications to maintain a thick mat as a groundcover and to bloom consistently. The Hawaiian ones are probably similar in this requirement. Fertilize regularly with slow-release or organic fertilizer (e.g., 8-8-8 formulations or fish emulsion) or with liquid foliar fertilizer. Follow the directions on the fertilizer label.

**Pests.** Few pests are known to attack portulacas. As with all succulent plants, overwatering should be avoided, because they might rot.

## ‘Ala‘ala wai nui

*Scientific name:* *Peperomia* species

*Family:* Piperaceae (pepper family)

**Description.** There are many species of *Peperomia* in Hawai‘i. They are usually small herbs with small leaves. The leaves may be green, or green with red markings. The flowers are tiny and come on thin spikes that are found at the stem tips. Peperomias are related to ‘awa (kava) and to black pepper. In Hawaiian forests, ‘ala‘ala wai nui can be found perched on the moist trunks of trees, sprawling over rocks and boulders, and sometimes in soil if it is rich and full of organic material.

In gardens, it likes a rich but well drained medium. Peat moss, perlite, and black cinder in equal proportions make a good planting medium. Leafy compost also works well.

**Propagation.** Peperomias grow well and easily from cuttings. Either stem or tip cuttings work fine. Make cuttings 3–4 inches long, remove the lower leaves, cut the upper leaves in half, and cut off any flower spikes. Flower growth and seed development takes energy away from the plant. You want to channel this energy into root production. You can plant the seed spikes separately and grow the seedlings too. The cuttings do not seem to need



Leaves and flower spikes of ‘ala‘ala wai nui (*Peperomia* spp.), a less-thirsty, shade tolerant groundcover or potted plant.



rooting hormones. Plant the cuttings about ½ inch deep in a 1:1 mixture of peat moss and perlite. Place them in a cool, shady place and water daily or twice daily if you can. In the wild, these plants survive long dry periods. In cultivation in a pot, they need regular water. This is one of those interesting growing aspects of native Hawaiian plants.

They are gorgeous on boulders, at the top of stone retaining walls, and can be tried as a groundcover for shady or semi-shady areas. They are an attractive potted plant, preferring shade.

*Pests.* ‘Ala‘ala wai nui sometimes gets attacked by fungi that make it rot at the base. Careful attention to watering and drainage can help prevent this. It can be sprayed with a standard fungicide if you notice the problem. If the plants start to rot, they can sometimes be saved by taking tip cuttings and rooting them as outlined above.

*Other uses.* The Hawaiians made a grey kapa dye from ‘ala‘ala wai nui.

## ‘Āhinahina, hinahina kuahiwi

*Scientific name:* *Artemisia australis*

*Family:* Asteraceae (daisy family)

*Description.* ‘Āhinahina has silvery, finely divided leaves (Figure 7). It is a groundcover or a low shrub 2–3 feet tall. It does not flower very often. The flowers are yellowish green and come on a spike that grows out between the leaves. The leaves are somewhat fragrant when crushed.

*Propagation.* ‘Āhinahina is easy to grow from cuttings. Make tip cuttings 3–4 inches long. Remove the lower leaves and cut the upper leaves in half. Put the cuttings in pots with a peat moss and perlite medium. Water daily, keep in shade until they are rooted, and gradually move them into a more sunny location. It does not seem to need rooting hormone to produce roots.

*Landscape uses.* In the wild, ‘āhinahina grows around boulders or on steep cliff faces. Similar uses can be made of them in the landscape. Plant them around boulders, on well drained slopes, or in large clay or cement pots. They prefer full sun.



The silvery grey leaves of this shrub or potted plant, ‘āhinahina (*Artemisia australis*), are finely divided. It provides an accent in a dryland garden.

*Pests.* Few pests attack ‘āhinahina. Sometimes you will find a few sucking insects on the stems. Pick them off by hand and crush them, spray insecticidal soap on the insects, or use a standard powder-formulation garden insecticide.

*Other uses.* The pretty, lacy, silvery leaves and stem tips of ‘āhinahina are attractive in haku lei. They are also good in fresh or dry flower arrangements.

## Shrubs

### Ma‘o hau hele, Rock’s Kaua‘i hibiscus

*Scientific name:* *Hibiscus calyphyllus* (syn: *H. rockii*)

*Family:* Malvaceae (hibiscus family)

*Description.* *Hibiscus calyphyllus* is a low, sprawling shrub with large, yellow blossoms. Its natural growth habit is shrublike, 2–4 feet tall. It is sometimes found in old kama‘āina gardens on Kaua‘i and the other islands. The author grew the Kaua‘i collection next to the African *H. calyphyllus* and found them to be different.

*Propagation.* This hibiscus is easily and rapidly produced from cuttings.

*Landscape uses.* It is attractive and blooms well when maintained at a height of 6–12 inches. In the landscape,





The large, bold, yellow flowers that bloom regularly are a striking feature of Rock's Kaua'i hibiscus (*Hibiscus calyphyllus*). It is useful as a groundcover or shrub.

it can be kept low with a string or blade trimmer. It is also attractive if allowed to grow more freely as a rambling shrub. It can be trained into a hedge. It will grow well in a large pot. The large, clear-yellow flowers, with their velvety, purple-black throats, make striking splashes of color in the garden.

*Pests and diseases.* It has few pest or disease problems.

### **Koki'o ke'oke'o, Hawaiian white hibiscus**

*Scientific names:* *Hibiscus waimeae*, *H. arnottianus*, *H. immaculatus*

*Family:* Malvaceae (hibiscus family)

*Description.* The Hawaiian native white hibiscuses have several unique attributes. The main one is that their flowers have a delicate, subtle fragrance.

*Hibiscus waimeae*, the Kaua'i white hibiscus, has a light pink staminal column and pubescent (hairy), light green leaves.

The staminal column of *Hibiscus arnottianus*, the O'ahu white hibiscus, is magenta, and the leaves are glabrous (smooth) and dark green.

The Moloka'i white hibiscus, *H. immaculatus*, has a pure white staminal column and light green, smooth leaves.

Each of these Hawaiian white hibiscuses is unique and possesses a slightly different fragrance. However, their propagation and landscape uses are similar, so they



*Hibiscus waimeae*, koki'o ke'oke'o, a fragrant Hawaiian hibiscus from Kaua'i, is an attractive and unique landscape plant.



The O'ahu white hibiscus (*Hibiscus arnottianus* var. *punaluensis*), seen here growing at Moanalua Gardens, has white flowers with a subtle fragrance.

are grouped together here.

*Propagation.* The usual propagation method is by cuttings. Hibiscus is also grown from seed and by grafting and air layering.

Take tip and stem cuttings 4–6 inches long, treat them with a medium-strength rooting hormone, place in a rooting mixture like perlite or equal amounts of perlite and vermiculite in pots or flats, and place under a mist system until they develop roots. Once rooted, they are potted into individual pots in a medium such as 1:1 peat moss and perlite with fertilizer incorporated into the mix.

Growing hibiscus from seeds is relatively fast and easy. However, because the hibiscus, especially the native Hawaiian whites, hybridize so readily, the offspring may be different from the parents. To get pure seed, hand-pollinate the flowers and then cover them with a bag to prevent cross-pollination. Many great hibiscus hybrids grown in Hawai‘i today have the Hawaiian whites as parents. You can raise seeds produced by chance crosses and see what grows, or you can cross-pollinate them on purpose.

Grafting is a good method to use for growing koki‘o ke‘oke‘o. Use a tough rootstock and graft the native onto it. Hibiscus is among the easiest plants to graft, and the native whites grow quite well this way.

Air layering is a good method, especially if a fairly large plant is desired. However, sometimes the root systems are not as strong as those produced by seedlings, cuttings, or grafted plants.

*Landscape use.* Koki‘o ke‘oke‘o is an excellent plant for the landscape. In wet, cool areas in Hawai‘i, it can grow into a fairly large tree (30–40 feet), with time. The more usual form is a rounded 3–4-foot shrub. It grows well in the ground or in a very large container. It can be mass-planted to form a hedge, planted singly as a specimen, or grouped as a mass or screen.

*Pests.* Koki‘o ke‘oke‘o are sometimes attacked by rose beetles, thrips, and aphids. Stick bugs sometimes cause bud drop. You can spray with insecticidal soap or with standard garden insecticides. Do not use diazinon on hibiscus.

*Other uses.* The Hawaiians used the buds of koki‘o ke‘oke‘o as a mild, pleasant-tasting laxative. One report says that the white flowers were for girl children, while the native red hibiscus, koki‘o ‘ula, was for boys. The fiber was used for cordage and tying.

## Ko‘oloa ‘ula

*Scientific name:* *Abutilon menziesii*

*Family name:* Malvaceae (hibiscus family)

*Description.* Ko‘oloa ‘ula is a shrub with silvery, heart-shaped leaves and small, pendant, red blossoms. It is related to hibiscus and ‘ilima. This shrub grows 3–

6 feet tall. It has a somewhat straggly growth habit in the wild but can be pruned into a more attractive shape. It is a federally listed endangered species. It is so rare in the wild mainly because its habitat has been destroyed by development, weeds, introduced animals, and diseases.

*Propagation.* It can be grown from cuttings, air layers, or seeds.

*Landscape use.* This shrub can be trained in an arborescent form or kept as a smaller shrub. It makes an interesting specimen and would also be attractive as a hedge.

*Pests.* It is sometimes attacked by chewing and sucking insects. These are controlled with standard garden insecticides in wettable powder formulations or with regular sprays of insecticidal soap. You can also plant them near a streetlight to repel rose beetles.

## ‘A‘ali‘i

*Scientific name:* *Dodonaea viscosa*

*Family:* Sapindaceae (lychee family)

*Description.* ‘A‘ali‘i is a shrub or, with time, a small tree. It grows 3–10 feet tall. The leaves are glossy green with reddish midribs and stems. The flowers are either male or female and are fairly small and insignificant (about ¼ inch in diameter). The female flowers develop



Ko‘oloa ‘ula (*Abutilon menziesii*). Close-up of the flower of this less thirsty shrub.

into attractive papery fruit capsules. These capsules come in a variety of colors: red, pink, green, yellow, and tan. The male flowers are tiny, about ¼ inch wide, red, yellow, or green, and shaped like a curled-up octopus. They produce abundant pollen, which is blown or carried by insects to the female flowers. 'A'ali'i is one of those Hawaiian plants with a very broad natural range. It can be found in coastal areas like Polihale on Kaua'i and Koko Head on O'ahu, and ranges up to high, dry sites like Haleakala and the Volcano area on the Big Island.

*Propagation.* 'A'ali'i is best grown from seed. Soaking the seeds for 24 hours in water that was initially boiling hot will increase and speed germination of the tiny, hard seeds.

*Landscape uses.* In the landscape, it is useful as a specimen shrub, hedge material, or tree. It responds well to pruning. 'A'ali'i is a tough plant with a strong root system. It is very drought and wind resistant once established.

*Pests.* 'A'ali'i has few pests.

*Other uses.* The seed capsules are attractive and are prized for haku lei. Flower arrangers have recently discovered them and use them in dry and fresh arrangements. If hung to dry in a well ventilated area, the fruit clusters will keep for years.



Brilliant red seed capsules of this 'a'ali'i (*Dodonaea viscosa*) can be used in haku lei (worn in the hair) or in fresh or dry flower arrangements.

## 'Ewa hinahina

*Scientific name:* *Achyranthes splendens* var. *rotundata*

*Family:* Amaranthaceae (kulu'i family)

*Description.* *Achyranthes* is a low shrub, 1–2 feet high. It is native to the 'Ewa coast of O'ahu. It has silvery leaves and spiky flowers like its relatives, the cock's combs. It is on the federal list of endangered plants and thus requires the proper permits to be grown commercially. Such permits can be acquired from the Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife.

*Propagation.* It is very easy to grow from either seeds or cuttings.

*Landscape uses.* It is highly salt and drought tolerant. In the landscape it is highly effective when mass planted.

*Pests.* It has few pests.



Leaves and flower spike of the very drought tolerant shrub, 'Ewa hinahina (*Achyranthes splendens* var. *rotundata*).



## Ma‘o, Hawaiian cotton

*Scientific name:* *Gossypium tomentosum*

*Family:* Malvaceae (hibiscus family)

*Description.* Ma‘o is a shrub 3–6 feet tall and equally as wide. It has silvery green leaves that are shaped like kukui or maple leaves, clear yellow flowers 2–3 inches in diameter, and seed capsules that have brown, fuzzy seeds with short, cotton-like hairs.

*Propagation.* Ma‘o is readily propagated from seeds. A 24-hour hot-water soak improves germination. Ma‘o can also be grown from cuttings and air layers.

*Landscape uses.* It is attractive if grown naturally or pruned and shaped. Ma‘o can be used as a specimen shrub or a hedge.

*Pests.* Ma‘o has some pest problems from chewing and sucking insects and nematodes. Use standard, wettable powder insecticides to fight insects. For nematodes, ensure that seedlings are grown in soilless medium to start with clean planting material. Amending the soil with compost can also help reduce nematode numbers.

*Other uses.* Although ma‘o is not useful for textile production, it has been used by plant breeders to improve the pest resistance of commercial cotton. The Hawaiians made a green dye for kapa (bark cloth) from ma‘o.

## Kulu‘i

*Scientific name:* *Nototrichium sandwicense*

*Family:* Amarantaceae (kulu‘i family)

*Description.* Kulu‘i is a shrub 3–6 feet tall. Kulu‘i has silvery leaves that are 2–5 inches long and about half as wide. It rarely flowers, and the flowers are insignificant. It is related to ‘ewa hinahina and Mainland cock’s combs. It is native to the dry slopes above Ka‘ena point on O‘ahu.

*Propagation.* Kulu‘i is easy to grow from cuttings. Collect the cuttings and propagate right away. Trim back three-fourths of the leaves, either cutting them off or in half. Stick several cuttings in a pot of perlite or a 1:1 mixture of perlite and vermiculite. They also will root



Kulu‘i (*Nototrichium sandwicense*) is a silvery-leaved, tough, drought and salt tolerant shrub, ideal for the less thirsty landscape.

in a pot of well drained soil.

*Landscape uses.* Kulu‘i is naturally a large shrub. It can be allowed to grow in its natural shape or pruned and shaped to suit the particular landscape. Kulu‘i will also grow in a large clay or cement pot on a sunny lānai.

*Other uses.* Kulu‘i leaves can be made into a very attractive, silvery “maile” lei.

## Naio, false sandalwood

*Scientific name:* *Myoporum sandwicense*

*Family:* Myoporaceae (naio family)

*Description.* Naio is a large shrub or small tree from 3 to 15 feet tall. It has either glossy green or waxy pointed leaves and small flowers clustered close to the stem. The flowers are either pink or white, depending on the variety. Naio has a very large natural range, from coastal strand areas to high, dry sites in the Hawaiian mountains (e.g., Mauna Loa).

*Propagation.* Naio can be grown from seeds or cuttings. It is somewhat slow growing in the initial stages. It can be pruned, but this must be done with caution as it does not flush out rapidly. The plants should be in a vigorous state of growth when pruning and shaping is performed.



Naio (*Myoporum sandwicense*) is a shrub or small tree, ideal in the landscape or as a potted specimen plant.

*Landscape uses.* Naio is naturally a shrub or, with time, a small tree. It is a good specimen or hedge plant. Its broad, natural elevational range indicates that it will do well in coastal and upland sites in Hawai‘i.

*Pests and diseases.* Naio has few pest or disease problems.

*Other uses.* Naio becomes woody with time. The wood has a sandalwood-like fragrance when freshly cut. When the Hawaiians ran short of true sandalwood for export, they sometimes used Naio as a filler.

## Naupaka kahakai, beach naupaka

*Scientific name:* *Scaevola sericea*

*Family:* Goodeniaceae (naupaka family)

*Description.* Beach naupaka is a shrub that is often grown as a hedge or in a mass planting. It has large, paddle-shaped, light green leaves. The leaves are fairly succulent. White, fragrant half-flowers are found nestled among the leaves. The flowers are followed by white berries. The seeds inside the berries are beige, corky, and ridged.

*Propagation.* Naupaka kahakai is very easy to grow from seed. Some reports state that the seeds germinate better



The beach naupaka (*Scaevola sericea*) is an extremely tough and easy-to-grow shrub, ground-shrub, or groundcover that is salt, wind, and drought tolerant.

after being soaked in salt water. Cuttings are also easy to grow. Fairly large branches may be cut and rooted in the ground or a container. These should be kept moist until rooted. If a large specimen plant is desired, it can be propagated by air layering.

*Landscape uses.* Beach naupaka makes an excellent windbreak, particularly in beach areas with strong, salty winds. It is nice as a specimen plant and does well in a large pot placed in a sunny location.

*Pests and diseases.* There are few pests or diseases associated with beach naupaka.

*Other uses.* The leaves are used regularly by snorkelers and fishermen to defog their face masks. Before they jump in the water, they break a leaf in half and smear the sap on the inside of the glass.

## Kolomona

*Scientific name: Senna gaudichaudii*

*Family: Fabaceae (bean family)*

*Description.* Kolomona is a shrub of dryland Hawai'i that is 3–6 feet tall. It has oval leaves of a deep green color that are pinnately arranged on the stems. The flowers are an interesting pale green with traces of yellow, and have brownish anthers. The flowers are followed by brown seed pods.

*Propagation.* Kolomona is best grown from seed. The seeds are brown, thin, and round with a small, convex protrusion on one end. Unlike other seeds in the bean family, these do not need to be soaked or scarified to germinate. Plant them in a pot of sterile, pre-moistened potting medium such as a 1:1 mixture of peat moss and perlite and water daily. After the seeds germinate and have two sets of leaves, they can be transplanted to individual pots and later planted in the ground.

*Landscape uses.* Kolomona makes an attractive, sprawling shrub for the landscape. It is quite drought tolerant and is a good candidate for the xeriphytic garden. It can also be grown in a large pot and placed in a sunny location. Its close pan-tropical relative, *Senna surratensis*



This green-flowered, native shrub, kolomona (*Senna gaudichaudii*), is drought tolerant and can be used as a hedge, specimen planting, or potted plant.

(scrambled egg bush), which is a yellow-flowered shrub or small tree, is commonly used in dry landscapes. Kolomona, with its attractive green flowers, is a good candidate for the same type of harsh, dry sites.

*Pests.* Few pests have been reported for this plant.

## Ma'ō hau hele

*Scientific name: Hibiscus brackenridgei*

*Family: Malvaceae (hibiscus family)*

*Description.* Ma'ō hau hele is a shrub 4–8 feet tall with large, bright yellow flowers. It blooms most profusely in spring and early summer. The flowers are 4–6 inches in diameter. There are varieties native to each of the main Hawaiian Islands.

*Propagation.* It can be easily grown from cuttings. Seeds also work well but are slower.

*Landscape uses.* It responds well to pruning and shaping, especially after its main blooming cycle. It is attractive as a specimen shrub, mass planting, or hedge. It is not a long-lived plant in the wild, dying after 4 to 6 years. It can be maintained longer in cultivation with proper care (pruning, fertilizing, and watering). However, it is a good idea to rejuvenate the planting after about 5 years.

*Pests.* Chewing and sucking insects sometimes attack



Ma'ō hau hele (*Hibiscus brackenridgei*) is Hawai'i's official state flower. It usually blooms in the spring.



ma‘o hau hele. Spray with standard wettable powder insecticides or insecticidal soap.

*Note of interest.* Ma‘o hau hele was designated as Hawai‘i’s official state flower by the 1988 Legislature.

### Hidden petaled ‘ilima

*Scientific name:* *Abutilon erimetopetalum*

*Family:* Malvaceae (hibiscus family)

*Description.* Hidden petaled ‘ilima has fuzzy, heart-shaped leaves and small, pendant flowers. The flowers have no true petals, just a green calyx and a protruding orange-yellow staminal column.

*Propagation.* The plant grows readily from seed.

*Landscape uses.* This plant makes an interesting specimen or shrub plant. Like many native members of the hibiscus family, it should be pruned to keep it from getting too top-heavy. Fertilizer can make the top growth too heavy and luxuriant for the roots to support.

*Pests.* They have few pests.

*Notes of interest.* This plant was thought to be extinct. It had not been seen since the 1920s. Bill Garnett of Waimea Arboretum and a state forester looked for this and other rare plants on Lana‘i. They found a few plants “eaten to the 6-foot level by alien Axis deer.”



The green petals of this rare hibiscus relative, hidden petaled ‘ilima (*Abutilon erimetopetalum*), are hidden behind the calyx.

### Trees

#### Wiliwili, Hawaiian coral tree, tiger’s claw

*Scientific name:* *Erythrina sandwicensis*

*Family:* Fabaceae (bean family)

*Description.* Wiliwili is a tree of the dry, leeward lowlands of Hawai‘i. It grows fairly rapidly and is about 30 feet tall at maturity. The flowers look like large pea blossoms. They come in a variety of colors including apricot, chartreuse, white, yellow, red, and chartreuse with an orange lip. The Hawaiian erythrinas are unique in the world for this wide variety of flower colors. The tree has a soft, light wood and bean-like pods that twist open during the wet season to reveal orange or red bean-like seeds.

*Propagation.* Wiliwili is grown easily and rapidly from seed. Place some of the orange-red seeds in a water-



The large, pea-shaped flowers of wiliwili (*Erythrina sandwicensis*) come in a range of pastel colors from chartreuse to apricot.

proof container. Pour some hot water (just about but not quite boiling) over the seeds and let them soak in the water for 24 hours. The seeds can then be planted, several to a 6-inch pot or one seed to a 3-inch pot. Seeds can also be nicked or scarified with a file or clipper to enhance germination. Wiliwili can also be grown from cuttings.

*Landscape uses.* Wiliwili is an attractive tree for the hot, dry, sunny landscape. One drawback with wiliwili in the landscape is that it is summer-deciduous. It loses its leaves just before it flowers. If this look is not acceptable, interplant wiliwili with evergreen plant material such as a naio, mānele, or alahe'e. Non-native evergreen or flowering trees or shrubs may also be interplanted with wiliwili.

*Other uses.* The Hawaiians made lei from the attractive blossoms and seeds and surfboards, canoe outriggers, and net floats from the lightweight, buoyant wood.

*Notes of interest.* In the Hawaiian language, wili means "to twist." When a word is repeated in the Hawaiian language, it means the character is emphasized. Wiliwili means really twisty. Wiliwili is naturally pollinated by native Hawaiian birds. Many birds, both native and introduced, congregate and feed on the pollen and nectar of blossoming trees.

## Mānele, Hawaiian soapberry

*Scientific name:* *Sapindus saponaria*

*Family:* Sapindaceae (lychee family)

*Description.* Mānele is a magnificent tree with shiny, green, pinnate leaves. It has rather tiny flowers that are followed by seeds that come singly or in twos. The seeds are covered by a shiny, brown, sticky fruit covering. Inside the fruit covering is a round, shiny, black seed.

*Propagation.* Mānele is best grown from seed. The hard seeds should be scarified or soaked in hot water for 24 hours to enhance germination.

*Landscape uses.* Mānele is a tough and good looking tree. It is very adaptable as to climate. Beautiful specimens grow at the 3000-foot level near Hawai'i Volca-

noes National Park on the Big Island. There are also attractive specimens in Ala Moana park where it is hot and dry and the water is brackish just inches below the soil surface.

*Other uses.* Mānele fruit covering was used as soap. The black seeds were polished, drilled, and then strung into lei. The hard wood is used for construction, utensils, and other purposes.

## Alahe'e

*Scientific name:* *Psydrax odoratum*

*Family:* Rubiaceae (gardenia family)

*Description.* Alahe'e is a shrub or small tree, ranging from 3 to 30 feet tall, with glossy, green leaves and fragrant clusters of small, white blossoms. The bark is white and makes a handsome contrast to the dark, shiny leaves.

*Propagation.* Alahe'e can be grown from seeds. Although many seeds are produced, most of them are attacked by a seed parasite and will not grow. Spraying the seeds on the parent tree can prevent this problem. The seedlings grow slowly at first, but take off once established in the ground. This is one of the many native Hawaiian plants for which cultivation has not been completely worked out. It is worth the effort because of its hardiness and attractive attributes. It has not been successfully grown from cuttings or air layers.

*Landscape uses.* It is attractive when grown in its natural form or pruned into a desired shape. It makes a very



The glossy, pinnate leaves of mānele (*Sapindus saponaria*) are an attractive feature of this medium-sized tree.

attractive and fragrant specimen shrub, small tree, or hedge. One place to see alaha'e in cultivation is at the Japanese garden at the East-West Center at the University of Hawai'i at Mānoa.

*Notes of interest.* The name alaha'e is an example of the poetic nature of the Hawaiian language. *Ala* means "fragrant" and *he'e* means "octopus" or "slippery like an octopus." Alaha'e has blossoms that you can stick your nose into and smell, but they are better enjoyed by letting the breeze waft the scent to you. The Hawaiians expressed all this as a "slippery fragrance." Alaha'e has very hard wood with a straight grain. The wood was used for 'ō'ō (digging sticks) and spears.



Alaha'e (*Psychrax odoratum*), a less-thirsty shrub or small tree, pruned and shaped into bonsai at the Japanese Garden of the East-West Center at the University of Hawai'i at Mānoa.



Clusters of fragrant, white flowers enhance the deep green, glossy leaves and white bark of alaha'e.

## Koai'a

*Scientific name:* *Acacia koaia*

*Family:* Fabaceae (bean family)

*Description.* Koai'a is a small tree, 15–25 feet tall, from the dry leeward areas of Maui, Moloka'i, Lana'i, and Hawai'i. It is related to true Hawaiian koa but is a smaller tree that is more adapted to dry conditions. It has an attractive, rounded shape; sickle-shaped, grey-green "leaves"; small, yellow, powder puff flowers; and brown seed pods.

*Propagation.* Koai'a is grown from seed.

*Landscape uses.* Koai'a makes a lovely tree in the landscape. It deserves to be more widely grown. It is not a huge tree like koa, and is, therefore, more suitable for the average landscape.

*Pests.* The tree should be kept in good health and monitored for insects. The trunk and stems are sometimes attacked by coffee twig borers. A preventative bark spray with a systemic insecticide and the removal of all infested branches should keep the tree pest-free.

*Other uses.* The wood is very hard and dense. In the past, when the tree was more abundant, it was favored for making long-lasting fence posts in pastures. The Hawaiians probably used it for tools and weapons.



Koai'a (*Acacia koaia*) is a medium-sized, less-thirsty tree, growing here at Ho'omaluhia Botanic Garden.



## ‘Ōhi‘a lehua

*Scientific name: Metrosideros polymorpha*

*Family: Myrtaceae (myrtle family)*

*Description.* ‘Ōhi‘a lehua is an extremely variable Hawaiian plant. It can be a tree, a shrub, or a prostrate bog dweller. It ranges in height from a few inches to 100 feet depending on habitat and cultivar. The flowers are usually red but can also be yellow, orange, pink, or white. The leaves can be glabrous (shiny) or tomentose (hairy) and green, reddish, and even purple or grey.

*Native habitat.* ‘Ōhi‘a is a fairly common plant in the rain forest. ‘Ōhi‘a has a broad natural range of habitats. It can be found on new lava flows as well as in wet coastal areas exposed to salt spray. It can also be found near the coast in wet areas like Wailau on Moloka‘i and Puna on the Big Island. It used to be found more widely all over the Hawaiian Islands, but due to development and competition from introduced plants, insects, and overpicking, its range has been reduced. It does not seem to be a drought tolerant plant.

*Propagation.* ‘Ōhi‘a can be grown from seed, cuttings, or by air layering. The most simple method is from seed. Collect fresh seed capsules. Sprinkle the tiny seeds onto firm, moist potting medium. Water daily and transplant into individual pots when the seedlings have two sets of leaves. With daily watering and monthly foliar fertilizing, a 2-foot plant can be produced in a year.

Air layers can be made, but this is best done on cultivated plants so as not to harm the plants in the wild. Standard air layering practices can be followed, but use of a strong rooting compound is recommended. Some trees are more easily propagated by air layering than others. Aerial roots on the parent plant are indications of ease of air layering.

To grow ‘ōhi‘a from cuttings, a mist system is required. Use of a 10 percent solution of Dip-N-Gro® is beneficial. Select wood ¼ inch in diameter and 4–6 inches long. Tip and stem cuttings with healthy leaves are best. Cut the leaves in half and remove leaves from the lower inch of the cutting. Dip the cutting into the rooting solution for 10 seconds. Good rooting media for ‘ōhi‘a cuttings include a 1:1 mixture of perlite and vermiculite, a 2:1 mixture of perlite and peat moss, and



Flowers and leaf buds of ‘ōhi‘a (*Metrosideros polymorpha*) are highly prized for Hawaiian lei.

pure vermiculite or pure perlite. Choice of medium depends on the grower's climate and preference. Success of rooting, like air layering, depends a great deal on the parent plant. Experienced growers have found that some plants will produce 100 percent rooted cuttings, while others are nearly impossible to grow this way.

*Landscape use.* 'Ōhi'a lehua is beautiful in the landscape as a blooming tree or shrub in the ground or in a large pot. A good planting medium for potted 'ōhi'a is a 1:1:1 mixture of peat moss, perlite, and cinder. In Mānoa, Waimea on the Big Island, and other areas, people are growing it in their home and business landscapes. As propagation and maintenance techniques are worked out, we should see more 'ōhi'a lehua in the landscape.

One important note, especially during establishment in the ground or if the plants are to be kept in containers, is never to let them dry out. Daily watering is essential in areas that do not receive daily rainfall.

'Ōhi'a lehua responds well to fertilizer. Slow-release, organic, or foliar fertilizers are best. Foliar is best applied one or two times a month. Follow the label directions for organic or slow-release forms.

*Pests.* Rose beetles sometimes damage the leaves. These can be handled with standard insecticides. Fungus and nematodes sometimes cause root rot. These can be treated with fungicides.

*Other uses.* 'Ōhi'a lehua blossoms and young leaf tips (liko) are highly prized for use in lei. This is another reason to grow them more widely. The trees in the wild, especially those near accessible trails, are becoming stripped. Trees suffer dieback from overpicking. Lei makers should cultivate plants in their own gardens and help to protect the plants in the wild.

*Notes of interest.* There are many Hawaiian legends and proverbs about 'ōhi'a lehua. It is one of the five plants sacred to Laka, goddess of the hula. Hula hālau and others who cherish lei 'ōhi'a lehua should grow the plants for their special occasions and events.

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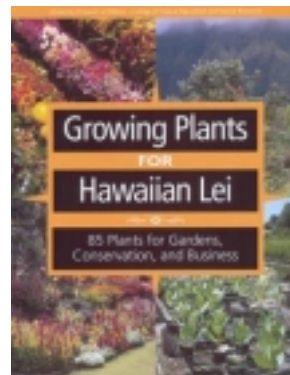
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