

Hawaiian Native Plants in the Landscape

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The Hawaiian flora developed on islands that range in elevation from sea level to 14,000 ft and rainfall varying from only a few inches per year to the world's wettest place, Waialeale on Kaua'i averaging over 500 inches of rainfall per year. Temperatures vary from hot/wet to hot/dry tropical with every gradation in between. Areas above 4,000 ft elevation may experience light frosts. Two mountains, Mauna Kea and Mauna Loa, are snow-capped each year while Mauna Kea has a permanently frozen lake at its summit. Soils are equally variable, ranging from sand and cinder (a'a and pahoehoe) to heavy latosols and rich alluviums.

The flora that evolved under these circumstances is unique. Approximately 1,000 species of flowering plants are native to the Islands. Of these, 89% are endemic, the highest of any floristic area of the world. Unfortunately, 38% of these species are considered threatened or endangered while 10% of previously recorded species are considered extinct. Only the State of California exceeds Hawai'i in the total number of endangered species. Their relative land masses, however, are not comparable.

Within the native Hawaiian flora are a number of species of great value for the landscape. It must be noted that interest in growing native plants in Hawai'i's gardens is a fairly recent phenomenon. Two decades ago few gardens in Hawai'i could be found with more than one or two native species. There are now native plant societies and programs dealing with the horticulture of native species are well-attended.

In my view, the most useful and colorful of the native species is 'ohi'a lehua (*Metrosideros polymorphus*), an endemic first cousin to the New Zealand pohutukawa (*M. excelsus*) seen as a street tree along coastal California.

'Ohi'a lehua is found in the wild from sea level to 9,000 ft, primarily in mesic to wet forests. It is highly variable, growing as a stunted shrub in new lava or as a small to medium tree of 30-40 ft, but attains its full stature in high rainfall areas of good soils where it attains almost 100 ft in height. Its growth habit is broadly columnar. Most bear masses of bright red flowers while yellow, orange, and coral-colored flowers are less common. Its normally slow growth is greatly enhanced with regular fertilizing and watering. Three flushes of flowers can be realized each year. It is extremely wind-tolerant and makes an excellent windbreak or tall screening hedge. It is a beautiful color accent in the overall garden design and, due to its relatively open crown, can be used as a specimen in a lawn area. It also makes a fine tubbed or potted specimen and has been successfully used as a bonsai subject. 'Ohi'a lehua fares best in open, well-drained soils. It should do well in sheltered coastal areas of California.

'Ohi'a lehua may be grown readily from seed, but to assure desired flower color, both rooting by cuttings, using a rooting hormone under intermittent mist, and air layering are commonly employed. It is highly variable in its ease of rooting.

Koa (*Acacia koa*) is endemic, one of about 1200 species in the genus. A large tree up to 100 ft in height, koa is frequently a dominant element of the vegetation in dry to wet areas from nearly sea level to over 6000 ft in elevation. It is a nitrogen fixer

and may be among the first to revegetate eroded or other stressed areas. Koa is wind-tolerant, partially drought-tolerant, and rapid growing. Koa is used for quick garden effects where an open broad canopied tree is needed to furnish light shade for tropical understory plants. Its light canopy also makes it useful for shading lawn areas. Koa grows easily and quickly from seed. A healthy koa tree grew well in the hills above the Berkeley Campus of the University of California during the 1940s.

Wiliwili (*Erythrina sandwicensis*) is an endemic tree to 30 ft in height with a wide canopy. It is found on dry, leeward coastal areas on all the main islands and is very drought-tolerant. The unique feature of wiliwili is the remarkable color variation found in the flower where color ranges from red, orange, burnt orange, yellow, chartreuse and combinations of two colors such as chartreuse with burnt orange petal edges. Flowering time is variable, some trees flower during the hot summer months while others flower in October and November. Variability characterizes wiliwili.

As with other native species, wiliwili is only now beginning to be used in the landscape where it functions as the perfect tree in the xeriscape garden. It grows readily in any well-drained soil and, with a modicum of water, may grow rapidly. Like many other members of the bean family, wiliwili is a nitrogen fixer. It does not like overly wet soils and should, therefore, be used as a color accent among other dry-loving natives.

Wiliwili is easily grown from seed using scarification or hot water treatment to hasten germination. Cuttings must be used to guarantee flower color. Wiliwili does not always form roots easily. A strong rooting hormone and intermittent mist produce more certain results.

Koki'o ke'oke'o (*Hibiscus arnottianus* var. *punaluuensis*), is one of several white-flowered, fragrant, endemic hibiscus which develop blossoms up to 6 in. across. For landscape purposes this is the finest. Found only in a small section of the middle part of the Ko'olau mountains behind Honolulu, this small tree, to 30 ft in height, makes an excellent hedge or tall screen, specimen tree for a courtyard or entry, or as a tubbed specimen in full sun. It flowers all year as long as water and fertilizer are applied, grows rapidly, and takes pruning very well. It is moderately wind-tolerant and thrives from sea level to elevations of about 2500 ft. It grows well along the coast, even in sandy loams, if protected against the worst of the on-shore salt winds. All native hibiscus grow readily from seed or cuttings.

Hapu'u (*Cibotium* spp.), the endemic Hawaiian tree fern, is found on most of the main islands where rainfall is plentiful. There are several species still under study by taxonomists. Suffice it to say that hapu'u, widely grown the world over for its large fronds, is an important element in the Hawaiian garden and has been for many years. It is unparalleled as overstory for shade and moisture-loving ornamentals. Hawaiian tree ferns tolerate some shade, but prefer strong light and will tolerate a light frost.

Propagation by spores can be readily achieved given the appropriate conditions, but keikis or side shoots are easily rooted. Most Hawaiian tree ferns are harvested from the forest, a practice which should soon be curtailed to assure their conservation. Trunks, which may attain 16 ft in height, may be cut off at any height and planted directly in the ground, well-guyed and watered. The cut top soon roots and resumes growth.

A'e (*Sapindus saponaria*), the indigenous soapberry tree, is a useful landscape subject. In Hawai'i, found only in mesic forests on the Island of Hawai'i between 3000 and 4000 ft elevation, its use in the landscape extends to low coastal areas where it tolerates poor soils, wind, and irregular watering and fertilizing. A'e produces a rounded, dense crown with large, pinnately compound, attractive dark-green leaves. The fruit is translucent brown, attractive and contains a black seed that germinates readily. Although rarely seen in cultivation, a'e makes a useful shade tree and is becoming more available to the landscaper.

Two endemic members of the Aralia Family, 'ohe makai (*Reynoldsia sandwicensis*) and 'ohe (*Tetraplasandra hawaiiensis*) are excellent landscape subjects where their large leaves form a useful accent in the garden design. Both are rare in cultivation and almost never found in general nurseries. 'Ohe was offered during the 1950s by a rare plant nursery in West Los Angeles, while it was unknown to local Hawaiian gardeners.

'Ohe makai, as the name implies, grows at lower elevations than its cousin and tolerates considerable heat and drought. It is a wide-crowned tree to 60 to 70 ft in height with purple fruits borne in attractive clusters. It grows readily from seed, less readily from cuttings.

'Ohe, from cooler, moister areas, is of comparable size. The foliage is dense, its large leaves lightly brushed with white on the underside. It makes a striking foliage accent in the landscape where it is seen in a few local botanical gardens. It is easily propagated by seed; cuttings are difficult to root. Little is known of propagation techniques for both 'ohe and 'ohe makai.

Ho'awa (*Pittosporum confertiflorum*), an endemic species, is one of about 150 species worldwide, 10 of which are endemic to the Hawaiian Islands. *Pittosporum confertiflorum* is a shrub or small, densely canopied, 20-ft tree found on many of the main islands, but never encountered in local nurseries. It has solid, dark-green, rough foliage with a golden underleaf color. It will withstand considerable drought and heat and can be used as a small tree, hedge, screen, or windbreak.

Another endemic species, *P. hosmeri*, is occasionally found in specialty nurseries. It has similar properties but has a more open canopy and reaches 30 ft in height. Flowers of both species are wonderfully fragrant at night. The pittosporums may be grown from seed and recent unconfirmed experiments indicate that tip cuttings, dipped in a strong rooting hormone and placed under intermittent mist, will form roots.

'Akia (*Wikstroemia uva-ursi*), an endemic species, has very recently become popular locally where it is grown on a fairly large scale. A low, spreading shrub growing to 3 ft in height, 'akia makes an excellent ground cover, bank cover or potted specimen. It is drought-tolerant, salt-and wind-tolerant and grows in virtually any well-drained soil including sand and coral or among lava rocks on difficult planting sites. Small, but plentiful, chartreuse-yellow flowers are followed by a bright-red fruit. It does best in full, hot sun, but will tolerate light shade.

'Akia is readily propagated from seed and with some difficulty from cuttings. Recent trials at the University of Hawai'i have shown increased rooting of cuttings from treatments with auxin and wounding of the cutting.

Kolokolo kahakai (*Vitex rotundifolia*) is an indigenous coastal species whose natural habitat is on sand dunes in the very teeth of salt winds and spray. There it forms a low-growing, spreading ground cover to 2 ft in height. It also performs

well inland and will attain a height of 3 ft or more. The strong, grey-green foliage is aromatic. The small but conspicuous flowers are blue-lavender. Kolokolo kahakai is unsurpassed as a ground cover or dune-holder in exposed beach landscapes. It is very easily rooted from cuttings under mist with or without rooting hormones.

The above sampling of valuable landscape species in the Hawaiian flora were selected to show the wide range of environmental conditions in which native species can solve landscape problems and provide visual enhancement. Landscapers in Hawai'i are becoming aware of their value and are beginning to specify their use which will lead to nursery propagation and public appreciation of the unique Hawaiian flora.

QUESTION-ANSWER SESSION

Mike Evans: *How is the Mexican agency that would be the same as our Forest Service promoting either private industry or their own nursery program for reforestation?*

Richard Phillips: Inside of Mexican agencies like our USDA there are forestry researchers and agronomists. Other agencies are responsible for four major areas: reforestation, plantation, urban forestry, and environmental protection. The Army which has very little experience in nursery management has been asked to grow 123,000,000 seedlings. This has been very difficult in some cases, but in others it has succeeded due to personal interests of those involved. To date, there has not been the investment necessary to bring the nurseries up to standards that will be needed to be competitive in the forestry industry.