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MALPIGHIACEAE the malpighia family

By W. R. Anderson

Trees, shrubs, or perennial vines, hairs usu attached in middle. Lvs usu opposite, simple, often bearing large glands on peti or underside of blade, or both; blades usu entire (or lobed or toothed); stipules usu present. Flws slightly to strongly bilaterally symmetrical, usu bisexual; sep 5, without glands or bearing (1–)2 glands on outer side; pet 5, free, base clawed, largest "flag" pet often different from others; stam usu 10 (or less); ovary superior, usu 3-celled, cells free or joined, ovule 1 per cell, styles usu 1 per cell or less. Frt dry or fleshy, samara-, nut-, or drupe-like, dehiscent or indehiscent.

The Malpighiaceae comprise about 70 genera and more than 1,250 species distributed pantropically but far more numerous and diverse in the New World than the Old. The family is easy to recognize in flower, thanks to the characteristic clawed petals; the large calyx glands are diagnostic when present, but some species or genera lack them. The fruits are more diverse than the flowers but, if the leaves are opposite and simple, the family is suggested by the presence of stipules, multicellular glands on the petiole or blade (often but not always present), and 1-celled hairs

attached at the middle. The basic reference on the taxonomy of the Malpighiaceae is still the German-language treatment written in the 1920s, *Das Pflanzenreich.*[1665] A modern floristic treatment for the Lesser Antilles is also useful for many cultivated Malpighiaceae.[432]

At least eight genera and 11 species are frequently cultivated in home gardens in Hawai'i; many additional taxa are found in local botanical gardens.[701]

Key to Malpighiaceae

1. Plants with flws (2).
1. Plants with frt (9).
2(1). Styles 1 or 2 (3).
2. Styles 3 (6).
3(2). Pet backs densely silky, largest "flag" pet lemon yellow with light pink fringe, other 4 pet light pink to white; 1 stam fil much longer than other 9 ..... *Hiptage benghalensis*
3. Pet glabrous, all yellow; fil ±similar in length or alternating, 5 longer, 5 shorter (4).
4(3). Infl axillary; cal bearing 8 or more large glands on back; anth opening lengthwise; styles short, stout, straight ..... *Bunchosia armeniaca*
4. Infl terminal; cal without glands or bearing few small glands on back; anth opening by apical pores; style(s) long, slender, curved (5).
5(4). Lvs opposite; usu only 1 style developed ..... *Tristellateia australasiae*
5. Lvs alternate; styles 2 ..... *Acridocarpus natalitius*
6(2). Vines ..... *Stigmaphyllon*
6. Shrubs or trees (7).
7(6). Pet pink, pink-and-white, or pale purple ..... *Malpighia*
7. Pet yellow or yellow-and-red (8).
8(7). Cal without glands; shrub to 10′ tall; lf blade bearing 2 marginal glands near base ..... *Galphimia gracilis*
8. Cal bearing 10 glands on back; tree to 30′ tall; lf blade without glands ..... *Byrsonima crassifolia*
9(1). Frt a fleshy, indehiscent drupe or berry (10).
9. Frt dry, dehiscent (12).
10(9). Infl terminal; lf blade without glands; mature frt yellow ..... *Byrsonima crassifolia*
10. Infl axillary; lf blade underside usu bearing glands; mature frt red (11).
11(10). Flws borne singly, in pairs, or in umbels or dense corymbs; frt glabrous; styles 3 ..... *Malpighia*
11. Flws borne in elongated racemes; frt densely silky-hairy; styles 2 ..... *Bunchosia armeniaca*
12(9). Frt breaking apart into unwinged segments ..... *Galphimia gracilis*
12. Frt breaking apart into winged samaras (13).
13(12). Samara 1-winged (14).
13. Samara bearing 3–10 wings or winglets on sides (15).
14(13). Lvs opposite; vines; samaras up to 3 per frt; flws borne in umbels, corymbs, or crowded racemes; cal bearing 8 large glands on back of 4 sep, fifth sep without glands; styles 3 ..... *Stigmaphyllon*
14. Lvs alternate; erect or climbing shrubs; samaras 1 or 2 per frt; flws borne in elongated racemes; cal bearing few small glands on back; styles 2 ..... *Acridocarpus natalitius*
15(13). Samara bearing 8–10 small winglets up to 0.2″ long ..... *Tristellateia australasiae*
15. Samara bearing 3 large wings 0.8–2″ long ..... *Hiptage benghalensis*

GALPHIMIA Cavanilles (anagram of *Malpighia*)

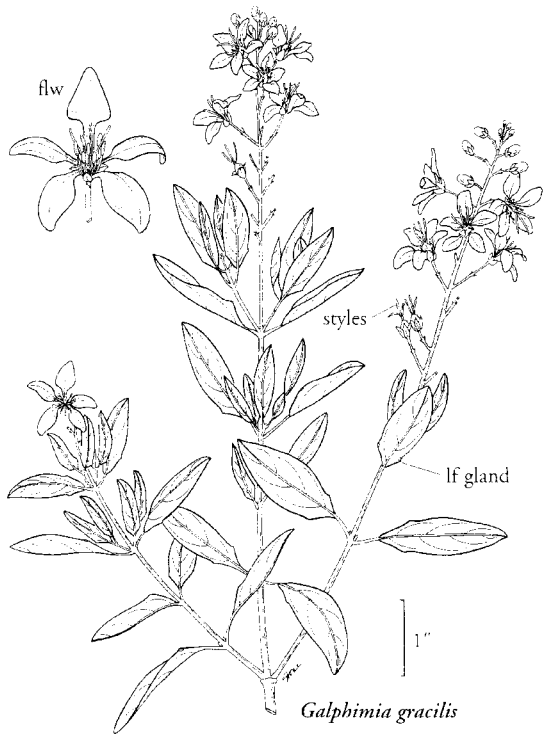
Subshrubs, **shrubs**, or occasionally treelets. Lvs usu bearing glands on blade or petl. **Infl terminal. Flw** cal glands up to 5 or absent; **pet yellow or yellow-and-red**, ±entire (minutely toothed); **styles 3, slender, awl-shaped with minute apical stigmas. Frt breaking apart into 3 dry, unwinged segments with thin, brittle walls.** Seed 1 per segment, usu retained inside.

Galphimia comprises about 11 species principally from Mexico and northern Central America, with one native to South America. One species is cultivated pantropically as an ornamental shrub. The name *Thryallis* has often been incorrectly applied to this genus, but it is nomenclaturally conserved for a different genus of Malpighiaceae native to central and southern Brazil.

Galphimia gracilis Bartling [Misapplied: *G. glauca, Thryallis glauca*], GALPHIMIA, SPRAY-OF-GOLD, THRYALLIS

Evergreen shrub 3–10′ tall. Lf petl 0.2–0.6″ long; blades elliptic or ovate, 1–2.3″ long, bearing 2 marginal glands near base. Infl racemose, 10–25-flwd. **Flw sep without glands; flag pet with longer claw; pet deciduous before frt reaches maturity; fil persistent, red in age;** ovary glabrous. Frt segments ca 0.2″ long.

This species, native to Mexico, has often been misidentified as *G. glauca* Cavanilles, which has never been cultivated in Hawai'i. Grown pantropically as an ornamental, *G. gracilis* is common here. In Mexico, where it is known as RAMA-DE-ORO ("spray of gold") and LLUVIA-DE-ORO ("rain of gold"), the leaves are used medicinally and the branches and stems for kindling.



Galphimia gracilis

This loosely growing, ever-blooming, evergreen shrub with brightly colored flowers is grown as a massed planting, boundary or foundation planting, or untrimmed hedge. The sprays of flowers are sometimes used in leis.[963] Spray-of-gold requires constant moisture in the garden and does best in full sun and reasonably fertile, well-drained soil with a pH of 5.5–6.5. It has poor salt tolerance and may need treatment for spider mites during hot weather. Light pruning is necessary to shape the plant and to maintain dense, bushy growth. Spray-of-gold is usually propagated in Hawai'i by 2–3" long semiwoody cuttings and can also be started from fresh seed when it is available.

HIPTAGE J. Gaertner (from Gk. *hiptamai,* to fly, alluding to the winged fruit)

Woody vines or shrubs. Lf blade base bearing 2 larger marginal glands, several smaller glands toward apex. **Flw cal usu with 1 large gland outside between 2 sep, running down onto pedicel; pet backs usu densely silky-hairy; stam with 1 fil much longer than other 9,** anth dehiscing lengthwise; **style 1, long, curved, other 2 styles aborted,** stigma small, slightly internal. **Frt breaking apart into 3 samaras, each 3-winged.**

An Old World genus of some 20 species, *Hiptage* is distributed from India through Southeast Asia to Taiwan and the Philippines. About half of these taxa are from India and were recently taxonomically revised.[1377] One species is cultivated as an ornamental.

Hiptage benghalensis (Linnaeus) Kurz [Syn.: *H. madablota* J. Gaertner; Misapplied: *Triopterys jamaicensis*], HIPTAGE

Woody vine, sometimes shrublike. Lf peti 0.3–0.4" long; blades elliptic or narrowly ovate, 3–7.5" long, apex tapering. **Infl a 6–25-flwd raceme, usu axillary,** occasionally terminal. **Flws** 1" Ø or more; pet fringed, **flag pet lemon yellow with light pink fringes, other 4 light pink to white.** Samara with central upper wing 1.2–2" long, 2 lower wings 0.8–1" long.

Hiptage is native from Sri Lanka and India through Southeast Asia and southern China to Taiwan and the Philippines. It is widely cultivated in tropical and subtropical gardens for its large, showy flowers and glossy leaves. Neal cited *Triopterys jamaicensis* Linnaeus as a synonym,[1052] but although the fruit of *Triopterys* (a genus of the West Indies) superficially resembles that of *Hiptage* the two genera are not at all closely related.

Hiptage is a large, woody, shrublike vine with the mounding growth habit of *Bougainvillea.* In the landscape it may be trimmed as a shrub or allowed to clamber on a fence or trellis. The flowers are highly scented, which makes the vine a desirable addition to a garden of fragrance. To contain its size and to promote new growth and flowering, hiptage should be severely pruned at least once a year. It should be grown in full sun to encourage maximum blossoming and is usually propagated by 4–5" long semiwoody cuttings.

Hiptage has become a serious pest in wet forests on Mauritius and threatens to do the same on Kaua'i, where a population has escaped from cultivation and become established in the wild. Biologists are attempting to eradicate this species before it spreads any farther. Gardeners should take care that their garden plants do not spread into nearby forested areas.

MALPIGHIA Linnaeus (honors M. Malpighi, 1628–1694, pioneer Italian anatomist)

Shrubs or treelets. Lf peti without glands; blade underside usu bearing glands. **Infl axillary,** of single or paired flws, umbels, or dense corymbs. **Flw sep some** (or all) **bearing glands on back; pet pink, pink-and-white, or pale purple;** anth alike or 2 larger; **styles 3, apex rounded, truncate, or hooked, stigma internal or subterminal. Frt a fleshy red drupe (or berry),** glabrous, stones up to 3, united or free but retained in common flesh.

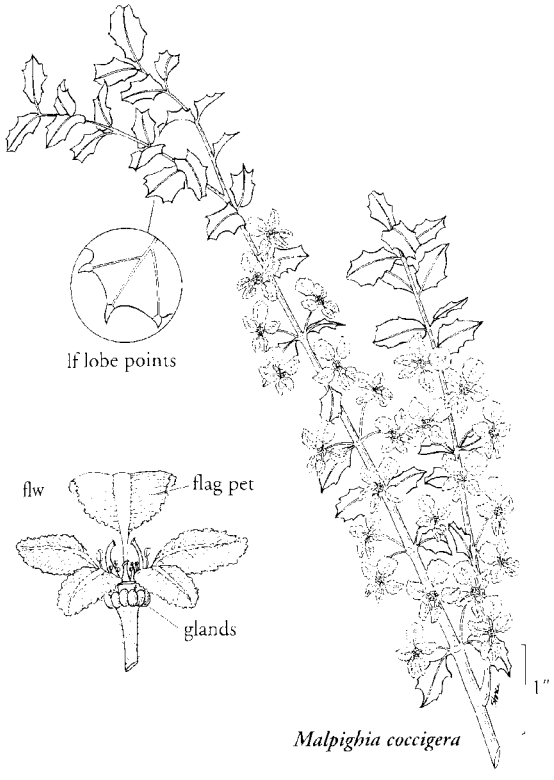
About 45 species of *Malpighia* are distributed throughout the American tropics and subtropics, mostly in the West Indies, Mexico, and Central America. Some members produce edible fruit or make fine ornamentals, and three species are likely to be encountered in Hawai'i's gardens.

Malpighia coccigera Linnaeus, SINGAPORE-HOLLY

Shrub 1–6' tall. **Lvs hollylike;** blades elliptic or circular, 0.2–1.5" long, **margins of some or all deeply undulate, lobes ending in stout, stiff point.** Flws single or paired; cal bearing 6–10 glands; pet pink or pink-and-white; 2 stam with longer, thicker fil and larger anth than rest; style apexes ±hooked, 2 longer and thicker than third. Frt 0.2–0.6" Ø, red-orange.

Singapore-holly is native to Cuba, Hispaniola, Puerto Rico, and the Lesser Antilles and is cultivated as a curiosity and ornamental in warm regions and in greenhouses. In nature the plants grow on exposed rocks and in dry thickets and low-elevation scrub forests, and under such conditions they remain small, rarely exceeding 3' in height, and are often prostrate. This species (and a few others) are unusual in having falsely dentate leaves with sharp bristles (actually large, 1-celled hairs) at the apex of each lobe; most Malpighiaceae have entire, elliptic leaves. The common name is misleading, since *M. coccigera* is neither a holly nor a native of Singapore.[231]

In our gardens, Singapore-holly is often grown as an evergreen, 3–4' tall trimmed hedge or border planting. It also makes an attractive potted plant or bonsai, with the dark green, holly-like leaves presented in sharp contrast to the pale pink flowers that appear every two or three months. It makes a fine rock garden plant and is often used in containers.[231] The cultivar 'Prostrata' is an interesting and attractive ground cover or hang-



Malpighia coccigera

ing basket plant in Hawai'i; other, variegated and weeping cultivars are also available.

Singapore-holly is at its best in rich, well-drained, damp soil in full sun, although its natural habitat suggests that it can thrive under hot, dry conditions in stony, poor soils. It is listed as suitable for xeriscape use in southern Florida.[137] The plant should be pruned after flowering to shape it and to encourage new growth, and it should be fed at two-month intervals with general garden fertilizer. Pests include nematodes and a variety of sucking insects such as scales, mealybugs, and mites, which may be controlled with suitable chemical sprays. Singapore-holly is usually propagated by 2–3″ semiwoody cuttings or by seed.

Malpighia emarginata A. P. de Candolle [Misapplied: *M. glabra, M. punicifolia*], ACEROLA, BARBADOS-CHERRY

Shrub or treelet 6–20′ tall. **Lf** blades elliptic, ovate, or obovate, 1–2.7″ long, **apex usu rounded or obtuse and often slightly notched.** Infl a 2–4-flwd umbel, sessile or stalk 0.1(–0.2)″ long. **Flw** cal bearing 6–10 glands; pet pink or purplish; **2 stam with notably thicker fil; styles divergent from base,** 2 bowed outward and then ascending, apex square or slightly hooked. Frt 0.7–1″ Ø, red, flesh edible, tart.

Acerola is widely cultivated for its edible fruit, one of the richest natural sources of vitamin C. The species is now found from Mexico through Central America and the West Indies to northern South America, but it is probably not native throughout its present range because it has been readily naturalized through dispersal by fruit-eating birds. Acerola was apparently first introduced to the Hawaiian Islands about 1946 by the Hawaiian Sugar Planters' Association.[972]

During the 1950s, acerola was considered as a commercial crop for Hawai'i; juice from the fruit was to be processed as a natural source of ascorbic acid, especially for baby food.[228,1042] Soon, though, the synthesis of inexpensive vitamin C diminished the need for natural sources, and the acerola industry in Hawai'i quickly declined. Now acerola is grown here solely for home consumption. Several good cultivars have been developed that can produce three heavy crops of fruit each year, such as 'Florida Sweet', popular for its sweet fruit that is eaten fresh; in addition, acerola can be used in juices, jellies, preserves, desserts, and toppings.[972,1191]

In the landscape, acerola can be used as a shade tree or incorporated into foundation plantings or in other situations where a small tree or large shrub is needed. The fallen fruit can create a mess if the tree overhangs a sidewalk or patio. Optimal growing conditions in Hawai'i include a hot, dry climate, well-drained soil with consistent and regular irrigation, fertilization at quarterly intervals with 10-30-10 plant food, and careful pruning to shape the tree. Acerola is adaptable to container culture and makes an attractive fruiting container plant or bonsai on a sunny lanai. Plants are propagated by air layers or 3–4″ long semiwoody cuttings of superior cultivars (though cuttings can be difficult to root); seed is rarely used because of poor germination and wide variation in offspring quality. Indeed, most fruit does not produce fully developed seeds and appears to develop apomictically. Improved cultivars are available from fruit tree nurseries.

Malpighia glabra Linnaeus [Syn.: *M. punicifolia* Linnaeus], ESCOBILLO

Shrub or treelet 3–20′ tall. **Lf** blades elliptic or ovate, 1–3.7″ long, entire, **apex usu short- to long-tapering, occasionally acute.** Infl an umbel or corymb, stalk 0.1–0.6(–1)″ long. **Flws** (3–)4–8; cal bearing 6 glands; pet pink or pale purple; **fil ±alike in thickness; styles ±straight, parallel or divergent distally,** apex truncate. Frt 0.3–0.5″ Ø, edible, acidic.

Escobillo is native from southern Texas through Mexico, the Greater Antilles, and Central America to northwestern South America. In Hawai'i, "Barbados-cherry" has been used as a common name for this species,[1053] but this name is properly applied only to *M. emarginata,* from which *M. glabra* is sometimes distinguished only with difficulty, especially when its leaves are broadly acute instead of tapering at the apex. Escobillo is much planted as an ornamental but has apparently never been cultivated for its edible fruit. Cultivation and propagation are similar to *M. emarginata.*

STIGMAPHYLLON Adr. Jussieu (Gk. *stigma,* stigma + *phyllon,* leaf, alluding to the leaflike flaps borne at the apex of the styles in many species)

Woody or herbaceous **vines.** Lf peti apex usu with 2 glands; blades entire or lobed. Infl simple or usu compound, of umbels, corymbs, or crowded racemes. **Flw sep: 4 biglandular,** 1 without glands; **pet bright yellow;** stam fil usu unequal, **anth usu unequal,** 4 often reduced or sterile; **styles 3, apex truncate, hooked, or bearing leaflike appendage, stigma internal. Frt breaking into 3 samaras, each 1-winged.**

There are about 100 species of *Stigmaphyllon,* all native to the American tropics and subtropics. The only recent taxonomic study covers Middle America and the West Indies.[21] Two species are cultivated in Hawai'i, neither abundantly.

Stigmaphyllon floribundum (A. P. de Candolle) C. E. Anderson [Misapplied: *S. littorale*], ORCHID VINE

Vine; old stems woody. Lf peti 0.2–0.8″ long; blades **elliptic** to ±circular, 1.4–7″ long, underside hairy at first, glabrous later, **margins without cilia,** venation pinnate. **Infl** bran ending **in crowded racemes or corymbs, usu 20–50-flwd,** pedicels 0.3–0.9″ long, slender. **Flws** 1–1.3″ Ø; **style apex bearing short spur.** Samara 0.8–1.4″ × 0.25–0.5″, smooth or sometimes sides spurred or crested, wing bearing tooth at base of upper margin.

Stigmaphyllon floribundum is native to Puerto Rico and two of the Virgin Islands. Although the individual flowers are not as large as in *S. ciliatum,* the compound inflorescence of this species bears so many flowers that it is extremely showy when in bloom. It is the more common species cultivated in Hawai'i and has been mistaken for *S. littorale* Adr. Jussieu, a species that is not cultivated here.

Orchid vine may climb for 20′ along a wall or up a fence. It prefers sunny locations with constant moisture but may also thrive in partial shade. In Hawai'i it flowers almost continuously throughout the year. A specimen trained as a potted plant on a lanai makes a colorful addition. Aphids are sometimes a problem on young growth and can be controlled with any mild general-purpose garden insecticide. Propagation is usually from 3″ long semiwoody cuttings.

Other *Stigmaphyllon*

Stigmaphyllon ciliatum (Lamarck) Adr. Jussieu, BRAZILIAN GOLD VINE, is a slender vine native from Belize around the Caribbean and Atlantic coast of Central and South America to Uruguay, where it is usually found in lowlands at or near the coast. The ovate leaf blades have rounded, overlapping basal lobes and slender cilia all around the margin (whence the Latin name); the inflorescences are umbels consisting of only 3–8 flowers, and the styles bear large, pendent, leaflike appendages at their apexes. Brazilian gold vine has long been popular in greenhouses for its attractive leaves and large, showy flowers, but it is rare in Hawai'i.

TRISTELLATEIA Thouars (Lat. *tri,* thrice + *stellata,* starred, alluding to the fruit of 3 star-shaped samaras)

Vines, often woody and large. Lvs usu biglandular on blade or peti. Infl a terminal raceme. Flw sep glands few and small or absent; **pet yellow, glabrous**; anth opening by apical pores; **style usu only 1 developed, elongated, curved,** stigma small, nearly apical. **Frt breaking apart into 3 samaras, each star-shaped,** winglets 4–10, radiating from seed-bearing portion.

Tristellateia is a genus of perhaps 20 species endemic to Madagascar except for one from continental Africa and another from Australasia. A single species is occasionally cultivated in our gardens.

Tristellateia australasiae A. Richard, BAGNIT, CLIMBING SPRAY-OF-GOLD

Woody vine; bran long. Lf peti 0.3–0.7″ long; blades ovate, 2–5″ long, base bearing 2 small marginal glands. **Infl lax, 8–40-flwd. Flws** ca 0.8–1″ Ø; **sep without glands, or 1 sep bearing 1–2 tiny marginal glands near base; fil** persistent, dark red in age, **alternating long and short;** style usu 1 (or 2 on same plant). **Samara 0.4–0.5″ Ø, winglets 8–10, to 0.2″ long.**

Tristellateia australasiae has a broad natural distribution from Thailand and the Philippines south to Indonesia, New Guinea, and New Caledonia.

In Hawai'i, bagnit is best grown in low-elevation gardens in well-drained soil. It has been suggested as a somewhat water-thrifty plant perhaps suitable for xeriscape use in Hawai'i. This evergreen, ever-blooming climber with 20′ long branches thrives in full sun and flowers more profusely under such conditions, but it tolerates light shade for part of the day. In our gardens, bagnit may twine up a fence or drape itself over a wall, and it is attractive as a mounding, 2–3′ high ground cover. The plant should be pruned lightly from time to time as necessary to encourage new growth and continuous flowering, and it responds well to regular applications of fertilizer. Propagation is by seed or 2–3″ long semiwoody cuttings.

Other Malpighiaceae

The following Malpighiaceae species are less common in Hawai'i.

Acridocarpus natalitius Adr. Jussieu, native to southern Africa, is an erect or climbing shrub immediately distinguished by its alternate leaves (rare in the family); large, long-stalked flowers borne in terminal racemes; sepals bearing a few small glands on the back; glabrous, lemon yellow petals; large anthers opening by apical pores (as in *Tristellateia*); 3-celled ovary with 1 cell usually abortive; and 2 long, slender, curved styles. One or 2 samaras develop, each bearing a single wing (as in species of *Stigmaphyllon*).

Bunchosia armeniaca (Cavanilles) A. P. de Candolle has long been cultivated in a few gardens in Hawai'i, presumably for its edible fruit, which is dark red and 1″ or more long. This species is native to South America, where it is called CIRUELO, a name also used here in Hawai'i.[1052] It is also called PEANUT BUTTER FRUIT by local tropical fruit fanciers. A shrub or tree 12–35″ tall, ciruelo has thick leaves 4″ or more long; axillary racemes; 8 or more large calyx glands; glabrous yellow petals; dark red connectives on the lengthwise-opening anthers; a densely silky ovary, the hairs persisting on the fruit; and 2 short, stout styles, these free to weakly joined and appearing to be only 1.

Byrsonima crassifolia (Linnaeus) Kunth, called NANCÉ in its native Latin America, is a 30′ tall, round-crowned tree with petioles mostly more than 0.5″ long and leaf blades mostly more than 2″ wide, loosely tomentose below, becoming hairless later, and without glands. The inflorescence is terminal, the flowers have all 5 sepals biglandular on their backs, and the fleshy fruit contains a single stone. Nancé fruit is most often eaten fresh but is also used to flavor wines and ice cream. The edible seeds, once freed from the stone inside the fruit, are used as livestock feed and yield a cheese-flavored oil used for cooking, as a butter substitute, and for fermenting a drink called *chicha.* Introduced to Hawai'i in the 1960s, nancé is at home in dry, sunny, lowland gardens as well as in cool, wet valleys. It is usually propagated from seed.