



## Bougainvillea

Kent D. Kobayashi, James McConnell<sup>1</sup>, and John Griffis  
Department of Tropical Plant and Soil Sciences, <sup>1</sup>University of Guam

### ***Bougainvillea* species**

The genus *Bougainvillea*, in the Nyctinaginacea (Four-o'clock) family of plants, has 14 species, with three that are horticulturally important: *B. spectabilis* Willdenow, *B. glabra* Choisy, and *B. peruviana* Humboldt and Bonpland. Many crosses among the various species have produced new hybrid species and important horticultural cultivars. Bougainvillea is native to South America. The name comes from Louis Antoine de Bougainville, a French navigator and military commander who was the first European to take note of the plant, in Brazil, in 1768.

### ***B. spectabilis***

This was the first member of the genus to be identified from Brazil in 1798. German botanist Carl Ludwig Willdenow is credited with this identification. This species is noted for its hairy leaves and stems. The leaves are large and ovate, with rippling along the edges and hairs on the underside. The bracts are red, dark pink, or purple, while the small flowers are cream colored. Its thorns are large and may be curved. The growth habit is dense, and the colorful bracts appear up and down the branches. The bloom cycle is seasonal, with plants blooming after the dry season or after a cool spell, which may trigger plants to bloom. *B. spectabilis* is Guam's territorial flower.



**Bougainvillea, paper flower;**  
**pukanawila, kepalō, kiapolō, pua kepalō**  
**(Hawaiian);**  
**puti tai nobiu (Chamorro)**

### ***B. glabra***

This climbing, evergreen member of the genus, also from Brazil, was first identified by Swiss botanist Jacques Denys Choisy in 1850. The elliptical leaves are green or variegated, with a glossy sheen. They are glabrous (smooth, hairless), but you may find some puberulence (presence of small hairs). Its bracts come in many sizes and shapes. Typically they are triangular and purple or mauve, although white bracts are also common. The bracts tend to appear along the branches and at the tips. The flowers are white to cream

colored. The thorns are small and curved at the tips. The growth habit is spreading, and the green-leaf types are fast growing. This species blooms several times a year. *B. glabra* and *B. spectabilis* are alike in general appearance, the main differences being the bloom cycle, and *B. glabra* being hairless whereas *B. spectabilis* is hairy.

*B. glabra*'s score under the Hawai'i-Pacific Weed Risk Assessment program is -1, not likely to be a pest, and its designation is L, meaning that it is "not currently recognized as invasive in Hawai'i, and not likely to have major ecological or economic impacts on other Pacific Islands based on the HP-WRA screening process."

### ***B. peruviana***

It is thought that this climbing, evergreen member from Peru was first identified by German naturalist and ex-

plorer Alexander von Humboldt in 1810. This species is noted for its green bark. The long, thin leaves are strongly ovate and glabrous. The rounded bracts are magenta to pink and may have some distortion or wrinkling, and the flowers are yellow. The thorns are short and straight. The growth habit is lanky. This species is not as vigorous as some of the hybrids and often requires pruning to promote substantial branching. The plants may bloom several times a year if subjected to dry periods between flushes. *B. peruviana* is the most stable species of the three described here, as there is very little variation in the general shape of bracts and leaves.

### ***Bougainvillea hybrids***

Among bougainvillea's horticultural hybrids, *B. glabra* x *B. peruviana* is by far the most common. This cross has its own hybrid name: *Bougainvillea x buttiana*. The original discovery of this hybrid was made by Mrs. R. Butt in a garden in Trinidad, hence the name. The leaves are large and ovate or heart-shaped with slight hairiness on both the upper and lower sides. The bracts are usually rounded, red or dark pink, and the thorns are straight and short. The small flowers are cream colored with pink tones, although the floral tube may be the same color as the bract. The growth habit is open and requires pruning to promote a bushy appearance. *B. x buttiana* hybrids generally bloom several times a year.

*Bougainvillea x spectoperuviana* is another common hybrid. The leaves are large, dark green, and ovate, and these hybrids are usually hairless. The bracts are coppery red in the juvenile stage, turning to various shades of magenta or pink as they age. The thorns are straight, and the flowers are cream colored. The growth habit is large and spreading, and they generally bloom several times a year.

*Bougainvillea x spectoglabra* is the last of the common hybrid bougainvilleas. The leaves are small and dark green, with mauve or purple bracts. The thorns are numerous and curved, and the small flowers are almost white. The growth habit is well branched and thick, and blooming is generally several times a year.

### **Characteristics**

Bougainvillea is a tropical and subtropical woody, ever-green, shrubby vine. Typically multi-trunked or with clumping stems, it has a spreading, round plant habit with a height and spread of up to 20 feet. It climbs by sending out slender arching canes armed with stiff curved



The true, perfect flower is small, tubular, commonly white or yellow, and surrounded by showy, vibrantly colorful petaloid bracts.

thorns. As they age, the stems turn from mid-green to dull green-brown. Bougainvillea is deciduous when grown in areas with a long dry season.

Numerous cultivars are available, with a striking array of colors. Their colorful “flowers” are really bracts, or modified leaves, ½–2-inch long structures to which the true flowers are attached at the mid-rib. New growth is required for inflorescence production, which occurs on short stem axes borne laterally in the axils of leaves. From their initial emergence to full maturity, the bracts of many cultivars change color. Bracts may retain their color for several months after the flowers have finished, gradually fading to resemble the color and texture of paper.

Leaves are simple and alternate, with an undulate leaf margin. The leaf blade is 2–4 inches long, with much variation in shape: globular, elliptical, obivate, ovate, or cordate. Leaves are mid- to deep green, although some cultivars have variegated foliage.

The true, perfect flowers are small, tubular, and surrounded by showy, colorful petaloid bracts. The vibrant colors of bougainvillea are not from the inconspicuous, commonly white or yellow, flowers but from the bracts that surround each flower.

The fruit is an elongated achene less than ½ inch long. It is rather inconspicuous, not showy, and has a dry, hard fruit cover.



**Bougainvillea in an urban landscape**



**Trained as a “standard”**

## Location and landscape uses

### Location

Bougainvilleas grow best in full sun. High light intensity is required for good flowering. Low light and shady areas are not suitable, as the plants will drop their bracts. Bougainvillea does best at elevations from 10 to 2500 feet.

Bougainvillea can tolerate hot dry locations, with temperatures over 100°F. It does well in locations with a minimum of 65°F at night and 75–95°F during the day. *B. glabra* can tolerate slightly cooler conditions (58–64°F) than *B. spectabilis* (64–68°F). Bougainvillea does best with at least 25 inches of rainfall per year.

Bougainvillea grows well in rich, well drained, acidic (pH 5.5–6.0) soil. It does not thrive in soil that is constantly wet. Proper soil pH is essential because it affects the availability of mineral elements. A soil pH above 6.0 increases the possibility of micronutrient deficiencies, particularly iron. Bougainvillea is drought tolerant, salt tolerant, and wind resistant.

Bougainvillea is very susceptible to girdling during a storm. The bark will rub off at ground level when stems whip in high-speed winds. The plant is slow to recover from this, compared to other shrubs. If girdling is severe, the entire plant will wilt a few days after a storm. It should not be planted in extremely windy, unprotected areas.

### Landscape uses

Bougainvillea’s growth habit and beautiful showy bracts make it a popular plant for landscapes. It is used in mass plantings, as shrubs or bushes, and as ground cover on banks. Bougainvillea provides hedges, barriers, and slope coverings. For large, difficult-to-maintain areas, bougainvillea is an excellent ground cover. It can cover a whole hillside and will choke out weed growth. Dwarf cultivars make colorful ground covers.

Bougainvillea can be trained as a “standard,” a small flowering tree with a single trunk (photo above), over arbors, into espaliers, onto walls, or to cascade down a slope. Bougainvillea is used as an accent plant, a specimen plant, in hanging baskets, in containers, and for bonsai.

Give plants enough room to grow to maturity without being crowded. Most cultivars do well 6–9 feet apart. Smaller cultivars can be planted closer together, at 3–5-foot spacing. Bougainvillea should not be planted within 4 feet of walkways, as the thorns could catch unsuspecting passersby.

In Hawai‘i, flowering is heaviest from September to April. Flowering is promoted by short daylengths. In addition, cultural practices are important to ensure satisfactory flowering—avoid overwatering, overfertilizing with nitrogen, putting plants in heavy shade, and pruning too frequently. The flowering peak in Guam occurs during the dry months, March through May.

## Culture

### **Watering**

Bougainvillea tolerates drying and if possible irrigation should be adjusted to be a little on the dry side. They are sensitive to overwatering but should not be allowed to completely dry out.

### **Fertilizer**

For best results, use organic fertilizer amendments or controlled-release fertilizers to moderate nitrogen release. At planting, amend the soil with a fertilizer high in phosphate. For long-term culture, topdressing with a controlled-release fertilizer is needed. Do not overfertilize. Too much fertilizer will promote vegetative growth and inhibit blooming.

Bougainvillea needs regular fertilizing with formulations having NPK ratios of 1:1:1 or 2:1:2. Applications of soluble minor elements help prevent leaf chlorosis. Micronutrient applications can be half the recommended rate, twice a year.

### **Pruning**

Bougainvillea responds well to pruning. Unless they are pruned regularly, bougainvillea grows into a tangled mass of old and new growth, and overcrowding often leads to pests and diseases. To prevent overcrowding, cut out any unneeded shoots. Cut all lateral shoots back to within two or three buds of the main stems. These will bear the new flowers and bracts.

Regular pruning is necessary to shape the plant and direct its growth because the shoots often grow vigorously. Flowers are borne on new growth, so pinching back and pruning is necessary to induce new growth. Pruning should be done after flowering has finished, as this encourages the new growth on which the next flush of flowers will occur.

To reduce the size of plants, cut them back by about a third, removing all spindly and twiggy growth. Prune suckers from the plant's base to encourage topgrowth. Dead wood should be removed as it appears. The long shoots can be trained in various shapes and heights—espalliers, arbors, twisted or braided trunks, or even large, fanciful animals.

## Controlling timing of flowering

### *Environment*

Bougainvillea will flower sooner and more profusely with high light intensities, moderate temperatures, and longer nights. Short daylengths enhance flowering: 8–11-hour daylengths with high light intensity and temperatures above 58–64°F. Heavy shade inhibits flowering. Drought stress can stimulate flowering even under long daylengths. Growers frequently allow plants to dry just to the point of wilting to induce flowering. Use care, because excessive drying can cause leaf drop and dormancy.

### **Cultural practices**

Pruning plants too frequently will inhibit flowering. Too much fertilizer will add growth but inhibit blooming. Nitrogen and phosphate are critical to flowering, but do not overfertilize. Keep soil moisture on the dry side.

## Pot culture

### **Light**

Plants should be placed in bright light or near a window with at least 4000 foot-candles of light. In low-light interior environments, their high light requirement leads to leaf drop. Bracts will be a lighter color than those grown in full sunshine.

As a point of reference, the amount of light at noon on a clear summer day is approximately 10,000 foot-candles. On an overcast winter day, it may be as low as 500 foot-candles. Indoors, on a clear summer afternoon, the direct sun entering a window may be 4000–8000 foot-candles, but the level will be only about 600 foot-candles in the shade to the sides of the window. The natural light indoors on the shady side of a house may be 150–250 foot-candles, depending on the amount of window area and the presence of eaves, window blinds, or curtains.

### *Media*

Any well drained potting medium is suitable for growing bougainvillea. A 1:1 (by volume) peat:perlite medium is suitable. If more weight is needed to stabilize the pot, man-made sand or soil may be added. The medium needs to be well drained to prevent a poor root system and reduced flowering. Avoid media with high peat content and water-retention levels. These types of

media retain too much water and will contribute to root rot. Media pH should be 5.5–6.0.

#### *Watering*

Plants should be watered when the medium surface becomes dry. Close attention is needed because it is easy for plants to use up the available moisture in the pots. The amount of water needed depends on the medium type, environmental conditions, size of the plant, and pot size. Watering well but less frequently is better than frequent, light waterings.

#### *Fertilizing*

In pot cultivation, an evenly balanced controlled-release fertilizer (e.g., 8-8-8 or 10-10-10) can be applied every three months. Water-soluble fertilizer formulations can be applied weekly or bi-weekly at half-strength to provide a low nutrient concentration.

#### *Pruning*

Frequent pruning helps maintain the desired plant size and shape and keeps new growth soft and thorns to a minimum. Frequent cutting back promotes constant flushing of new growth and flowers.

Prune young plants to encourage a framework of strong shoots emerging from the base of the plant. Prune and shape plants after they flower, keeping them about 3 feet high and removing all spindly and twiggy growth. Cut out any weak or damaged growth.

#### **Growth regulators**

To induce lateral branching, applications of BA (benzyladenine) at 50–100 ppm can be made when the plant tips are pinched back. Apply one spray 24 hours after the first pinch and another 24 hours after the second pinch. Dikegulac sodium at 2 ounces/gallon can be used in lieu of the second pinch-plus-BA application to improve branching. Atrimmec<sup>®</sup>, a commercial formulation of dikegulac sodium (18.5% active ingredient), has been used at 1 ounce/gallon. Sprays should be applied to unpinched shoots when they reach 3 inches or to pruned plants three days after pruning. Avoid treating plants that are under stress.

To retard growth, Cycocel<sup>®</sup> (chlormequat) has been used on potted bougainvillea as a soil drench at 0.01–0.02 ounce per pot when the axillary buds swell following the first pinch. A-Rest<sup>™</sup> (ancymidol) and Bonzi<sup>®</sup> (paclobutrazol) are also effective. Use paclobutrazol at

20–40 ppm when plants are near salable size.

To prevent bract abscission, use the sodium salt of NAA (naphthaleneacetic acid) as a spray or dip at 10–30 ppm. At the higher rate, NAA may promote abscission of immature bracts.

It is recommended that you test plant growth regulators on just a few plants before extensive use. Always follow label instructions. If label application rates or methods differ from those given above, follow the label.

### **Propagation**

#### **Cuttings**

Softwood terminals, maturing green wood, and matured intermediate wood stem pieces can be used for propagation. Stem cuttings should be 1/8 inch or more thick and should have at least three to five nodes. Leaves may be left on the cuttings during rooting, but remove leaves from portions of the stem that are under the surface of the rooting medium.

Use a well drained rooting medium such as a 1:1 (by volume) peat:perlite mixture. Other rooting media such as man-made sand and peat or coir (coconut fiber) work well. Insert cuttings 1–2 inches into the medium and water thoroughly. Cuttings may be rooted directly in small pots or Jiffy-7s. Several cuttings may be rooted together in larger pots 5–6 inches in diameter. Foam propagation blocks may also be used.

Softwood terminals of easy-to-root cultivars do not require a rooting hormone. With more mature wood, a rooting hormone such as IBA (3-indolebutyric acid) at 2000–6000 ppm is commonly used. Higher concentrations may be needed with more difficult-to-root cultivars. Intermittent misting is commonly used to prevent desiccation during rooting. Cuttings should not be allowed to wilt.

Time to rooting is about 4–12 weeks, depending on the cultivar and the use of a rooting hormone. Transplant young plants with caution to avoid damaging their brittle roots. A broad-spectrum fungicide drench applied when planting cuttings and again after transplanting helps prevent root rot.

#### **Leaf-bud cuttings**

Leaf-bud cuttings can be used when source material is limited. Each node can be used as a cutting. The cutting, taken from shoots that are partially matured, consists of a leaf blade and a short piece of the stem (1–1½

inches) with the attached axillary bud. Cut the stem section about ½–1 inch above and below the point of leaf attachment. Place the bud vertically in a rooting medium and lightly cover it (¼ inch) so that only the leaf blade can be seen.

### Grafting

Some cultivars that have little or no chlorophyll in their leaves are difficult to grow from cuttings and need to be grafted onto a vigorous rootstock to be propagated. Grafting is useful with delicate cultivars that have fragile root systems. It is also used when it is desired to have multiple cultivars on one plant.

The scion should be free of disease. The rootstock could be a seedling or a rooted cutting of an existing, established plant. All cut surfaces should be covered with grafting wax once the join is made to prevent moisture loss. Remove shoots from the rootstock. Put the grafted plant in a humid environment so the scion does not dry out.

Various kinds of grafts may be used, including wedge, whip or tongue, or approach graft.

### Seeds

Seeds germinate readily and require no treatments to break dormancy.

### Pests and diseases

Contact the nearest Cooperative Extension Service office for assistance in identifying and recommendations for control of the various pests and diseases listed in the table on p. 8–9.

### Use in adornment

Bougainvillea bracts are commonly used in lei making. Clip clusters of bracts, preferably in the early morning, and transport them in a paper or cloth bag. Wash with a cold-water soak. Bracts can be wrapped in damp newspaper, placed in a plastic container or paper box, and stored in a refrigerator at 40°F for up to 14 days.

Bougainvillea bracts are also used in *haku* (in Guam, *mwar mwar*), traditional, lei-like headbands made of leaves and flowers.

### Acknowledgement

Thanks go to Scot Nelson and Edwin Mersino for reviewing the manuscript.

### References

- Bradley, S. 2005. *The pruner's bible: A step-by-step guide to pruning every plant in your garden*. Rodale, Inc., Emmaus, PA.
- Criley, R.A. 1997. *Bougainvillea*. In: M.L. Gaston, S.A. Carver, C.A. Irwin, and R.A. Larson (eds.), *Tips on growing specialty potted crops*. Ohio Florists' Association, Columbus, OH.
- Gilman, E.F. 1999. *Bougainvillea spp.* Cooperative Extension Service, University of Florida, Fact Sheet FPS-70.
- Growing plants for Hawaiian lei: 85 plants for gardens, conservation, and business. 2002. University of Hawai'i at Mānoa, College of Tropical Agriculture and Human Resources (CTAHR).
- Hackett, W.P., R.M. Sachs, and J. DeBie. 1972. Growing bougainvillea as a flowering pot plant. *California Agriculture* 26(8):12–13.
- Hamilton, D.F., and J.T. Midcap. 2003. Propagation of woody ornamentals by cuttings. Cooperative Extension Service, University of Florida.
- Iredell, J. 1994. *Growing bougainvilleas*. Simon & Schuster Australia. East Roseville, NSW, Australia.
- Neal, M.C. 1965. In gardens of Hawaii. Bishop Museum Press, Honolulu.
- Pertuit, A. 1999. *Bougainvilleas*. Cooperative Extension Service, Clemson University, Home & Garden Information Center HGIC 1553.
- Schoellhorn, R., and E. Alvarez. 2002. Warm climate production guidelines for bougainvillea. Cooperative Extension Service, University of Florida, ENH 874.
- Tavares, J., D. Hensley, J. Deputy, D. Tsuda, and A. Hara. 1998. *Bougainvillea looper*. CTAHR publication IP-2.
- Teho, F. 1971. *Plants of Hawaii: How to grow them*. The Petroglyph Press, Hilo, HI.
- Watson, D.P., and R.A. Criley. 1973. *Bougainvilleas*. CTAHR Circular 469.

### Internode length and landscape characteristics



Internode length has a strong influence on bougainvillea growth habit and characteristics in the landscape. Compare the distance between bract nodes on the upper two stems, from the same plant, with the stem from a different plant, below. (The tiles are 10 inches square.)



Here is the plant with the shorter internodes, compact and easily shaped and maintained in the landscape.



Here is the plant with the longer internodes; note its exuberant growth habit. Highly colorful at some times of year, it is capable of climbing 30–40 feet into the Norfolk Island Pine behind it. Maintenance can be laborious.

## Pests, diseases, and physiological problems

<b>Problem</b>	<b>Description</b>	<b>Symptoms</b>	<b>Control</b>
aphids	Small, rounded or pear-shaped, soft bodied insects. Clustered on stems, leaves, buds, and flowers. Usually found on new growth. Most aphids have a pair of tube-like cornicles on the posterior of the abdomen.	Aphids suck the sap, causing speckles on the foliage, reduced color, stunting, wilting, and deformed leaves. In severe cases, leaf loss occurs.	Insecticidal soap is the safest and most effective control strategy. Controlling the ants will go a long way in helping to control aphids, as well as scales and mealybugs. Ants move these insects around and harvest the honeydew they exude. Ants also protect these insects from predators and parasites.
bougainvillea loopers ( <i>Disclisioprocta stellata</i> )	Green or brown smooth skin caterpillar, one inch long. Feeds primarily at night.	Leaves are eaten. Severe scalloping of leaves. As the population multiplies, plants can be defoliated.	<i>Bacillus thuringiensis</i> (BT) insecticide. Neem-based biological insecticide products. Most synthetic insecticides with labels permitting use against caterpillars on landscape ornamentals. Organic insecticide Spinosad. Spraying late in the evening, when caterpillars and adult moths are active, is recommended.
grasshoppers	Grasshoppers are easy to see and should be controlled before they become numerous.	These insects occasionally consume large quantities of foliage. Their feeding leaves an irregular appearance.	Spray plants with an insecticide registered for ornamental plants.
mealybugs	White, cottony masses found in leaf axils, on underside of leaves, on roots, and other protected areas.	Mealybugs suck plant juices. Infested plants become stunted, and plant parts may die. Honey-dew and sooty mold are often present.	Systemic insecticides are preferred. Horticultural oil can be used, but the label should be followed to avoid burning the leaves and flowers. Burning may occur if the concentration is too high or if the plants are sprayed in the heat of the day. HDOA is releasing predator insects that should help control mealybugs in the future.
mites	These small pests feed on young new growth. Most mites are very small and difficult to see even with a hand lens.	Feeding causes curling, puckering, deformity, distortion, and bronzing. Wilting may occur.	Minimize the possibility of introducing mites into the growing area on infested plant material. Eliminate weeds that are alternate hosts. Ultra fine oil, insecticidal soap, or neem may also be used. Wash foliage with a strong spray of cold water. Wash the plants with soapy water and a soft brush or cloth to remove insects.
reniform nematodes	Microscopic parasitic roundworms that live in and feed on roots, damaging roots and preventing normal uptake of water and nutrients.	Poor growth, stunted, chlorotic (yellow) foliage; premature wilting, low vigor, thin canopy, and leaf and/or bloom loss under relatively mild stress; swollen, knotted, gnarled areas on the roots.	The goal is to manage their population, reducing their numbers below damaging levels. Incorporate good compost or organic materials, such as manure or wood shavings, into the soil as a preplant amendment to encourage microbial activity to depress nematode populations. Grow French marigolds, tilling it in as green mulch. Solarization, the heating of soil by using clear plastic tarps to increase and trap the sun's heat, can be an effective means of controlling nematodes in the soil.



<b>Problem</b>	<b>Description</b>	<b>Symptoms</b>	<b>Control</b>
scales ( <i>Coccus hesperidum</i> )	Scales are sedentary insects that are covered by a hard protective covering (shell) or waxy secretion. Appear on leaves, petioles, or stems.	Scales suck plant juices. They appear as raised or brown bumps (scales) which give stems or leaves a lumpy appearance. Feeding causes a characteristic yellow or chlorotic streak that radiates from point of attachment.	Horticultural oils work well. A systemic insecticide may have to be used against scales. Control the ants that move the scales around and farm them. Wash the plants with soapy water and a soft brush or cloth to remove insects. Thoroughly wash undersides of leaves where pests may also reside. Remove with alcohol-saturated cotton swab.
whiteflies	Sap-feeding insects that feed on undersides of leaves. Whiteflies are tiny; the adults resemble white moths. The immature stages look like scale insects.	Infested leaves often have small yellow spots where adults or immature whiteflies have fed. When populations become dense, the leaves become yellow and lower leaves are covered with black sooty mold.	Many insecticides are registered for and effective at controlling whiteflies. Undersides of leaves must be covered thoroughly to achieve satisfactory control. Successive sprays of insecticidal soaps, oils, or synthetic pyrethrum.
leaf spots*	Bacteria and fungi cause leaf spots. Can be a problem in prolonged wet conditions.	Small, reddish, round spots on the leaves. Spots are usually surrounded by a "halo" of pale green and rapidly expand to become irregular dark patches. Defoliation may occur.	Various broad-spectrum fungicides may be used. Remove all dead leaves and reduce crowding between plants. Discard infected plants. Try to avoid overhead sprinkling and late afternoon watering.
root rots ( <i>Rhizoctonia</i> , <i>Pythium</i> , and <i>Phytophthora</i> )	Fungal diseases of bougainvillea roots, resulting in their malfunction and decay. May attack cuttings during propagation. <i>Pythium</i> and <i>Phytophthora</i> are classified as fungus-like organisms.	Wilting, dieback, stunting, chlorosis of foliage.	Remove and destroy symptomatic plants as soon as they are found. For <i>Rhizoctonia</i> , apply a broad-spectrum fungicide drench during transplanting or planting in the landscape. Use a metalaxyl or phosphorus acid-based product for <i>Pythium</i> or <i>Phytophthora</i> . Avoid overwatering. Avoid planting in heavy soils.
chlorosis	A lack of normal green pigmentation in the foliage generally due to deficiency of one or more micronutrients (usually magnesium or iron) or root rot. Chlorosis could indicate a pathogenic attack of the roots or foliage, which can mimic a nutritional deficiency such as nitrogen.	Pale green leaves with dark green veins; yellowing of the foliage.	Acidify the soil with aluminum sulfate, iron sulfate, or wettable sulfur. An acidulating houseplant fertilizer can be used to lower the soil pH. An application of a complete micronutrient blend or chelated spray should help. Allow the soil to remain evenly moist but not saturated. Remove excess plants in a hedge.

\*(*Pseudomonas stizilobii*, *Burkholderia andropogonis*, *Cercosporidium bougainvilleae*, *Colletotrichum dematium* forma *bougainvilleae*, *Gladosporum arthrinoides*)

Note: Read and follow manufacturers' directions on labels. The pesticides mentioned are possible options for control, but mention of them should not be considered a recommendation. Licensing for sale and use of pesticide formulations varies from state to state and country to country. The pesticide label is the law. Read it before purchasing a pesticide to ensure that the product is registered for your intended use. Read the label entirely before use and follow its instructions. Mention in this publication to a company or product name does not imply recommendation of the product or company to the exclusion of others that may also be suitable.

**Cultivars (varieties)**

<b>Cultivar</b>	<b>Bract color</b>	<b>Comments</b>
Afterglow	Yellow-orange	Sparse foliage. Bracts turn a dusty rose color when old. Heavy bloomer.
Barbara Karst	Bright red	A popular cultivar that performs well. Moderate to vigorous growth. Leaves dull, dark green, broadly ovate with pointed tips, slightly wavy margins. A constant bloomer. Flowers white and conspicuous. Thorns medium and straight.
Bois-de-Rose	Dusty pink	Vigorous growth. Dark green furry leaves. Thorns large, slightly recurved.
California Gold	Gold, yellow	Nice vining habit. Large long-lasting rich gold bracts; can appear yellow in some environments.
Crimson Jewel	Crimson, pink, orange	Dwarf. Good container plant and ground cover.
Double Pink	Pink	Huge clusters of bright pink double bracts. Repeat bloomer.
Double Red	Deep red	Clusters of fluffy double bracts over nice green leaves.
Dr. David Barry (Singapore Pink, Singapore Beauty)	Lavender-pink	Round shrubby vigorous cultivar with long elliptic leaves tapering to a pointed tip. Very large elliptic reflex bracts. Flowers prominent, cream. Thorns short, not prominent. Fine for containers.
Elizabeth Angus	Purple	Vigorous growing. Leaves dark green, glossy, and tapering. Young stems puberulent. Bracts large. Flowers yellowish, large, and conspicuous. Thorns stout, long, recurved.
Golden Glow (Millarii, Gold Queen, Hawaiian Gold)	Bright gold, pinkish-gold	Vigorous and erect. Leaves rounded and large. Bracts broadly ovate. Thorns medium and straight.
Golden Summers (Miss Oneuse)	White	Variegated yellow-gold and green foliage. Large bracts. Repeat bloomer. Thorns medium and slightly curved.
Helen Johnson (Temple Fire)	Reddish-purple, opening slightly coppery	A dwarf compact bushy grower about three feet tall and wide. Branches freely. Leaves are small, broadly ovate, sharply pointed at apex; margins slightly wavy. Bracts sparse, broadly ovate, pointed apex. Thorns small, short, slender. Good for hanging baskets and as a ground cover.
Jamaica White (Apple Blossom, Audrey Grey)	White with flush of pink	Medium grower. Leaves large, rounded, dark green, and smooth. Bracts medium size. Very pretty but rather shy flowering. Thorns medium.
Jane Snook (Durban, President)	Pink	Compact, dense. Tends to be pendulous with some vigorous canes. Leaves long and light green with long petioles. Bracts large with ruffled edges. Flowers large and greenish-cream. Thorns medium and fine.
John Lattin	Iridescent pale lavender	Erect leggy grower. Leaves long, ovate, medium green, glossy, and pointed at tips. Bracts taper to a long point at apex. Flowers moderate in size, greenish-cream. Thorns long and curved.
Juanita Hatten	Bright red, dark pink	Moderate growth habit; branches freely. Foliage may be slightly variegated in shades of green. Attractive mid-green, ovate leaves with slightly wavy margins. Bracts ovate, medium to large. Tends to be ever-blooming. Flowers prominent and creamy-white. Thorns moderate and only slightly recurved. Good for hanging baskets.
Killie Campbell	Copper, red, magenta	Large-growing, pendulous. Leaves dark green, long, ovate, margins wavy, tapering to long-pointed apex. Petiole long. Bracts large, thin-textured, and ruffled. Flowers large, conspicuous. Thorns long, straight.
Lady Hudson (Princess Margaret Rose)	Pale pink	Long canes often bear of leaves especially when young. Leaves broadly ovate with long petioles, light green, and glabrous. Bracts small, ruffled.

<b>Cultivar</b>	<b>Bract color</b>	<b>Comments</b>
Lateritia (Dar-es-Salaam)	Brick-red	Dense, shrubby, slow growing. Leaves medium size, furry. Bracts medium size. Flowers conspicuous, creamy-white. Thorns medium, curved.
Lady Mary Baring (Yellow Glory, Hawaiian Yellow)	Bright yellow	Growth erect and open. Leaves large, rounded, dark green. Bracts medium size, rounded. Flowers not conspicuous. Thorns medium, stout, and straight.
Meriol Fitzpatrick (Dream)	Pale, shimmering lavender	Bushy. Leaves dark green and elliptic. Bracts thin, ovate, tapering, with slightly ruffled margins. Flowers medium in size, creamy-white. Thorns medium and recurved.
Miami Pink	Dark pink	Does best in landscapes.
Miss Manila (Tango)	Golden-orange, apricot, light pink	Vigorous, cascading, dense habit. New growth coppery. Leaves ovate, light to medium green. Bracts large, whorled, rounded at apex, slightly ruffled. Flowers large and prominent, cream. Thorns medium to strong, straight.
Mrs. Butt (Dame Clara Butt, Crimson Lake)	Red to peach	Habit loose and upright, vigorous. Leaves large and rounded with a short sharp point at apex. Bracts medium size, broadly ovate. Repeat bloomer. Flowers prominent, white with a tinge of pink or red. Thorns medium, stout, and straight.
Mrs. McClean (Hawaiian Orange, Orange Glory)	Bright orange	Erect growth. Leaves large, rounded. Bracts medium size. Flowers not conspicuous, cream. Thorns medium, stout, and straight.
Oo-La-La (Poultoni)	Purple	Compact, small to moderate growth, bushy. Canes short. New growth copper-red. Leaves broadly ovate, pointed apex, slightly wavy margins. Bracts moderately large with acute apex. Bracts open copper-red, become magenta-red, and finally have a bluish appearance. Cream flowers are conspicuous. Thorns few, small, slightly curved.
Orange Fiesta	Pumpkin	Luminous bracts have hints of pink and salmon. Allowing plants to wilt slightly encourages more blossoms.
Pink Pixie (Hawaiian Torch, Smartipants)	Pink, magenta-red	True miniature. Small leathery leaves, internodes very short, and leaves crowded. Bracts small and densely packed. Flowers prominent, small, and white. Thorns short, stubby, and blunt. Good for small pots.
Raspberry Ice (Hawaii, Tropical Rainbow)	Red	Compact, bushy grower. New shoots reddish. Leaves small to medium, ovate, tapered to a pointed apex, margins wavy. Variegated foliage with cream to golden yellow margins, dark grayish-green center. Bracts medium, ovate. Repeat bloomer. Thorns short, thin, and straight.
Rosa Catalina	Rosy pink	Dense, busy, and vigorous. Leaves ovate, furry, tapering to a point. Bracts medium, ovate with pointed apex. Flowers prominent. Thorns medium, stout.
Royal Purple	Dark purple	Good replacement for Elizabeth Angus in humid areas.
Scarlet O'Hara (San Diego Red, Hawaiian Scarlet)	Orange, dark red	Loose, upright, vigorous with strong canes. New growth dark red, slightly puberulent. Leaves very large, rounded, dark green, thick-textured. Bracts nearly round and very large. Flowers conspicuous, cream, large. Many thorns, medium, recurved.
Summer Snow	White	Large bracts. Excellent for weddings. Does well in hanging baskets.
Sundown	Apricot	Vigorous. Good bloomer. Heavy feeder.
Surprise (Mary Palmer)	Pink and white	Grows large. Leaves large and mid-green.
Sweet Dream	Pale lavender	Leaves completely gold. Thornless.

<b>Cultivar</b>	<b>Bract color</b>	<b>Comments</b>
Texas Dawn (Purple King, Robyn's Glory)	Light purple-pink	Loose, open habit. Leaves large and rounded. Bracts rounded, medium size. Flowers not conspicuous, creamy-white. Thorns medium to long, stout, and slight recurved.
Tropical Bouquet Variegata	Orange, pink	Compact and bushy. Bracts orange but quickly become pink. Variegated foliage.
Vickie (Vicky, Vicki, Thimma)	Pink, white	Leaves have a large splash of gold or creamy yellow in the center. Some white bracts may be sported.

Other cultivars include Carmencita, Betty Hendry, Bridal Bouquet, Buttiana, Carmencita, Closeburn, Convent, Doubloon, Dream, Dulci Dayborn, Easter Parade, Fascelles Purple, Gillian Greensmith, Gopal, Harrissi, Hugh Evans, India, Indica, Indian Flame, Jubilee, Lacquer Red, Lemner's Special, Lilac Queen, Lyamunga No. 2, New River, Orange King, Pink Champagne, Purple Prince, Rao, Red Glory, Rhodomine, Rose Pink, San Diego Red, William Paulton, and Yellow Glory.