

## CULTURAL CONCEPTS FOR BOUGAINVILLEAS IN FLORIDA<sup>1</sup>

C. RAMCHARAN, D. B. MCCONNELL and  
C. R. JOHNSON

IFAS Department of Ornamental Horticulture  
Gainesville

*Abstract.* Bougainvilleas are widely utilized woody vines in tropical and subtropical areas because they are relatively pest free and tolerate a wide variety of soil types and conditions. They are native to South America, and in horticultural practice can be trained as espaliers or pruned and trimmed into standards. Research has shown that some cultivars flowered continuously under short day conditions and flower number increased with increased nitrogen levels. Certain cultivars make compact, floriferous pot plants when grown under correct daylight and adequate fertilizer and growth retardant treatments. The taxonomy of the genus is complex, but most varieties are thought to have been derived from two major species—*B. glabra* and *B. spectabilis*. Several hybrids have been produced in Florida with 'Barbara Karst' predominant since 1940.

Bougainvilleas were first collected in Brazil by Commerson, who named them in honor of the French navigator L. A. de Bougainville, with whom he traveled around the world during 1766-1769. They are strong bushy shrubs or woody climbers native to tropical and subtropical South America. The genus *Bougainvillea* is in the Four O'Clock family, Nyctaginaceae, and leaves are alternate and entire. Flowers, in groups of three, are inconspicuous, tubular and each is subtended by a large showy heart-shaped bract that constitutes the decorative value of the plant. Bougainvilleas have been widely collected and described, but the innumerable cultivars and hybrids have resulted in a complex taxonomy and confusion in identification.

*B. glabra* and *B. spectabilis* are widely used species and most *Bougainvillea* cultivars are thought to have originated from them (1, 2); some authors (3, 4) have included a third species, *B. peruviana* as being of horticultural importance. The multiplicity of cultivar names for essentially similar populations of *Bougainvillea* has been due to an inadequate awareness of leaf and inflorescence variability.

*B. glabra*, Choisy, grows to over 10 ft., with ovate and acuminate 2 to 4 inch long glabrous, bright green leaves; bracts are cordate-ovate, bright rosy-red and distinctly veined. This species is free-flowering, often dwarfed and grown in pots. The cultivar, 'Sander' was developed as a hybrid from *B. glabra* and is probably the most widely planted. It is floriferous as a small potted plant or as a shrub or climber, is easily propagated and produces a mass of purplish bloom throughout the year. This is the least susceptible cultivar to cold injury of those grown in Florida. 'Crimson Lake', another widely used cultivar, is a rapid grower with bright crimson bracts. 'Afterglow' originated as a bud sport from 'Crimson Lake' and has yellow to orange bracts that change to copper and salmon with age. The cultivar 'Cyphers' has large deep colored rose bracts. The cultivar 'Variegata' has creamy white variegated leaves and is used as a foliage plant. *Bougainvillea* cultivars with white bracts include 'Purity', 'Moonlight', 'Madonna' and 'Elizabeth Doxey'.

*B. spectabilis*, Willd., has large and thick leaves with both leaves and stems densely tomentose and spines recurved at the tops. Bracts are large and deep-rose color but vary to purple and greenish. This species differs from *B. glabra* since it is densely pubescent and flowers predominantly in dry periods. The cultivar 'Lateritia' has brick-red bracts that are showy in full bloom but is difficult to propagate from cuttings.

Jim Hendry initiated a hybridization program of *Bougainvilleas* in Florida in 1927. An outstanding cross was between 'Crimson Lake' and 'Sander' producing 'Barbara Karst'. Bracts are similar in color to 'Crimson Lake', but growth habit is more compact with flowers on stem and shoot terminals. 'Barbara Karst' has been a predominant variety in Florida, California and South Texas since 1940. Other cultivars developed include 'Betty Hendry' and 'Susan Hendry' (12).

*Propagation.* The flowers of *Bougainvillea* are self-sterile and rarely produce seed, and layers or cuttings are used for propagation. Traditionally, 6-12" lengths of old wood of uniform diameter taken in April-June have been used for rooting. Several concentrations of IAA, IBA, NAA and Seradix B<sub>3</sub> have been found to improve rooting (5). For pot production of 'San Diego Red' 3-4" long, succulent tip cuttings dipped in Hormodin #1 were used and these rooted in 4 weeks under mist with bottom heat of 75°F (6).

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*Liner and Container Production.* April-May cuttings can be transplanted to the field after rooting and then containerized in early fall and they will bloom in spring. For early bloom (2) plants should be kept in pots through the summer and cut back in the fall. Recommendations (7) for increased flowering in nursery production are: (1) Increased light intensity through improved plant spacing and training and tying of individual branches to prevent mutual shading. (2) Propagation as far in advance of scheduled sale as possible. (3) Ventilation and heating greenhouses to maintain temperatures of 60°F night and 80°F day.

Subsequent reduction in temperature produces more color in blossoms. In California (6) the 'San Diego Red' cultivar was used to obtain a marketable flowering pot plant in 11-15 weeks. A combination of soft pinch after rooting and treatment with chlormequat 5-7 days after pinching was used.

*Flowering.* Research work in Florida (8) showed that flowering buds on plants receiving long day treatments abscised while plants under short days flowered abundantly. More flowering bracts of high quality developed at high N fertilizer levels when short days were given, but K had no effect on flowering. Later work (9) also showed that *B. glabra* 'Sander' could be kept in a profusely flowering condition throughout the year if given short days and more flowers were produced with increasing N fertilizer levels up to 600 ppa/yr. A daylength between 8 to 10 hours for Bougainvillea flowering was reported with an inductive period of at least 2 weeks for complete flower development.

Chlormequat (10) was found to promote flowering under short day conditions but not under long days. GA<sub>3</sub> prevented the chlormequat-induced promotion of flowering and applied alone, GA<sub>3</sub> greatly delayed flowering. SADH (B9) also proved effective in promoting flowering under short days. In Hawaii (11), 5,000 ppm SADH reduced growth approximately 70%, but chlormequat was found to be ineffective.

*Cultural Requirements.* Though Bougainvilleas grow in a wide variety of soils they become established faster in sands when planting soil is amended with organic matter. Plants in moist soils with good drainage grow fast and once established they tolerate drought. Bor and Raizada reported (3) that plants are most luxuriant between 2,000-4,000 ft. above sea level, and Hottes (2) stated bract colors are better in cool weather. Plants do better in full sun but are slightly shade tolerant.

Old and dead wood should be pruned and old plants can be rejuvenated by cutting back severely.

*B. glabra* and its varieties are the best for ordinary purposes, as they bloom when small and grow well in cool greenhouses or outdoors in frost free areas. *B. spectabilis* and its cv. 'Lateritia' require more tropical conditions and require pruning to keep in bounds.

One authority (3) stated that mature plants merely need a periodic top dressing of manure and clean weeding. Research in Florida indicated that fertilizer should be applied in December, March, June, and September. In evaluation of established plants, flower production increased with increasing levels of N, and greater leaf growth occurred at all levels of K as N increased. Stock plants treated with high N levels produced cuttings with better quality root systems (9).

Iron and manganese deficiency symptoms frequently occur in marl soils located in South Florida, and application of a chelated minor element mix containing iron and manganese may be necessary.

*Landscape Use.* Bougainvilleas can be utilized in Central and South Florida where the 12 or more cultivars offered by nurseries are all good landscape subjects. Purple and magenta color bracts tend to mask effects of red, pink and other clear-colored kinds when planted close together. These deep colored Bougainvilleas are best used on a grand scale climbing tall trees, rambling freely on the sides of a moderately high house or along the upper part of a back wall. All kinds make desirable subjects for covering verandas, arches and pergolas. Since they are drought tolerant and can withstand heavy pruning, they make colorful hedges. Most species can also be grown as standards, isolated shrubs, or as container plants. Because of their relatively simple cultural requirements they could produce good landscape subjects for state highways.

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