

‘USS Alabama’, ‘USS Mississippi’, ‘USS Missouri’, ‘USS Tennessee’, and ‘USS Texas’ Chinese Hibiscus (*Hibiscus rosa-sinensis* L.)

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Chinese hibiscus (*Hibiscus rosa-sinensis* L.) or tropical hibiscus is extensively planted as a flowering pot plant worldwide and as a flowering shrub throughout tropical regions. *Hibiscus rosa-sinensis* has not been reported from the wild and is generally a highly heterozygous polyploid of complex ancestry (Singh and Khoshoo, 1970). The Linnaean showy double red-flowered plant type was obtained from China where it was cultivated, although no wild forms of the species are known to exist there (Kimbrough, 1997). Indigenous hibiscus species from islands in the south Indian Ocean including *H. schizopetalus* Hook., *H. liliiflorus* Cav., *H. fragilis* DC., and *H. boryanus* Hook and Arn. in combination with the Pacific Island species *H. kokio* Hillebrand, *H. arnotianus* Gray, *H. wimeae* Heller, *H. denisonii* auct., and *H. storckii* Seeman are thought to have played a major role in the development of cultivated *H. rosa-sinensis* (Singh and Khoshoo, 1989).

Chinese hibiscus has moderately high pollen fertility (Singh and Khoshoo, 1989) but seed set is rarely observed under normal conditions in the tropics (Sharma and Sharma, 1962). Proper attention to environmental conditions during pollination was demonstrated to improve seed set in an Italian study with best set occurring in the spring and fall under moderate shade when the temperature ranged from 16 to 27 °C, and dew point was between 10 and 16 °C (Mercuri et al., 2009). Observations of seed set indicates some *H. rosa-sinensis* cultivars are superior female parents, whereas others are better male parents (Lawton, 2004).

Size, shape, and flower color as well as plant habit show great variation in Chinese hibiscus clones. Newer clones generally flower more freely in more diverse colors than heirloom clones and are cutting propagated instead of grafted (Dickey, 1950; Lawton, 2004). Modern breeding is generally directed at the hobby flower show,

florist-grade flowering pot plant, or landscape shrub market segments. The hobby market is focused on floral traits with little attention to ease of propagation or plant morphology. Florist-grade clones are bred to be compact, responsive to growth regulators, have high bud counts under greenhouse production environments, and have dark green dense foliage. Breeding for the shrub market is limited by lower plant values and is generally serviced by screening clones developed for the other more financially lucrative market segments. Landscape shrub producers and consumers desire clones with characteristics such as rapid growth to fill bigger pots, environmental tolerance, and extended bloom cycles (Lawton, 2004). ‘USS Alabama’, ‘USS Mississippi’, ‘USS Missouri’, ‘USS Tennessee’, and ‘USS Texas’ were selected for the shrub market.

Origin

The five new Chinese hibiscus cultivars are products from a planned hibiscus breeding program conducted by the inventors at Poplarville, MS. The goal of the research is to produce new clones with a combination of desirable horticultural traits. Desirable floral traits include early bloom, uniform flower size, range of flower colors, and an extended bloom cycle. Improved plant traits include well-branched crowns and good garden performance in landscape-sized containers during hot, humid summers. ‘USS Alabama, tested as HRS07-2(447), resulted from the cross: (‘Rose Red’ × ‘Cheri Orange’) × ‘Sundance’. ‘USS Mississippi’, tested as HRS07-3(510), resulted from the cross ‘Sunny Wind’ × ‘Gabriel’. ‘USS Missouri’, tested as HRS07-680, resulted from a series of crosses between polyploid *H. rosa-sinensis* clones that ended in the cross [(‘Evangeline’ × ‘Brilliant Red’) × ‘Rose Red’] × [(‘Evangeline’ × ‘Brilliant Red’) × ‘Gabriel’]. ‘USS Tennessee’, tested as HRS07-2117, resulted from two complex parents, [(‘Evangeline’ × ‘Molly Cunningham’) × ‘Party Favor’] × [(‘Brilliant Red’ × ‘Rum Runner’) × ‘Evangeline’]. ‘USS Texas’, tested as HRS07-1390, resulted from a cross between an open-pollinated ‘Cupid’ seedling and ‘Gabriel’.

‘USS Alabama’, ‘USS Mississippi’, ‘USS Missouri’, ‘USS Tennessee’, and ‘USS Texas’ vary in their combination of traits, particularly flower color (Fig. 1) and growth habit. Plants of the five new hibiscus clones develop rapidly in containers. Old flowers abscise freely with no production of seed pods under normal culture. The phenotype of each clone may be affected somewhat by changes in cultural practices and environmental conditions such as high light-intensity fading flower color and excess nutrient levels darkening foliage color. Ultimate plant size is dependent on container size and environmental conditions.

‘USS Alabama’ is characterized by dense lime green foliage, an upright growth habit, and prolific flowering. Flowers are uniformly colored yellow 10A (Royal Horticultural Society Flower Council of Holland, 2001) with a small blush red (orange-red N34B) eye. The moderately large 15-cm diameter blooms are composed of overlapping obovate petals (7.5 to 5.0 cm). The yellow 4D styles are generally 8.5 cm long with five yellow 13A stigmatic pads. Undersides of petals are light yellow (yellow 10B) with a textured appearance resulting from a pattern of prominent veins. Cordate leaves (9.5 × 8.5 cm) are green 137B with coarsely serrated margins and pale green (green 138B) undersides. New stems are grayed green 193B aging to grayed brown 199B. Plants of ‘USS Alabama’ are densely branched with moderate pruning and upright with abundant flowering from spring through fall in temperate regions. Plants grown in a #3 nursery pot were 1.0 m tall × 0.5 m wide within 6 months under optimum conditions. Under tropical landscape conditions, plants should mature to ≈3.5 m tall × 2.0 m wide.

‘USS Mississippi’ is categorized by clean foliage, a compact growth habit, beautiful blooms, and ease of production. Flowers are yellow–orange 16B with a white eye (white N155B). The eye is blushed red 46B with the intensity of the blush fading with warmer temperatures. Flowers are 14 to 16 cm in diameter with orbiculate petals (6.5 to 5.0 cm) that overlap slightly and are somewhat recurved when the flower matures. The yellow 4D styles are generally 7.0 cm long with five yellow 9B stigmatic pads. Stamens and pollen grains are yellow–orange 14B. Undersides of petals are lighter yellow (yellow 11B) with prominent veining. Ovate-shaped leaves (10 × 8 cm) are green 139A with lightly serrated margins and paler green (green 139C) undersides. Fused sepals are green 138B on the upper surfaces and predominantly green 138D on the lower surfaces with green 138A stripes along the edges and in the middle. Flower peduncles are 5.5 cm and hold flowers facing up. Newly mature stems are grayed green 198B with gray–brown 199B flecks aging to gray 201B with lines of brown N200A.

‘USS Missouri’ is classified by dark green foliage, a uniform upright growth habit,

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Fig. 1. Comparison of *Hibiscus rosa-sinensis* flowers from (A) 'USS Tennessee', (B) 'USS Texas', (C) 'USS Alabama', (D) 'USS Missouri', and (E) 'USS Mississippi'.

attractive foliage, and abundant large red flowers. This clone is suited to production as a container plant as a result of its attractive plant form and red (red 43B) flowers of intermediate size (14 to 17 cm) with overlapping orbiculate-shaped petals (6 × 7cm). Each petal has a dark splotch (purple 79A) at the base displayed as a five-lobed eye in the flower. Cordate-shaped leaves (9 × 8 cm) are dark green (green 137B) with a serrated edge. Foliage cover is dense and growth habit is upright. Under tropical landscape conditions, plants should mature to ≈3 m tall × 1.5 m wide.

'USS Tennessee' was selected for its adaption to southern climatic conditions manifested in traits inherited from its parents in combination with attractive multicolored flowers. Plants are vigorous with an upright growth habit and abundant production of large (15 to 17 cm) orange (orange 26A) flowers. Each petal (8.5 × 8.5 cm) has a splotch (2 × 3 cm) of red (red 46A) at its base that bleeds out into the lower petal. Flowers appear to have a red eye as observed from a distance. A pattern of veins is visible on upper petal surfaces giving flowers a textured appearance, particularly on lower petal surfaces. The green (yellow-green 144A) cordate-shaped leaves range up to 8.5 cm in width × 10 cm in length with serrated margins and 4-cm petioles. Plants in a #3 nursery pot grow to 0.8 m tall and 0.4 m wide within 6 months under optimum conditions. Under tropical landscape conditions, plants should mature to ≈3 m tall × 1.5 m wide.

'USS Texas' is characterized by olive green foliage, a uniform upright growth

habit, and attractive, abundant large flowers. Flowers are hunter orange (grayed orange N172A) with light orange (grayed orange 163B) streaks. The moderate-sized (13 to 15 cm) blooms are composed of overlapping orbiculate petals (7 × 7 cm). The gauzy-textured petals have a pink zone (red-purple 63C) at the base displayed as a five-lobed star in flower centers. Undersides of petals are light orange (grayed orange 163B). Cordate leaves (9.5 × 8.5 cm) are light green (green 146A) with a serrated edge and pale green (green 137C) undersides. New stems are grayed green 191A aging to grayed green 197A. Plants grown in a #3 nursery pot were 1.0 m tall × 0.5 m wide within 6 months with adequate moisture, fertilizer, and sunlight. Under tropical landscape conditions, plants should mature to ≈3.0 m tall × 1.5 m wide.

Culture

'USS Alabama', 'USS Mississippi', 'USS Missouri', 'USS Tennessee', and 'USS Texas' are ideal plants for summer decoration on patios, around pools, or other outside areas. Plants are adapted to summer environmental conditions typical of the southeastern United States but should also exhibit good summer performance in other areas of the country with more moderate summers. The clones are also adapted for use as woody perennial plants in USDA hardiness zones 9 and above for use as hedges, specimen plants, and mass plantings. Plants prefer partial or afternoon shade in climates with intense summer sunlight but are adapted to full sun production with proper watering. In cooler

climates, plants used outdoors should be placed in warm locations sheltered from cool winds. Other cultural practices for maximum flowering and plant development conform to established practices for *H. rosa-sinense* clones. No unusual insect or disease pests have been observed on plants growing in Poplarville, MS, El Campo, TX, and Sarasota, FL, but strict pest management programs are required during production, like with any other tropical hibiscus.

Propagation

Asexual propagation of the five new hibiscus clones in Texas, Mississippi, and Florida has shown that the distinctive features of each cultivar reproduce true to type in succeeding generations. Actively growing stock plants provide softwood cuttings with most consistent rooting and initial growth using standard mist propagation procedures (Dole and Wilkins, 1999). Effects of growth regulators have not been researched on the five clones.

Availability

Additional information or a list of nurseries propagating 'USS Alabama', 'USS Mississippi', 'USS Missouri', 'USS Tennessee', and 'USS Texas' is available on written request to Cecil Pounders, e-mail: Cecil.Pounders@ars.usda.gov. The USDA-ARS does not have plants for sale. In addition, specimens of the releases have been deposited in the National Plant Germplasm System where they will be available for research purposes. It is requested that appropriate

recognition be made if this germplasm contributes to the development of other new cultivars.

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