

## New Large-Bracted Dogwoods from Rutgers University

Elwin R. Orton, Jr.

Rutgers University, Department of Plant Science, Box 231, Cook College, New Brunswick, New Jersey 08903

### INTRODUCTION

During the first 5 years of the woody ornamentals breeding program at Rutgers University, hybridization studies were limited to intra- and inter-specific hybridization of plants of the genus *Ilex*, and of the genus *Pyracantha*. Starting in 1965, plants of the various cultivars and numbered selections of *Cornus florida*, *C. kousa*, and *C. nuttallii* available in the trade were assembled in a performance trial as the starting point for interspecific hybridization between these three species of large-bracted dogwood. Such a field trial of tree species is essential to a long-range hybridization program: first, the trial allows one to observe the degree of genetic variability available within the various species and thus obtain a measure of the potential improvement one can expect to achieve via a program of controlled crosses; secondly, the performance trial provides the parent material used in making the crosses; and thirdly, the trial provides the current standards of excellence for evaluating plant material from the breeding program. It is not enough that seedlings from controlled crosses be good; rather, the various progenies must include plants superior, or novel, to those in commerce if the program is to be successful.

### GENETIC VARIABILITY IN *C. FLORIDA* AND *C. KOUSA*

Early in this work, it was discovered that all the plants of *C. florida* and *C. kousa* exhibited a very high level of self-incompatibility. Thus, the plants are obligately cross-fertilized in nature and would be expected to exhibit a high degree of both phenotypic and genetic variability. This, of course, was true of the plant material available as cultivars in the trade. The trial included plants of dwarf, pendulous, or fastigiate habit. Some had floral bracts of various color (white, pink, red), some exhibited floral "doubles" or various foliage variegations. Various clones showed different levels of vigor and winter hardiness, and floral bracts of widely different size, shape, and texture.

Variation in plant vigor was particularly high in *C. kousa* and is believed to result from the introduction of a small sample of germplasm from the wild and subsequent inbreeding (Orton, 1985). Also, variability in the size, shape, and texture of the floral bracts was particularly high in the case of *C. kousa*.

Close examination of the floral structures in plants of *C. florida* and *C. kousa* revealed why plants of the latter species flower a month later than plants of *C. florida*. It is common in the nursery industry and in horticultural literature to refer to the true flowers in flower heads of *C. florida* and *C. kousa* as being protected in the overwintering floral buds by the enclosing floral bracts. While this is true for *C. florida*, it is not true for *C. kousa*. In the latter species, the floral bracts are minute, feathery structures clasping the tiny, developmentally immature flowers and the flower head is enclosed by two opposing pair of vegetative bracts at the base

of the very abbreviated peduncle. These homologous structures are clearly visible in *C. florida*, being 1/4 to 1/3 in. in length near the base of the 1/2 to 1 in. peduncle of the overwintering flower buds. As growth resumes in the spring, the floral bracts enclosing the true flowers of *C. florida* unfold and enlarge to provide the showy floral display. The deciduous vegetative bracts enclosing the true flowers of *C. kousa* drop as growth resumes in the spring but the developmentally immature floral bracts and true flowers mature a month later than in *C. florida*. This is to be expected when one considers that the peduncle of the nearly sessile flower head of the overwintering bud increases to a length of 2 1/2 to 3 in. by the time of flowering and floral display.

In *C. nuttallii*, the true flowers are well developed, but are naked in the relatively large overwintering flower buds. Neither the vegetative bracts nor the floral bracts subtending the flower heads enclose the true flowers. As with *C. florida*, the floral bracts subtending the true flowers in the overwintering buds of *C. nuttallii* are developmentally more mature than in *C. kousa*. Thus, flowering and the ornamental display of the floral bracts occur about the same time as in *C. florida*.

No cultivar with good pink or red bracts has been found in *C. kousa*. Several clones said to exhibit pink or red bracts are in the trade and were acquired as they became available. The clones tested exhibited white floral bracts with just a trace of pink at the margins of the bracts when grown in a greenhouse in late winter and early spring.

Work with *C. florida* showed the pink- or red-bracted characteristic is conditioned by a single recessive gene in the homozygous state (Orton, 1982). One could speculate that the reported [red- or] pink-bracted clones of *C. kousa* may be heterozygous for a single recessive gene conditioning bract color. Such heterozygotes in *C. florida* often produce "apple-blossom pink" bracts during a cool spring. If such is the case, one could assume that a gene homologous to the gene in *Cornus florida* does exist in *C. kousa*. If true, progeny resulting from crossing such a heterozygote with a plant of *C. florida* homozygous for the recessive gene conditioning anthocyanin pigmentation of the bracts should segregate 1:1 for pink- or red-bracted seedlings and white-bracted seedlings.

These crosses were made and all of the seedlings with cotyledons exhibiting anthocyanin pigmentation—a trait associated with pink- and/or red- bracted segregates in *C. florida* (Orton, 1982)—were small and weak and seldom survived as long as a year. Thus, this researcher doubts that a reliably good red-bracted form of *C. kousa* will be found in nature. The pink-bracted plants observed among hybrids of *C. kousa* × *C. florida* are known to be heterozygous for the single recessive gene conditioning pink or red bracts in *C. florida*. As is true with the heterozygotes in *C. florida*, the intensity of the anthocyanin pigment in the floral bracts of the hybrids varies from year to year depending on seasonal factors.

### CULTIVARS INTRODUCED

The two cultivars described below resulted from intraspecific hybridization within *C. florida*.

**D376-15, PP 8214, Red Beauty<sup>®</sup>**. Plants of Red Beauty<sup>®</sup> are semi-dwarf, with dark green leaves, and a densely branched, unusually symmetrical form. The floral bracts are bright red and showy early in the season.



**D184-11, PP 8213, Wonderberry<sup>®</sup>**. Plants of Wonderberry<sup>®</sup> are unusually vigorous, with large, thick, dark green, leathery leaves. Each white floral bract has a spot of red at the tip and the showy display is rather typical of the species. The trees are unusual for their display of large, tubular, bright red fruit nearly twice the size typical of the species.

Six F<sub>1</sub> interspecific hybrids of *C. kousa* × *C. florida* have been patented and introduced to commerce as Rutgers University's Stellar<sup>®</sup> series. Plants of all six hybrids exhibit more vigor than is typical for plants of either parent species and all exhibit large, flat leaves of a rich, dark green color. Similarly, all of the hybrids are highly resistant to infestation by the common dogwood borer. Additionally, the hybrids have moderate to high resistance to *Discula destructiva*, the incitant of dogwood anthracnose. Plants of the Stellar<sup>®</sup> series are highly floriferous, and the period of floral display is intermediate to that of plants of the parent species. The over-wintering floral buds are also intermediate to those of the parent species: the true flowers on the flower heads of each hybrid are enclosed to varying degrees by both the two opposing sets of floral bracts and the two opposing sets of vegetative bracts immediately subtending each flower head. All of the hybrids exhibit some flower heads in which a few of the true flowers are not enclosed by any of the subtending floral or vegetative bracts. However, plants of all six hybrids consistently have provided a good floral display in Zone 6a. U.S.D.A. Plant Hardiness zone 6a (-5 to -10F).

The hybrids of the Stellar<sup>®</sup> series are listed below in the order in which the floral display of each hybrid commences in the spring.

**Cornus 'Rutlan', PP 7732, Ruth Ellen<sup>®</sup>**. Plants of Ruth Ellen<sup>®</sup> are similar to plants of *C. florida*. They are low and spreading rather than upright as with young plants of *C. kousa*. At 19 years, the original seedling was 18 ft tall, had a uniform spread of 22 ft, and was densely branched close to the ground.\* The period of floral display of Ruth Ellen<sup>®</sup> slightly overlaps the last day or two of the floral display of most plants of *C. florida*. At the peak of the floral display, the trees are brilliant white in appearance and very showy even from a distance.

**Cornus 'Rutfan', PP 7206, Stardust<sup>®</sup>**. Plants of this cultivar are similar to the *C. florida* parent as the general form is low and horizontal but they are much smaller than plants of Ruth Ellen<sup>®</sup>. The plants are heavily branched to the ground like a hedge. At 19 years, the original seedling was 11 feet tall with a uniform spread of 19 feet.\* The floral display of Stardust<sup>®</sup> typically starts one day later than that of Ruth Ellen<sup>®</sup>. The white floral bracts of Stardust<sup>®</sup> are obovate with an acute tip. The bracts are distinctly separate and do not overlap. Although plants of this cultivar are low and densely foliated, evidence of infection by *Discula* has not been observed.

**Cornus 'Rutcan', PP 7210, Constellation<sup>®</sup>**. Plants of Constellation<sup>®</sup> are erect in habit and much more vigorous than plants of *C. kousa*, but do not exhibit the vase-shaped habit typical of young plants of *C. kousa*; that is, the plants branch low and are uniformly wide from base to top. The floral display commences two days after that of Ruth Ellen<sup>®</sup>, and is quite spectacular even when viewed from a distance. At 19 years, the original seedling was 21 ft tall and 17 ft wide.\* The white floral bracts are obovate with an acute tip. Both the inner and outer

(lower) floral bracts are separate with no overlap and are significantly longer than are the floral bracts of Stardust<sup>®</sup>.

***Cornus* 'Rutdan', PP 7204, Celestial<sup>™</sup>**. This hybrid is vigorous and erect in habit, exhibiting a uniform width rather than the vase-shape of a young plant of *C. kousa*. The floral display commences four to five days after that of Ruth Ellen<sup>®</sup>. The expanded floral bracts are white with a tinge of green and form a small cup early in the season. However, the bracts flatten and become pure white in a few days. Bracts are obovate to nearly rounded with an acute tip and a base broadly tapered. Margins of adjacent bracts often touch but do not overlap. At 19 years, the original seedling was 17 ft tall and 14 ft wide.\*

***Cornus* 'Rutban', PP#7205, Aurora<sup>®</sup>**. Plants of Aurora<sup>®</sup> are very vigorous, erect in habit, and uniformly wide throughout. They are also very floriferous. The period of floral display is about the same as that of Celestial<sup>®</sup>. The floral bracts are white and provide a heavily textured, velvety appearance, and become creamy-white as they age. They are nearly rounded to obovate with a broad, tapering base and an acute tip. The margins of the basal one-third of adjacent bracts typically overlap. At 19 years, the original seedling measured 18 ft tall and 18 ft wide.\*

***Cornus* 'Rutgan', PP#7207, Stellar Pink<sup>®</sup>**. Plants of Stellar Pink<sup>®</sup> are very vigorous and erect in habit. They branch low and are uniformly wide throughout, as opposed to the vase-shaped habit typical of young plants of *C. kousa*. The period of floral display of the floral bracts is similar to that of Celestial<sup>™</sup> and Aurora<sup>®</sup>. The rounded, overlapping bracts are a soft pink in color and have a nice textured appearance. From a distance, the pink bracts are not as showy as the dark red bracts of good clones of *C. florida*. However, they provide a very attractive display when viewed more closely. At 19 years, the original seedling was 20 ft tall and 19 ft wide.\*

The six hybrids of the Stellar<sup>®</sup> series listed above represent Rutgers University's answer to "dogwood decline". New intra- and inter-specific hybrids of the large-bracted dogwoods will be introduced from Rutgers University in the next two to three years.

\*For purposes of comparison, 26-year-old plants of *C. florida* 'Springtime' and 'Sweetwater' in the performance trial measured 10 ft tall by 16 ft wide and 12 ft tall by 19 ft wide, respectively.

#### LITERATURE CITED

- Orton, E.R. 1982. Propagation of *Cornus florida* forma *rubra* by seed—the process and potential. Comb. Proc. Intl. Plant Prop. Soc. 32:482-489.
- Orton, E.R. 1985. Interspecific hybridization among *Cornus florida*, *C. kousa*, and *C. nuttallii*. Comb. Proc. Intl. Plant Prop. Soc. 35:655-661.