

## Cercis Breeding at the U.S. National Arboretum: Improving Redbud Rootability and Combining Other Traits of Interest®

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The genus *Cercis* (redbud or Judas tree) is a morphologically and biogeographically diverse group with high ornamental appeal. A variety of ornamental traits have been discovered and selected for in the native eastern redbud (*C. canadensis*). These traits include varied leaf morphology, unique flower color, and diverse habit. Almost all eastern redbud cultivars are graft-propagated due to difficulties with rooting. Grafting is a time-intensive and costly method to obtain clonal (or cultivar) material. In contrast, various species native to Asia have been found to be easier to root than *C. canadensis*. Preliminary work at the U.S. National Arboretum (USNA) suggests that it may be possible to combine the rootability of the Asian species with the ornamental character(s) of the native species. Such interspecific hybridization presents an avenue to improve the nursery production of eastern redbud while also expanding the ornamental and environmental qualities of the entire group.

Although grafting methodology has been improved (Macdonald, 1990), grafting remains more time-intensive and costly than cutting propagation. We found that *C. glabra*, *C. chinensis*, and *C. yunnanensis* rooted in higher percentages than *C. canadensis* (Pooler and Dix, 2001). *Cercis glabra* and *C. yunnanensis* are likely variants of *C. chinensis* (Davis et al., 2002), which may explain their similar rooting behavior. Although the basis for this increased rootability is currently unknown, it may be a heritable trait.

The USNA has a number of diverse taxa of Asian species which have shown different characters than the North American species. For example, observation of over 20 taxa of *C. chinensis* has revealed that plants with semi-rugose leaves are resistant to redbud leaffolder (*Fascista cercerisella*) which folds *C. canadensis* leaves, making them less attractive and possibly more susceptible to other insects and/or disease. In addition, *C. chinensis* plants tend to be smaller in stature than the North American species and have a multi-stemmed habit. Thus, in addition to increased rootability, *C. chinensis* could confer desirable ornamental qualities.

Preliminary work at the USNA has determined that interspecific hybridization between Asian species and the eastern redbud is possible. Thus far, *C. canadensis* has been successfully hybridized with *C. racemosa* and *C. chinensis*, resulting in progeny with characters intermediate between those of the parents (e.g., semi-racemose flowers when *C. racemosa* is a parent). Progeny of the *C. canadensis* × *C. chinensis* crosses often show some level of incompatibility, as evidenced by dwarf mature forms (< 0.6 m (< 2 ft) tall in 14 years) or small elongated leaves that have lost the heart shape characteristic of the genus. The foliar elongation is attractive in progeny with normal-sized leaves and gives a finer-textured appearance to the plant. All of the progeny have been found to be resistant to leaffolder and most display the smaller, multi-stemmed form of *C. chinensis*.

The next steps in the breeding program are to begin selections for rootability and to interbreed for a segregating F<sub>2</sub> population where we expect to find progeny with recombined traits of interest, including the ability to root from cuttings. To

select for rootability, we will follow the methods that have been used to successfully propagate *C. chinensis* taxa. Cuttings are taken roughly 8 weeks after bud break, are wounded 1 cm from the basal end, treated with 2.0% (20,000 ppm) IBA-talc and placed on a mist bench in a greenhouse (Pooler and Dix, 2001). Controlled crosses with selected plants will be made using bees in a pollinator-exclusion cage. Once grown out, the F<sub>2</sub> population will be assessed for ornamental characters and rootability in a similar fashion as above.

If this method of hybridizing and selection proves successful in enhancing the rootability and insect resistance of eastern redbud, while retaining its desirable characteristics (e.g., flower color, leaf morphology), the program will be expanded to include more ornamental and environmental characters.

#### LITERATURE CITED

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