

## **The North American Plant Collections Consortium as a model for conservation, research and education in botanic gardens**

**Mark Weathington**

JC Raulston Arboretum, North Carolina State University, Raleigh, North Carolina, USA

### **Abstract**

The American Public Garden Association's North American Plant Collections Consortium (NAPCC), in partnership with the United States Department of Agriculture, is dedicated to a continent-wide approach to plant germplasm preservation, promoting high standards of curatorial care. Participants commit to holding and developing collections of documented living plants. These collections are used for germplasm preservation, research, and education. The NAPCC comprises several types of collections, including taxonomic groups, historic groups, eco-regional collections, and thematic groups. These collections may be held by a single institution or coordinated among multiple participants. This program has led to increased germplasm conservation, increased public awareness, heightened curatorial standards, and easier access to germplasm for researchers, as well as helping to achieve the Global Strategy for Plant Conservation's Target 8, "At least 75 per cent of threatened plant species in *ex situ* collections, preferably in the country of origin, and at least 20 per cent available for recovery and restoration programmes."

### **Keywords**

Germplasm, plant collections, curation, NAPCC, APGA, USDA

### **The NAPCC Program**

The American Public Garden Association (APGA) was established in 1940 as the American Association of Botanical Gardens and Arboreta and serves as the primary professional association for public gardens across North America. There are currently approximately 500 member institutions and over 5000 individual members of the organization. APGA's mission is to advance public gardens as a force for positive change in their communities, through national leadership, advocacy and innovation. The North American Plant Collections Consortium (NAPCC) is an initiative of APGA in partnership with the US Department of Agriculture (USDA) dedicated to a continent-wide approach to plant germplasm preservation, promoting high standards of curatorial care. Participants commit to holding and developing collections of documented living plants. These collections are used for germplasm preservation, research, and education.

In the late 1980s, the NAPCC began as an initiative of the APGA Plant Collections Committee, modeled on the UK's national collections program. By 1990 a part-time manager was hired by APGA to head the program. The first six collections applied for NAPCC status and were reviewed in 1996 as a pilot for the program and in 2005 a collaborative, multi-institution application was instituted. There are currently 69 participating gardens holding 63 individual collections and 3 multi-institution collections.

The program is partially funded through a cooperative agreement with the USDA Agricultural Research Service. The USDA operates the National Plant Germplasm System, which is the primary player in the U.S. effort to conserve and use crop germplasm; it is one of the world's largest collectors and distributors of germplasm. Most of this system is dedicated to economic and food crops but the USDA also conserves woody ornamentals in Beltsville, Maryland and herbaceous ornamentals in Columbus, Ohio. The partnership between the USDA and APGA, utilizing the strengths of North American public gardens, helps further the mission of both organizations.

The NAPCC comprises several types of collections including taxonomic groups, historic groups, eco-regional collections, and thematic groups. Most collections are alpha-taxonomic collections concentrating on a single genus, family, or even species and may consist of wild collections and/or horticultural selections. The NAPCC program is open for any APGA member to participate, but all participants must have an active collections management program, an endorsement from and commitment to maintain the plant group from the governing body, an up-to-date collections policy, and a curator for the proposed collection. In addition, participants commit to allowing access to the proposed collection for research.

Applicants to the NAPCC program submit a written application detailing their plant collections policy, letter of endorsement from their governing body, signed conditions for participation, collections inventory, curriculum vitae of key collections management staff, and an application fee. The NAPCC manager reviews the application packet and assigns a peer reviewer for a site visit to evaluate the collection, facilities, key staff, and curatorial practices. The reviewer writes a full evaluation and recommends the applicant receive “Full Status” admission to the NAPCC program, “Provisional Status” for 1–3 years with “Full Status” awarded after the successful completion of recommended improvements, or “Not Recommended at the Time” with a list of activities necessary for completion prior to re-application.

Recruitment for the program is through a continent-wide network of recruiters working with regional organizers to help identify potential collections and work with garden staff to raise curatorial standards to the level that will allow for successful participation in the NAPCC program. Peer site reviewers are trained through periodic workshops which typically include two mock site reviews with different outcomes to ensure standard evaluations.

NAPCC collection holders set their own collections policies and procedures which must conform to accepted curatorial practices. Plant sales and exchanges are governed by the individual institutions, although voluntary codes of conduct and best practices are encouraged. The NAPCC collection holder agrees to make every attempt to distribute the collection to other APGA member gardens if the collection should ever be de-accessioned or participation in the NAPCC program terminated.

## Case Studies

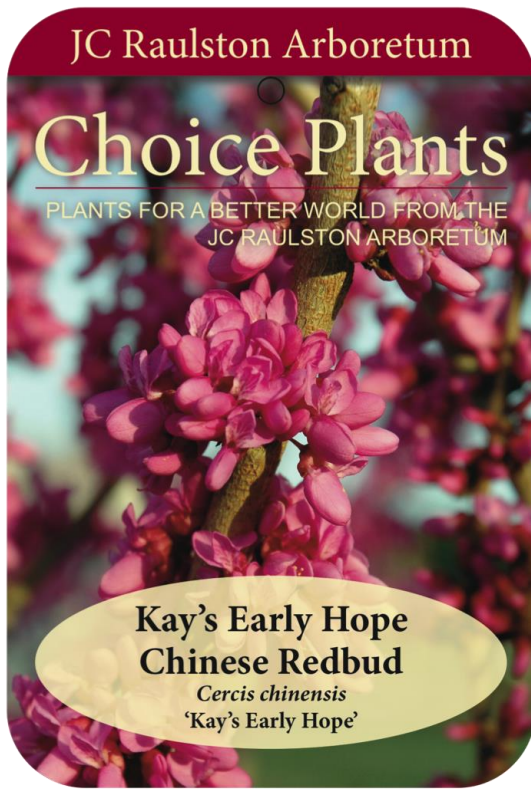
- The JC Raulston Arboretum (JCRA) at North Carolina State University holds a NAPCC *Cercis* (redbud) collection consisting of 69 accessions representing 52 taxa including 11 species, subspecies, and botanical varieties. The collection has been utilized in breeding work by Dr. Dennis Werner of NC State University as well as private breeders in the nursery industry. The collection has also been utilized to select superior forms and hybrids including *Cercis* ‘Big John’, an upright form with vigorous growth and notably large flowers and *Cercis chinensis* ‘Kay’s Early Hope’ (fig. 1) a precocious, exceptionally floriferous, long flowering form. The collection is also used to educate the public on this genus, as an illustration of a group with a distribution scattered across the northern temperate regions, and to discuss the particular attributes of plants in the Fabaceae family through interpretive signage, self-guided tour brochures, staff led tours, and educational articles. Outside researchers utilizing the J C Raulston’s redbud collection include the California Academy of Sciences for a phylogenetic study of *Cercis*, the Hungarian Academy of Sciences for a molecular study of the genus, and to help develop a national *Cercis* collection in Somerset, UK.
- The Dawes Arboretum in Newark, Ohio holds a NAPCC *ex situ Metasequoia glyptostroboides* (dawn redwood) collection, consisting of 320 individual trees from 47 wild-collected accessions. The collection represents genetics from across the dawn redwood’s native range and represents the greatest genetic diversity of the species outside of China (fig. 2). The collection is being used for genetic analysis and holds the

potential for conservation and restoration of the species in the future. The collection also has considerable potential for horticultural selection of improved forms for landscape use.

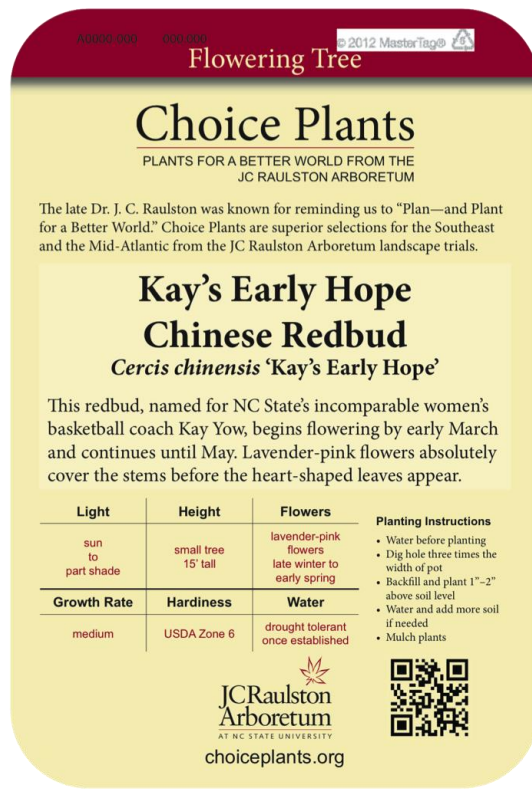
- Recently (2005), multi-institution collections have been developed to better capture the broad taxonomic diversity in some of the larger genera. The *Quercus* (oak) collection is held across 20 institutional partners with one partner serving as the coordinator. Collectively, this group holds 2,367 accessions representing 168 species, subspecies, and varieties and over 500 cultivars (fig.3). Forty-one percent of the collection is of known wild-collected germplasm. This is especially important for a group such as the oaks with recalcitrant seed that is difficult to store for any length of time in seed banks.
- Other NAPCC collections are being used in a variety of ways, such as the University of Michigan Matthaei Botanical Gardens & Nichols Arboretum where they are working with the Belarussian Academy of Sciences on DNA fingerprinting of historic herbaceous *Paeonia* (peony) selections. The multi-institution *Magnolia* (magnolia) collection holders are coordinating with the Magnolia Society International to host magnolia study days for public education and using gap analysis of their combined collections to pinpoint collection weaknesses and make concerted efforts to fill those gaps, especially in the case of endangered taxa, in an attempt to work towards the Global Strategy for Plant Conservation's (GSPC) Target 8.

## Conclusion

The partnership between the APGA and USDA allows for a much greater degree of germplasm preservation than either entity working alone. The increased coordination and communication between gardens has created a stronger collections conservation environment nationally, and the NAPCC's emphasis on high standards of curatorial care has helped develop the curatorial staff of smaller and less well-funded gardens. Education programs and interpretation have led to a greater public appreciation of the role of botanic gardens in the conservation of plants, and the NAPCC's emphasis on science has led to easier access to germplasm for researchers.



front



back

Fig 1 A *Cercis* selection from the J C Raulston Arboretum being sold though the Choice Plants program



Fig. 2 *Metasequoia glyptostroboides* branchlet variation at the Dawes Arboretum

Fig. 3 Interpretive educational sign at the University of California, Davis Arboretum

# WHAT DO oaks look like?

This white oak (*Quercus alba*) is what someone from the eastern U.S. would consider a typical oak, **but...** oaks are variable.

**white oak**  
*Quercus alba*  
temperate forests of the central and eastern U.S.

**bur oak**  
*Quercus macrocarpa*  
temperate forests of the central and eastern U.S.

**valley oak**  
*Quercus lobata*  
interior valleys of California

**mesa oak**  
*Quercus engelmannii*  
coastal southern California

**coast live oak**  
*Quercus agrifolia*  
coastal hills of California

**gray oak**  
*Quercus grisea*  
southwest U.S. and Mexico

**oak of tabor**  
*Quercus shalimensis*  
eastern Mediterranean region

**kermes oak**  
*Quercus coccinea*  
Mediterranean region

**kermes oak**  
*Quercus coccinea*  
richly hilled areas of the Mediterranean region

**Chinese cork oak**  
*Quercus variabilis*  
temperate forests of east Asia

**Chisos red oak**  
*Quercus grisea*  
desert mountains of west Texas

**Turkish oak**  
*Quercus cerris*  
mountains of southern Europe and Asia Minor

All oaks and leaves are actual size

**What Do All Oaks Have in Common?**

- Oaks belong to the genus *Quercus* and the plant family Fagaceae, the beech family
- Oaks have acorns – nuts borne in a scaly cup
- Oaks have tasseled catkins (hanging male flowers) that release pollen in spring

Oaks rely on wind to carry pollen from the male flowers (shown here) to the female flowers, which are tiny and nondescript.

These are all different kinds of oaks. Can you find leaves and acorns that look like these in Shields Oak Grove?

**Peter J. Shields Oak Grove**

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