International Oaks

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Proceedings

8th International Oak Society Conference

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Cover illustration. Wendy Brockman (*Quercus palustris*).
Photos. p. 9: James MacEwen (Michael Heathcoat Amory); p. 10: Guy Sternberg (8th International Oak Society Conference participants); p. 11: Charles Snyers d'Attenhoven (*Quercus stellata*); p. 13: Béatrice Chassé (*Q.* ×*fernowii*).

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***Quercus aliena* (Chicago Botanic Garden).**

Documenting *Quercus* at the Chicago Botanic Garden

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The genus *Quercus* is one of the special collections of focus at the Chicago Botanic Garden. As a member of the multi-site *Quercus* collections of the North American Plant Collections Consortium of the American Public Gardens Association, documentation of all aspects of this collection is a priority.

The living collection currently consists of 184 accessions representing 64 taxa and 1,131 plants. An additional 8 taxa and 59 accessions are represented by images, herbarium and DNA vouchers of taxa not part of the living collection.

In an effort to support scientific studies of this collection, the Living Plant Documentation staff and volunteers at CBG collect, document and maintain accurate inventories, maps, labels, accession tags, herbarium vouchers, DNA vouchers, and digital images (of diagnostic characteristics) for each accession.

- Images of 11 different views for each accession are shared outside the Garden using an application called Smugmug that enables taxonomic experts to comment/annotate the images remotely.
- DNA vouchers are collected and stored to support requests from outside the institution.
- 3 herbarium vouchers are collected for both vegetative and reproductive features.
- Each specimen has a unique accession tag allowing for latitude and longitude coordinates to be captured with ESRI ArcGIS software.
- 4 staff and 85 volunteers support different aspects of this project.

(Boyce Tankersley is Director of Living Plant Documentation; Andrew Bunting is the Assistant Director of Chicago Botanic Garden and Director of Plant Collections; Andrew Bell is Woody Plant Curator.)

Quercus at Chicago Botanic G

Emily Russell, Frank Balestri, Veronica Harry-Jack
Chicago Botani

Introduction

The genus *Quercus* is one of the special collections of focus at the Chicago Botanic Garden. As a member of the multi-site *Quercus* collection of the North American Plant Collections Consortium, documentation and curation of this collection is a priority.

The living collection of *Quercus* currently consists of 184 accessions representing 63 taxa and 1,131 plants. There are 59 non-living accessions of images, herbarium and DNA vouchers that include eight taxa not currently part of the living collection. Also on the property are seven taxa of *Quercus* naturally occurring in the McDonald Woods, 100 acres of restored oak/hickory woodland.

All aspects of these accessions are carefully documented for the use of Garden staff, researchers at other institutions, and the general public. The condition of individual trees is monitored and maintained, and new threats such as climate change are analyzed for impacts. As a guardian of *Quercus* germplasm, emphasis is placed on acquisition and preservation of rare taxa.

Documentation

In an effort to support scientific studies of the *Quercus* collection, the Living Plant Documentation staff and volunteers at CBG maintain accurate inventories, maps, labels, accession tags, herbarium vouchers, DNA vouchers, and digital images of diagnostic characteristics for each accession.

- Images of 11 different views of each accession are shared outside the Garden using an application called Smugmug that enables taxonomic experts to annotate the images remotely (Fig. 1).

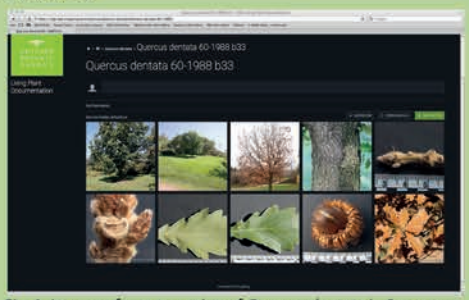


Fig. 1. Images of one accession of *Quercus dentata* in Smugmug

- DNA vouchers are collected and stored to support requests from outside the institution.
- Three herbarium vouchers are collected for both vegetative and reproductive features (Fig. 2). Images of herbarium vouchers are uploaded to www.sciencecollections.org.
- Each specimen has a unique identification number allowing its latitude and longitude coordinates to be captured on garden maps using ESRI ArcGIS software (Fig. 3).
- Photos, plant locations, and basic cultural information can be viewed on the PlantFinder app at www.chicagobotanic garden.org/plantcollections#plantfinder.
- A complete collections inventory is uploaded to Botanic Gardens Conservation International annually.

Fig. 2. Image of herbarium voucher of *Quercus alba*

- Four staff and 85 volunteers support different aspects of documentation.

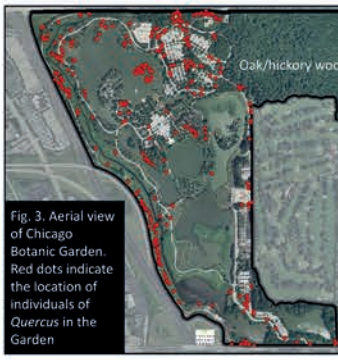


Fig. 3. Aerial view of Chicago Botanic Garden. Red dots indicate the location of individuals of *Quercus* in the Garden

63 Taxa of *Quercu*

Q. acerifolia	*Q. imbricaria*
Q. acutissima	*Q. lyrata*
Q. alba	*Q. macrocarp*
Q. aliena	*Q. macrocarp*
Q. aliena var. *acutiserrata*	*Q. macrocarp*
Q. arkansana	*Q. macrocarp*
Q. baronii	*Q. marilandic*
Q. bicolor	*Q. mongolica*
Q. bicolor 'Bonnie and Mike'	*Q. mongolica*
Q. bicolor 'JFS-KW18'	*Q. montana*
Q. bicolor × *robur* var. *procara*	*Q. muehlenbe*
Q. castaneifolia	*Q. palustris*
Q. cerris 'Variegata'	*Q. palustris* 'P
Q. coccinea	*Q. palustris* 'S
Q. dentata	*Q. palustris* ×
Q. dentata 'Pinnatifida'	*Q. petraea*
Q. ellipsoidalis	*Q. phellos*
Q. gambelii × *macrocarpa*	*Q. prinoides*
Q. glandulifera	*Q. prinus*
Q. glandulifera var. *brevipetiolata*	*Q. robur*
Q. iberica	*Q. robur* 'Fast

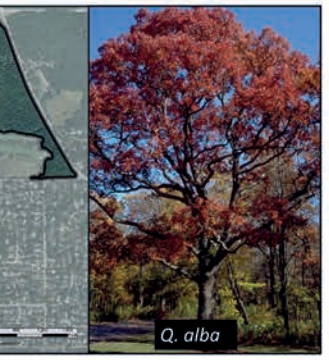
Plant conservation is a major focus at t
are five species of *Quercus* native to ea
Threatened Species (Fig. 5). The Garde
plants for *ex situ* conservation in the
Arboretum is planned for Fall 2015 in th

Future collection trips also targeting
Chicagoland area, Wabash Valley, Ozark

In addition to wild-collected germplasm
cultivars and commercially-available h
heritage, commerce, and culture, and
for street trees and urban plantings, a
landscape architecture.

rden: Documentation and Curation

, Dr. Andrew Bell, Boyce Tankersley, and Andrew Bunting
rden, Glencoe, IL 60022



Living Collection

	Q. robur 'JFS-KW2QX'
	Q. robur 'Purpurascens'
	Q. robur 'Purpurea'
color	*Q. robur* 'Variegata'
mbellii	*Q. robur* × *alba* 'JFS-KW1QX'
inus	*Q. robur* × *bicolor* 'Nadler'
	Q. rubra
	Q. serrata
aotungensis	*Q. shumardii*
	Q. shumardii var. *schneckii*
	Q. sp.
	Q. stellata
een'	*Q. stellata* × *alba*
ign'	*Q. variabilis*
	Q. velutina
	Q. virginiana
	Q. × *bimundorum* 'Crimschmidt'
	Q. × *f ernowii*
	Q. × *jackiana*
	Q. × *macdanielli* 'Clemons'
	Q. × *warei* 'Long'

Curatorial Practice and Research

The Curator of Woody Plants manages the development and preservation of the *Quercus* collection for display, research and education. A grant from the Institute of Museum and Library Services from 2011-2013 supported a curatorial review of the collection and new research into the potential effects of climate change on 52 taxa of trees.

Health assessments were conducted on all trees in the display gardens, noting pest, disease, environmental, cultural, and structural problems. Leaf scorch, chlorosis, and girdling roots were the most common problems noted among the *Quercus*. 18 oak trees were found to be in poor condition and of these, four accessions were propagated to preserve valuable germplasm.

Garden staff developed climate change models to aid in the management of the tree collection and to create an adaptive planting list for the City of Chicago. Projections were made with MaxEnt Species Distribution Modeling for the decades 2020, 2050, and 2080 using temperature and precipitation data from a high emissions scenario (Fig. 4).

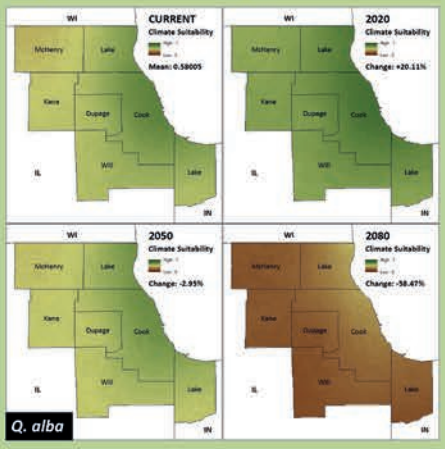


Fig. 4. Projections of climate suitability for *Quercus alba* in the Chicago region using temperature and precipitation data from A2 high emissions climate scenario

Quercus alba, *Q. bicolor*, *Q. imbricaria*, *Q. robur* 'Fastigiata', and *Q. rubra* were included in the climate change study. All five of these taxa retained 80% or more climate suitability in the Chicago region in the 2050s, and can be recommended for plantings with an expected lifespan of 35-60 years. However, none of these taxa retained 50% or more climate suitability for the decade 2080, a threshold used to recommend "legacy" plantings. More results of this study are available at www.chicagobotanic.org/plantinfo/tree_alternatives.

Future Acquisitions

hicago Botanic Garden. Targeted for acquisition
n North America that are on the IUCN Red List of
ill collect and propagate germplasm from these
rden. A joint collection trip with the Morton
utheastern United States.

ks native to North America will include the
d Daniel Boone National Forest.

e Garden collects and preserves
ds of *Quercus*. These plants are significant for
be used for breeding new selections, research
as a reference for students of horticulture and

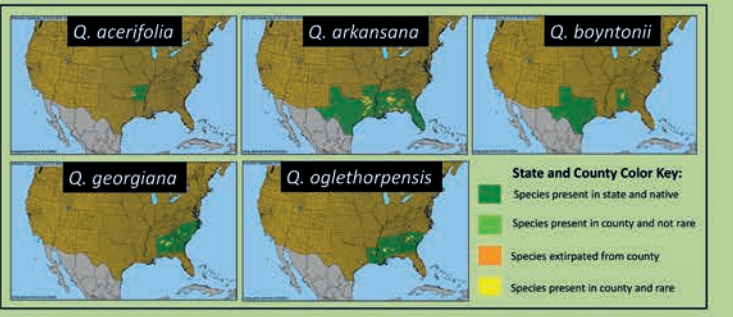


Fig. 5. County-level distribution maps of five species of *Quercus* of conservation concern native to eastern North America