

TEST YOUR oak wisdom

Lift the flaps to check your answers.

What do all oaks
have in common?



How many kinds of
oaks are there?



Where do oaks
grow in the wild?



How tall do
oaks get?



How long do
oaks live?



What are oak
apples?



Explore Shields Oak Grove to learn more about these amazing trees.

Peter J. Shields Oak Grove



Welcome to Shields Oak Grove



Special Collections, Shields Library

Shields Oak Grove is named for Judge Peter J. Shields, often called the father of the UC Davis campus. Judge Shields and his wife Carolee created a fund to provide support for the Arboretum's land along the waterway.



Debbie Aldridge

Dr. John M. Tucker was a professor of botany, director of the Arboretum (1965-66 and 1972-84), and a prominent oak researcher. Many of the oaks in Shields Oak Grove were started in the 1960s from acorns collected from around the world for his research.

Dr. Tucker created an endowment to help preserve the Grove for future generations. Contact the UC Davis Arboretum to learn more about supporting Shields Oak Grove and other giving opportunities.



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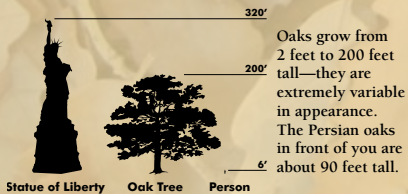
- Oaks are trees and shrubs that belong to the genus *Quercus*, meaning “fine tree”
- Oaks have acorns—nuts that grow in a scaly cup
- Oaks have tassel-like hanging flowers; their pollen is distributed by the wind



- There are approximately 500 species of oak trees and shrubs in the world
- The UC Davis Arboretum collection includes about 100 species, varieties, and hybrids



Oaks are native to the Northern Hemisphere, from the cold northern latitudes to tropical Southeast Asia and Central America. Shields Oak Grove features oaks from around the world.



Oaks grow from 2 feet to 200 feet tall—they are extremely variable in appearance. The Persian oaks in front of you are about 90 feet tall.



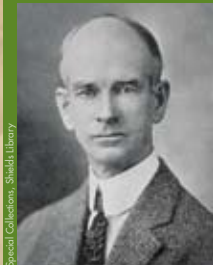
- 400 years—oldest native valley oak (*Quercus lobata*) in the Arboretum
- 1,500 years—oldest English oaks (*Quercus robur*)—This 1,000 year old tree grows in Sherwood Forest
- 13,000 years—shrub oak (*Quercus palmeri*) in Riverside County, California



An oak apple, or gall, is not a fruit at all. When a tiny wasp injects its egg into an oak twig, the tree forms a growth of plant tissue, called a gall, around the egg. The gall provides food and protection for the wasp larva as it matures and eats its way out—look for the tiny exit hole.



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WHAT DO oaks look like?

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

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

bur oak
Quercus macrocarpa
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



netleaf oak
Quercus rugosa
mountains of Mexico



Chisos red oak
Quercus gravesii
desert mountains of west Texas

Chinese cork oak
Quercus variabilis
temperate forests of east Asia



Turkish oak
Quercus cerris
mountains of southern Europe and Asia Minor



coast live oak
Quercus agrifolia
coastal hills of California



gray oak
Quercus grisea
southwest U.S. and Mexico



oak of Tabor
Quercus ithaburensis
eastern Mediterranean region



kermes oak
Quercus coccifera
Mediterranean region

kermes oak
Quercus coccifera
rocky hillsides of the Mediterranean region

coast live oak
Quercus agrifolia
coastal hills of California

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 tassel-like 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.

All photos were taken by Allan Jones

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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IF THIS tree COULD TALK

Growing up in a living museum of plants



Noah's Ark for Oaks?

As a member of the **North American Plant Collections Consortium (NAPCC) Multisite Oak Collection**, we, along with a growing list of other public gardens, have committed to maintain our oak collection at the highest horticultural and museum standards to ensure its long-term preservation for research, teaching, and conservation.

Although large, the Arboretum's collection includes only 14% of the 500 oak species that occur worldwide. Oaks come from a broad range of climate and soil conditions, and no single garden can grow every kind of oak. By partnering with gardens from different climate zones across North America, together we can preserve more oak species, hybrids, and horticultural varieties than any of us could on our own.



Members of the NAPCC Multisite Oak Collection (as of 2010)

- Chicago Botanic Garden, Glencoe, IL
- Cornell Plantations, Ithaca, NY
- Denver Botanic Gardens, Denver, CO
- Donald E. Davis Arboretum, Auburn, AL
- Holden Arboretum, Kirtland, OH
- Landis Arboretum, Esperance, NY
- Missouri Botanical Garden, Saint Louis, MO
- Morris Arboretum of the University of Pennsylvania, Philadelphia, PA
- The Morton Arboretum, Lisle, IL
- Mount Auburn Cemetery, Cambridge, MA
- New York Botanic Garden, Bronx, NY
- Rancho Santa Ana Botanic Garden, Claremont, CA
- Scott Arboretum of Swarthmore College, Swarthmore, PA
- Starhill Forest Arboretum, Petersburg, IL
- UC Davis Arboretum, Davis, CA
- The University of California Botanic Garden, Berkeley, CA
- University of Washington Botanic Gardens, Seattle, WA

Are Oaks Threatened?

In California and worldwide, many oak species are threatened with extinction by urbanization, clearing for agriculture, livestock grazing, overharvesting, and global climate change. A recent global study of oaks found 29 species to be critically endangered or endangered and 27 more species to be vulnerable. In Shields Oak Grove, Santa Cruz Island oak (*Quercus parvula*) and Brandege oak (*Quercus brandegeei*) from Baja California are both considered endangered.

2009 Age 46 – Sampled and Pressed

Arboretum volunteers collected and pressed samples of my stems to add to the UC Davis Herbarium (a collection of pressed plant samples), so researchers can study me and make sure I'm properly identified.



Emily Griswold

2007 Age 44 – A Great Honor

The Arboretum oak collection was inducted into the North American Plant Collections Consortium. I'm now part of an important national collection!



Down Spinella

2006 Age 43 – On the Map

Student mappers determined my GPS location and added me to a new digital map. Researchers can now find me on a map on the Arboretum website.



2003 Age 40 – Health Check-up

I get periodic health checks from an arborist, or tree doctor. In 2003, my health was rated as good.



Emily Griswold

1999 Age 36 – A New Label

I got a new label that helps visitors identify me and learn where my species grows in the wild.



1983 Age 20– Becoming a Mature Tree

Around this time I started flowering every spring and making acorns every fall. UC Davis classes started to come here to study me and the other oaks.



Allan Jones

1970s The Sapling Years

Age 2 – Planting

I was so small when the gardener planted me here from my nursery pot that I had to be hand-watered and protected from rabbits with a wire cage.



1965

1963

Joining the Scientific Collection

The curator gave my acorn an accession number (A63.0009) to track my life and times in the Arboretum.



Allan Jones

My Wild Origins

A UC Davis student collected my acorn in west Texas while working for botany professor John Tucker.



Emily Griswold

start here



Peter J. Shields Oak Grove

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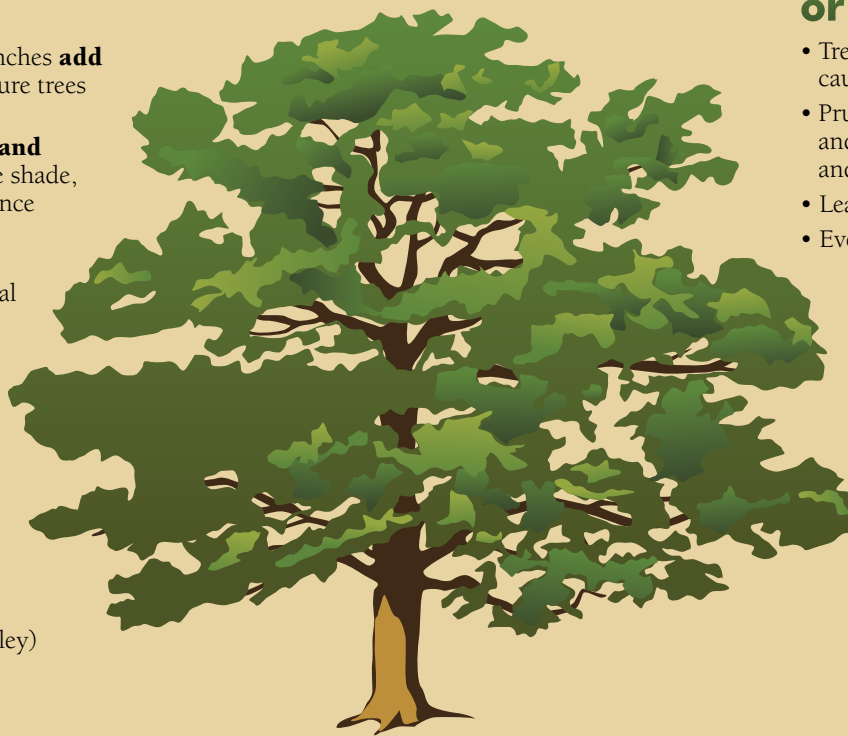
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SHOULD I GROW AN oak?

You decide. Many oaks thrive in hot Central Valley summers, but some are too big for urban gardens.

To grow...

- Picturesque spreading branches **add beauty** to the garden; mature trees increase property values
- Many oaks are **long lived and drought tolerant**, provide shade, and require little maintenance
- Contrary to popular belief, many oak species **grow rapidly** and tolerate normal garden irrigation
- Oaks **support native wildlife** like jays, squirrels, insects, and songbirds
- Some oaks, like valley oak, are resistant to Sudden Oak Death, a disease that is epidemic in coastal northern California (not currently a problem in the Central Valley)



or not to grow?

- Trees that are **too big** for the site can cause problems for home gardeners
- Pruning large trees can be expensive, and spreading roots can lift sidewalks and damage foundations
- Leaf litter and acorns **can be messy**
- Evergreen oaks **create deep shade** that makes it hard to grow other plants
 - **Native oaks and lawns are not compatible**—frequent irrigation can cause fungal diseases in some oaks
- Deep-rooted seedlings can be a challenge to weed
 - Some oaks, like coast live oak, are susceptible to Sudden Oak Death disease in coastal regions (not currently a problem in the Central Valley)



Recommended Oaks for the Central Valley



VALLEY OAK

Quercus lobata
Mighty deciduous oak of the Central Valley is upright and fast-growing when young. It grows to 50-70 ft. tall with a spreading crown as it matures. Tolerates moderate irrigation, heat, and alkaline soils and is immune to Sudden Oak Death.

ENGLISH OAK

Quercus robur
Fairly fast-growing deciduous tree to 50-60 ft. tall with a wide open canopy. There are also upright forms with narrow canopies. Tolerates occasional frequent watering. Immune to Sudden Oak Death.



SOUTHERN LIVE OAK *Quercus virginiana*
Picturesque evergreen oak of the South, with wide, open canopy of glossy leaves. Grows moderately fast to 40 ft. tall and wide. Tolerates irrigation or dry conditions. Immune to Sudden Oak Death.

GAMBEL OAK

Quercus gambelii
Small, rugged oak to 30 ft. tall, deciduous, adaptable to many soil types and moisture levels. Fast grower on rich soil. Can be multi-trunked. Immune to Sudden Oak Death.



All sidebar photos: Emily Griswold

Peter J. Shields Oak Grove



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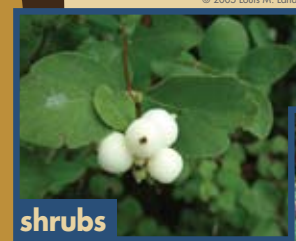
WHAT CAN I PLANT UNDER oaks?

If your oak is native to a region that is dry in summer, like California or the Mediterranean basin, you need **plants that like dry shade.**

Because over-watering can harm mature native oaks, plants grown under these oaks need to thrive with low summer water. Many California native plants are good oak partners because they can grow well with deep watering once or twice a month.



Try these oak partners:



shrubs

Snowberry
(*Symphoricarpos albus*
var. *laevigatus*)

© 2005 Louis M. Landry



perennials

Emily Griswold

Visit the Arboretum website (arboretum.ucdavis.edu) for more information on these and other local favorites.

Canyon snow Pacific iris (*Iris douglasiana*)



Ellen Zagory

California fescue (*Festuca californica*)



grasses

Ellen Zagory



Deergrass
(*Muhlenbergia rigens*)

Nikhil Joshi



Why is over-watering bad for California native oak trees?

Diseases such as oak root fungus, caused by *Armillaria* fungus, and root rot, caused by *Phytophthora* water molds, are encouraged by summer watering and can kill mature trees.



Jack Kelly Clark

Armillaria mushrooms at the base of an infected tree



Jack Kelly Clark

Armillaria fungus under the bark of an infected tree

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A single western scrub-jay can harvest up to 7,000 ripe acorns in the fall in California.

jays: ACCIDENTAL GARDENERS

Jays “plant” oak trees by stashing their acorns underground.

The jay carries the acorns away and buries them one at a time.

Covering the acorns with leaves or pebbles helps hide them from other jays and acorn thieves like squirrels.

The jay can remember where the acorns are “planted” for up to eight months and will dig them up to eat later in the year.

Any leftover acorns can start to grow into new oak trees.



FALL

WINTER

SPRING

UC DAVIS
ARBORETUM

Peter J. Shields Oak Grove



Global “Gardeners”

Jays “plant” oaks all around the world. In fact, jays live wherever oaks grow. By burying acorns, many species of jays have helped oaks spread across North America, Europe, and Asia.

© Neal Kramer



The WESTERN SCRUB-JAY “plants” valley oak (*Quercus lobata*) acorns here in Davis.



The GREEN JAY “plants” netleaf oak (*Quercus rugosa*) acorns in Mexico.

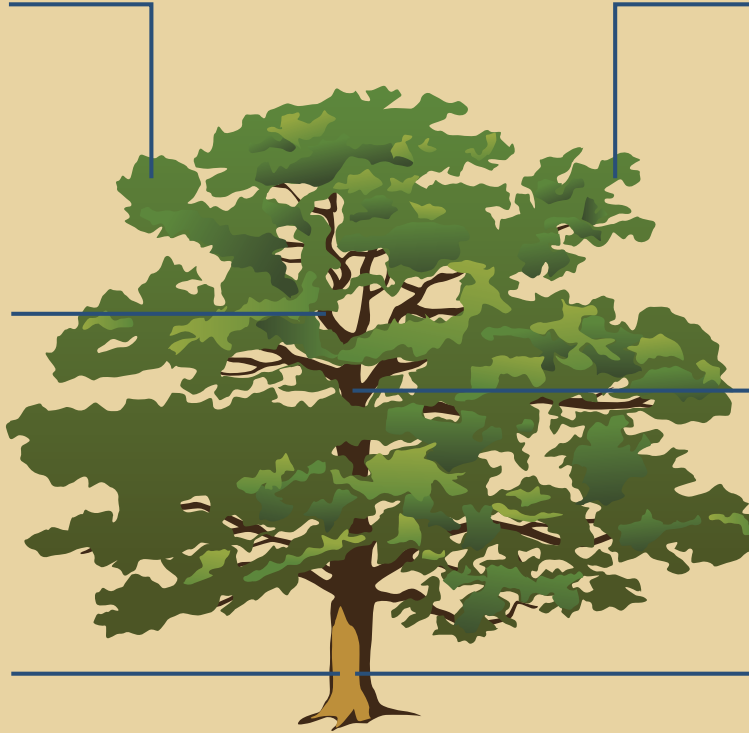
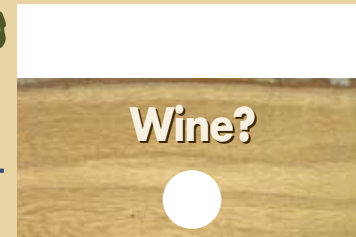
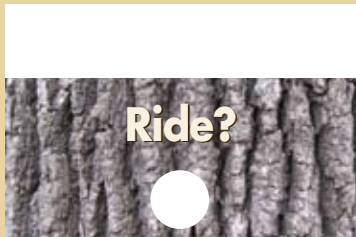
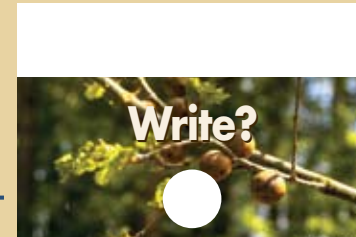
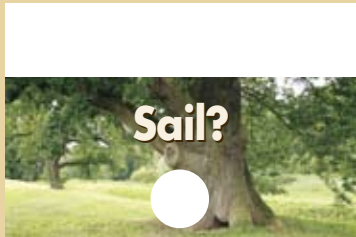
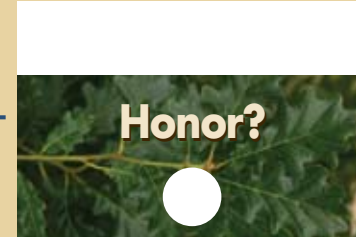
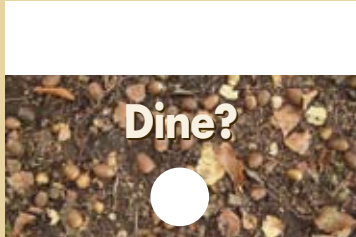


The EURASIAN JAY “plants” Persian oak (*Quercus castaneifolia*) acorns in the Caucasus Mountains of Eurasia.

Wine, Dine, Write, Ride

This English Oak Does it All!

Lift and learn how different parts of the English oak have been used throughout the ages.



Quercus robur, English Oak



ENGLISH OAK

Quercus robur



Distribution of English oak, *Quercus robur*. Also called le chêne pédonculé (French), die Stieleiche (German), kocányos tölgy (Hungarian), el roble (Spanish), sommereik (Norwegian), la farnia (Italian), ficheiro (Portuguese), stejard (Romanian), tammi (Finnish), dosya (Turkish), zomereik (Dutch), and dub letni (Czech).

- English oak is native to Europe, Asia Minor, the Caucasus, and parts of North Africa
- Trees may live up to 1,500 years
- Reaches 50–70 feet tall with a trunk diameter of 12 feet

Cultural Importance

- Oaks were sacred to Norse, Celtic, Slavic, Teutonic and Greek peoples
- English oak's ancient Celtic name Duir means door—the tree was considered a threshold to other dimensions
- Druids built sacred circles of stones under spreading oaks or in oak groves



Carrigogulla stone circle and oaks, County Cork, Ireland

- In Bronze-Age Europe, oaks were associated with gods of thunder and lightning. Hercules called up thunderstorms by rattling an oak club in a hollow oak. The English still say, "Beware of an oak, it draws the stroke."



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Lift and learn how different parts of the English oak have been used throughout the ages.



People have pastured pigs and other livestock in English oak woodlands to feed on acorns for thousands of years. Iberian ham from Spain, Alentejo ham from Portugal, and Westphalian ham from Germany are all produced from pigs fed on acorns.



Wood from the trunk and branches of English oak has been prized as a shipbuilding material over the centuries for its strength and flexibility. Viking ships, the great ocean-going vessels of the early middle ages, were built of the wood of English oak trees.



The tannic acid found in oak bark was the original substance used to tan (preserve) leather, such as that used to make saddles.

English oak leaves have been used as symbols of courage, strength, and honor in many cultures. The oak leaf wreath shown here came from a burial site in the Dardanelles (modern Turkey) from the 4th Century BC.



Ink made from oak galls (round growths caused by insects) was the standard writing and drawing ink in England and the rest of Europe from about the 12th century to the 19th century, and remained in use well into the 20th century.



English oak wood has been used to make wine barrels for centuries for its water-tight properties. Aging wine in oak barrels can affect its flavor, color and texture.



ENGLISH OAK *Quercus robur*



Distribution of English oak, *Quercus robur*. Also called le chêne pédonculé (French), die Stieleiche (German), kocsányos tölgy (Hungarian), el roble (Spanish), sommereik (Norwegian), la farnia (Italian), facheiro (Portuguese), stejard (Romanian), tammi (Finnish), dosya (Turkish), zomereik (Dutch), and dub letní (Czech).

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Quercus robur, English Oak

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