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**35. Propagating the oaks of the Interior West.** Skogerboe, S. American Nurseryman  
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Various oaks native to the Interior West are propagated and grown at Fort Collins Wholesale Nursery in north central Colorado.

Most of us know the adage, “If we want something done right, we have to do it ourselves.” Propagating the native oaks of the interior portion of the American West is a perfect example of this old saying. As with many regionally important plant species, it is often difficult — and sometimes impossible — to find these oaks in the nursery trade. We cannot easily open up the nursery catalogs on our desks and order these plants, so if we want them, we have to grow them ourselves.

At Fort Collins Wholesale Nursery, located in north central Colorado, we grow many of our region's native oaks because our conditions are vastly different than in much of the rest of the country: Our precipitation rate is only 14 inches per year. Our mineral soils are thin and lacking in organic matter, and the pH is very alkaline, oftentimes greater than 8. Our springs and falls are unsettled: Spring freezes can drop temperatures into the teens in late May, and in the fall, I've experienced the first frost come as an arctic blast with 5 below zero temperatures.

Our native oaks have evolved in these inhospitable conditions, and they can take what nature throws at them. For us, they can be nearly cast iron. The oaks we grow include *Quercus gambelii* (Gambel oak); *Q. turbinella* (desert live oak, shrub live oak); *Q. × mazei* (Colorado Foothills oak); *Q. undulata* (wavyleaf oak); and for experimentation, *Q. oblongifolia* (Mexican blue oak). *Q. gambelii*, *Q. × mazei* and *Q. undulata* are field-grown, as well as in No. 2 and No. 5 containers. We grow a few

*Q. oblongifolia*, mostly to use as trade bait to pry away the other plant treasures of fellow plant nerds.

Gambel oak is a large shrub or small tree that forms colonies by suckering. The pure species grows from 12 to 20 feet with an equal spread. It has glossy, dark green foliage, and the autumn color is predominantly yellow with occasional trees showing oranges and reds. It is often found in large groves that can cover an entire mountainside at elevations up to 8,000 feet in Colorado.

Desert live oak is a broad-leaved evergreen with small, 1-inch-long, bluish green leaves with sharp points at the tips of each lobe. The foliage greatly resembles a holly. It forms a large, rounded shrub — approximately 10 feet tall and wide — and thrives in hot, dry conditions on the sides of hills and mountains. The acorns are sweet when eaten, evidently not being high in the bitter tannins found in the majority of our North American oaks.

Colorado Foothills oak is also known as the tree-form Gambel oak. It resem-

bles the Gambel oak in leaf and acorn, but inherited the single trunk and size of its long-ago *Q. macrocarpa* (bur oak) parentage. It grows to 35 feet tall and 25 feet wide.

Wavyleaf oak is by far the most variable oak I have ever encountered. Because it has so many different species in its lineage, it can range from being only a couple of feet to 25 feet tall. Its foliage can be green to gray to blue; it can be lobed or its margins can be entire. I've seen glossy leaves on one plant and noticed pubescent leaves on its neighbor. It is truly the lovable mutt of the American oaks. But as a general rule, the average size of these hybrids is about 10 feet tall and wide, the leaves are about 2 inches long, and the margins are slightly lobed and undulating.

Mexican blue oak is a true aristocrat of the oaks of the American Southwest. This beautiful, single-trunked tree is captivating in the wild. To see one is to want one. It grows to 25 feet tall with an equal spread. The 2-inch-long, pubescent leaves



# Propagating the Oaks of the Interior West



*Western native oaks are beautiful and tough, but they're not often found in the trade. Propagation from wild sources, however, can add these gems to your inventory and to the naturalized landscape.*

by SCOTT SKOGERBOE

are bluish and — true to its species name — really are oblong.

In order to grow these oaks, follow these steps.

### Step 1. Locate these plants in the wild.

In my experience, collecting from the wild is the best way to ensure better species purity. It would be easier for me to travel down to the Denver Botanic Gardens and collect most of these oaks from their accessions, but because all the oaks in their collection are growing side by side, there is no telling how hybridized the seedlings would be — oaks are notoriously promiscuous.

I've combed the Interior West to locate the best stands of native oaks to provide reliable sources of healthy acorns. For tips on locating specific oaks in the Interior West, see the sidebar, "Acorn hunting," page 18.

### Step 2. Collection tips.

One thing I have learned during my career is to know when the acorn is ripe enough to pick. Conventional wisdom tells us to wait until the acorn turns brown and falls off the tree.

With our western oaks, however, this is oftentimes a big mistake because every last, brown acorn on the ground is eaten by hungry nocturnal wildlife. So I have learned to pick the acorns green off the plant. The trick is to know when the acorns are ready. One rule of thumb is: If you no-

tice a few acorns turning brown, then the rest of the crop is fine to collect. Keep collection records to estimate when the acorn crop will be ready from year to year.

Keep in mind that wild-collected acorns are, more often than not, heavily infested with weevil larvae that need to be controlled or your crop will be devoured by these ravenous insects. I place no-pest strips — along with the acorns — in a sealed, plastic box for several days to kill the weevils.

But the most important step to remember is oak acorns are recalcitrant, which means they are perishable. If allowed to dry out for longer than a few days, the acorn dies. During my collection trips, I place them in paper sacks and store the sacks out of the direct sun. As soon as I return home, I prepare the seed in plastic bags with dry vermiculite and store them in my refrigerator. I use dry vermiculite because green acorns are full of moisture; as the moisture escapes the seed, it dampens the vermiculite media and protects the seed from desiccation.

### Step 3. Planting tips.

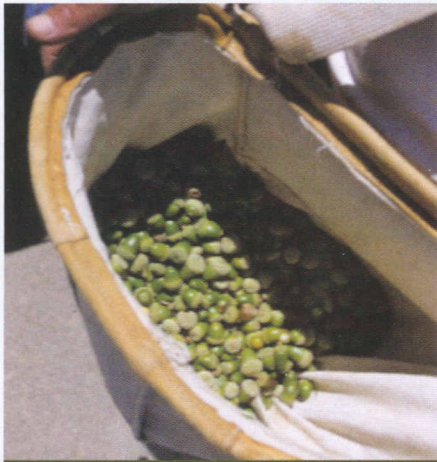
Most of the oaks of the Interior West germinate in the fall. They send down the root radicle sometimes within days of collection and



The addition of ectomycorrhizae to the root zone of sprouting oaks helps to ensure healthy growth. Here, the fruiting body of mycorrhizal fungi *Laccaria laccata* grows on bur oak.

Acorns often are infested with weevil larvae, so the placement of a no-pest strip among freshly gathered seed helps to kill the ravenous insects.





Conventional wisdom holds that acorns should be gathered once they've turned brown. With oaks of the Interior West, however, it's best to harvest them directly from the tree before local wildlife has a chance to devour them.

should be planted right away. If I notice a germinated acorn has an exit hole from a weevil, I throw it away because chances are it will not survive. I plant each in a 2- by 2- by 5½-inch bottomless tree band made by Anderson Die & Manufacturing Inc., Portland, OR, and place each completed flat in a minimally heated greenhouse. We set our thermostats to 15°, so as to protect our plants from extreme, root-killing low temperatures.

Most of the germinated acorns spend the winter dormant and do not send up their shoots until the following spring. We store such acorns — like those of *Q. × mazei* — in alternating layers of moist vermiculite and seed in 5-gallon buckets with drainage holes cut into the bottom. Each bucket is labeled and kept in an underground root cellar, which maintains an even temperature of 36° to 40° throughout the winter. Acorns are checked every month for signs of root radicle emergence, and we plant them accordingly.

We have learned that it is best to plant two to three times as many acorns as your target number. Oaks tend to have quite a few runts, which will take years of extra growing in the field before they amount to something salable. In the long run, it is better to grow more than you need, cull the little guys and replace them with vigorous plants.

**Step 4. Growing tips.** Probably the most important step I take to ensure the ultimate health of my oak seedlings is to add ectomycorrhizae to the root zone. By using this symbiotic organism, I grow healthier  
(Continued on page 20)



Wavyleaf oak (*Quercus undulata*) propagated from acorns collected near Kenton, OK, is grafted onto *Q. × mazei* rootstock.



*Quercus oblongifolia* (Mexican blue oak) can be found at the foot of Sunset Peak in the Capitan Mountains of New Mexico, near the site of an alleged alien crash landing.

# Acorn Hunting

I have had the honor of developing a friendship with Dr. Allan Taylor, a retired professor from the University of Colorado, Boulder. Although he was in the department of linguistics,

he is an expert on the woody plants of the Rocky Mountains and has spent a lifetime exploring our region. Dr. Taylor took me under his wing and showed me his favorite stomping grounds. Here are some of the places to look for these oaks.

***Quercus gambelii*.** The Gambel oak is the most abundant of our native oaks and is famous for its ability to form colonies by suckering, providing protective habitat to small animals against predation. It has an abundant acorn crop, which is an important food source for many animals, including our native black bears that gorge themselves each fall in preparation for winter hibernation. Readily found throughout the Interior West at higher elevations, it is especially prevalent along the Front Range of Colorado from Douglas County southward into New Mexico, where I collect acorns in the third week of August.

***Q. undulata*.** The wavyleaf oak is a very interesting plant: Because of its wide range in size and leaf characteristics, it has long been thought to be not a true species, but a hybrid complex of the oaks found in our region. Included in the lineage of this complex are: *Q. gambelii* (which is considered the common denominator); *Q. arizonica* (Arizona white oak); *Q. turbinella* (desert live oak); *Q. havardii* (Havard oak, shinnery oak); *Q. muehlenbergii* (chinkapin oak); *Q. mohriana* (Mohr oak); and *Q. grisea* (gray oak).

I have found this oak as far north as Phantom Canyon near Florence, CO, but this ecotype is dominated by the Gambel oak, and about one-half of the seedlings grown from this population are nearly indistinguishable from pure *Q. gambelii*. I personally prefer the strain dominated by the other species in the complex, particularly *Q. grisea* and *Q. havardii*, as the seedlings grown from this strain have bluish foliage. This oak is fairly plentiful on the south side of the various mesas from Folsom, NM, east to the Black Mesa near Kenton, OK.

Although the acorn ripening date fluctuates with the yearly heat units, Aug. 10 is a good starting point to plan your collecting expedition.

***Q. turbinella***. The desert live oak is a broad-leaved evergreen and in Colorado is extremely rare, having hybridized itself in our state to the verge of extinction by crossing with *Q. gambelii* and *Q. undulata*. A more than 100-year-old herbarium record at the University of Colorado shows it was once found in Phantom Canyon. Dr. Taylor and I have discovered only a single specimen still alive, and the oak progeny surrounding it are now distinctly hybridized with the Gambel oak plentiful in the canyon.

Another single specimen was found in Montrose County, CO, along the Dolores River. A good place to collect this oak is west of Socorro, NM, in the lower elevations of the Magdalena Mountains. An additional favorite locale is near an old mining camp called Silver Reef north of St. George, UT.

Acorns start to ripen in the last week of July with some specimens ripening around the second week of August.

***Q. x mazei***. The Colorado Foothills oak is perhaps my favorite native tree. This tree is often referred to as the tree-form Gambel oak. However, botanist Dr. Jack Maze, after whom this hybrid is named, points to introgression between *Q. macrocarpa* and *Q. gambelii* in two separate locations. The first is in northeastern New Mexico, where the *Q. macrocarpa* reached west into the native stands of the Gambel oak during the ice age of the Pleistocene; the second is in the Black Hills of western South Dakota and adjacent Wyoming, where the Gambel oak reached north into the western range of the bur oak just after the glaciers retreated. I have visited both populations and, based on leaf and acorn morphology, I believe Dr. Maze to be correct.

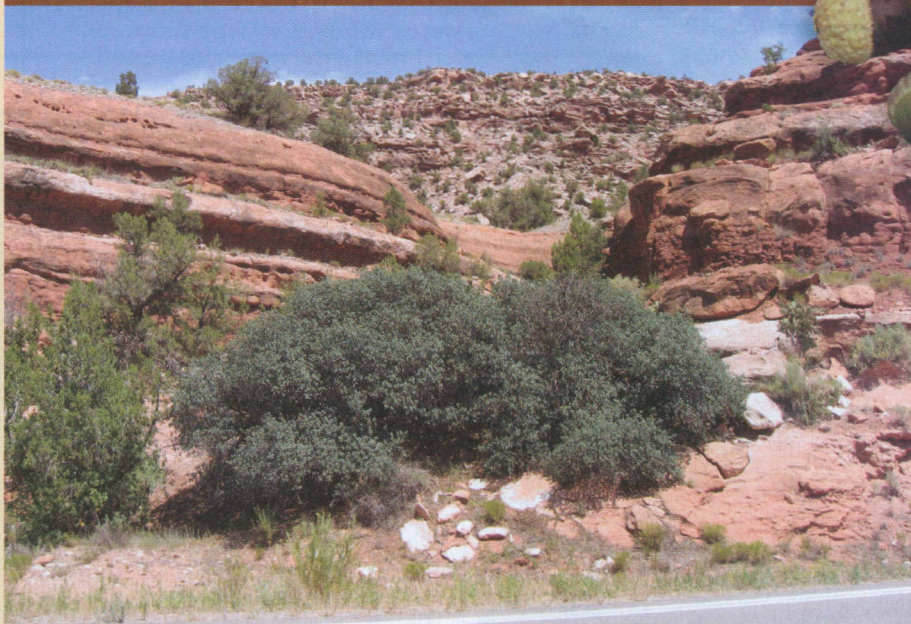
In southern Colorado, an excellent stand of *Q. x mazei* can be found north of the town of Walsenburg, along Apache Creek, east of Greenhorn Mountain. Another great collecting site is in Cottonwood Canyon, which is located along the border of Baca and Las Animas counties in southeastern Colorado. In Wyoming, an easy place to collect acorns of this hybrid is around the KOA campground at the base of the Devils Tower in Crook County.

Collect acorns green off the tree in the last half of August.

***Q. oblongifolia***. The Mexican blue oak is



The author's wife, Dianne Skogerboe, collects acorns of *Quercus turbinella* near the Magdalena Mountains in New Mexico.



Extremely rare in Colorado, a single specimen of *Quercus turbinella* was located in Montrose County along the Dolores River.

a beautiful, broad-leaved evergreen oak of the southwestern states of Arizona, New Mexico and western Texas, and is also found in the Mexican frontier states from Coahuila west to Baja California. A disjunct population that was brought to my attention is found on the eastern flank of the Capitan Mountains between the small towns of Tinnie north to Arabella, NM.

I was told of these trees by Michael Melendrez, who is a nurseryman in Los Lunas, NM, and an expert on the oaks of this state.

Mr. Melendrez informed me that, historically, this area had experienced cold temperatures as low as  $-40^{\circ}$ . Judging on where this oak grows naturally, it should not survive the winters in my Zone 5 area of Colorado, but I have been growing three specimens from this population for the past seven years without so much as a centimeter of tip dieback. These oaks, however, fail to stay evergreen through the winters.

Collection time for this oak is the first week in August.



# Hit Pay Dirt!

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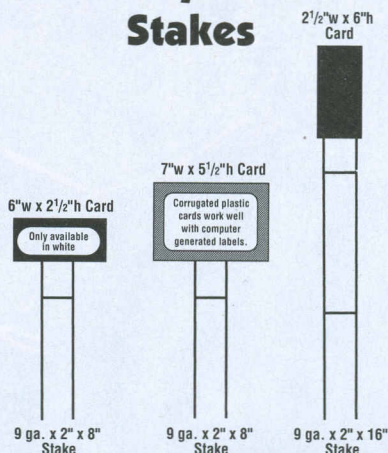
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plants, use less fertilizer and have next to zero problems with damping-off fungus, which in turn eliminates the use of potentially harmful fungicides in my greenhouses. I use a liquid mycorrhizae blend of several different fungi known to colonize the genus *Quercus*, which I purchase from Mycorrhizal Applications Inc., Grants Pass, OR. This liquid contains several mycorrhizal fungi known to colonize the roots of the genus *Quercus*. The fungus that has been the most successful in my oaks is *Laccaria laccata*. Each September, the media in my oak pots contain a multitude of the fruiting bodies of this fungus.

One word of caution: Be careful with overfertilizing plants grown with mycorrhizae, as too much phosphorus can be detrimental to the health of these fungi.

Another important step I recommend is to space the seedlings once they reach about 6 inches in height during the first growing season. I sort by size, throw out the dead and the runts, and place an empty pot between each seedling to improve airflow and light penetration to each leaf.

We grow each oak for an entire year in its first 2-inch root-making container, then transplant it to a 4-inch root-pruning container for another year. The third year we shift it up into a No. 2 pot. With each transplant step, we perform manual root pruning to eliminate circling roots. Some of the No. 2 plants are sold in open inventory; some are shifted into No. 5 containers for a fourth growing season; and the remainder are planted in the field where they grow for an additional four to five years. We sell these field trees by height, and they range from 4 to 8 feet at harvest.

The oaks of the Interior West are beautiful, tough and are of great value to our native wildlife. They deserve a prominent spot in our Western landscape from Boise to El Paso, from Flagstaff to Billings and every place in between. There is an opportunity here, as right now they are vastly underutilized, so if we want them, we have to grow them ourselves.

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