

Propagating the Oaks of the Interior West®

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INTRODUCTION

Most of us know the old 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 just open up the nursery catalogs on our desks and order these plants, so if we want them, we have to grow them ourselves.

At our Nursery, located in north central Colorado, we grow many of our regions native oaks because our conditions are vastly different than in much of the rest of the country. We start with having a precipitation rate of only 14 in. per year. Our mineral soils are thin and lacking in organic matter and the pH is very alkaline, often times greater than 8. Our springs and falls are very unsettled, as we can have spring freezes into the teens in late May, and in the fall, I’ve experienced the first frost come as an arctic blast blowing in with -5 °F temperatures. Our native oaks have evolved in these inhospitable conditions, and can take what nature throws at them. For us, they can be nearly cast iron.

The oaks we grow include *Quercus gambelii*, the Gambel oak; *Q. turbinella*, the desert live oak; *Q. ×mazei*, the Colorado foothills oak; *Q. oblongifolia*, the Mexican blue oak; and *Q. undulate*, the wavyleaf oak. In order to grow these oaks follow these steps.

PROPAGATION AND PRODUCTION

Step 1. Locate These Plants in the Wild. In my experience, collecting from the wild is the best way to insure better species purity. It would be easier for me to travel down to the Denver Botanic Garden and collect most of these oaks off their accessions, but since all the oaks in their collection are growing side by side, there is no telling how hybridized the seedlings would be as oaks are notoriously promiscuous. I have had the honor of developing a friendship with Dr. Allan Taylor, a retired professor from the University of Colorado. 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. Generally speaking, here are some of the places to look for these oaks.

***Quercus gambelii*.** The Gamble 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, an important food source for many animals including our native black bear that gorge themselves each fall in preparation for winter hibernation. It is readily found throughout the interior west at higher elevations. Especially prevalent along the Front Range of Colorado from Douglas County southward and into New Mexico where I collect acorns in the third week of August.

***Quercus undulate*.** The wavyleaf oak is a very interesting oak which because of its wide range in size, and leaf characteristics has long been thought to be, not a true species, but a hybrid complex of the oaks found in our region (Tucker, 1961). Included in the parental lineage of this complex are; *Q. gambelii*, (which is considered the common denominator) *Q. arizonica*, *Q. turbinella*, *Q. havardii*, *Q. muhlenbergii*, *Q. mohriana*, and *Q. grisea*. I have found this oak as far north in Phantom Canyon, near Florence, Colorado, but this ecotype is dominated by the Gamble Oak, and about 1/2 of the seedlings grown from this population are undistinguishable with 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. To find this ecotype, they are fairly plentiful on the south side of the various Mesa's from Folsom, New Mexico, east to the Black Mesa near Kenton, Oklahoma. Although the acorn ripening date fluctuates with the yearly heat units, a good starting place to plan your collecting expedition is for the 10th of August.

***Quercus turbinella*.** The desert live oak is a broadleaf evergreen oak 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*. An over 100-year-old herbarium record at the University of Colorado shows it was once found in Phantom Canyon near Florence, Colorado. Subsequent exploration by Dr. Taylor and myself have discovered only a single specimen still alive, and the oak progeny surrounding it are now distinctly hybridized with the Gamble oak plentiful in the canyon. Another single specimen was found in Montrose County, Colorado, along the Delores River. A good place to collect this oak is west of Socorro, New Mexico, in the lower elevations of the Magdalena Mountains. Another favorite local is near an old mining camp called Silver Reef north of St. George, Utah. Acorns start to ripen in the last week of July with some specimens ripening in around the 2nd week of August.

***Quercus ×mazei*.** The Colorado foothills oak is perhaps my favorite native tree. This tree is often referred to as the tree form Gamble Oak. However, Dr. Jack Maze, a botanist at the University of Toronto points to introgression between *Q. macrocarpa* and *Q. gambelii*, in two separate locations (Maze, 1968). The first in northeastern New Mexico where the bur oak reached westerly into the native stands of the Gamble oak during the ice age of the Pleistocene and the second in the Black Hills of western South Dakota and adjacent Wyoming where the Gamble 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; believe Dr. Maze to be correct. In southern Colorado, an excellent stand of *Q. ×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 southeast Colorado. In Wyoming, the easiest 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.

***Quercus oblongifolia*.** The Mexican blue oak is a beautiful broadleaf evergreen oak of the Southwestern states of Arizona, New Mexico, and West Texas, and is also found in the Mexican frontier states from Coahuila west to Baja California. A population which was brought to my attention is a disjunct population on the

eastern flank of the Capitan Mountains between the small towns of Tinnie north to Arabella, New Mexico. I was told of these trees by Michael Melendrez who is a Nurseryman in Los Lunas, New Mexico, and an expert on the oaks of New Mexico. Mr. Melendrez informed me that historically this area had experienced cold temperatures as low as 40 °F below. Although this oak, judging on where it grows naturally, should not survive the winters in my Zone 5 area of Colorado, I have been growing three specimens from this population without so much as a centimeter of tip dieback for the last 7 years. These oaks however, fail to stay evergreen throughout the winters. Collection time for this oak is the first week in August.

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. However, with our western oaks, this is often times a big mistake, because every last brown acorn on the ground is eaten at night by hungry nocturnal wildlife. 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 to keep in mind is if you notice a few acorns turning brown, then the rest of the crop is fine to collect. Keep collection records to know when the acorn crop is ready year to year.

Another thing not to overlook is wild collected acorns are, more often than not, heavily infested with weevil larvae which need to be controlled or your crop will be devoured by these hungry insects. I use a no-pest strip which I place with my 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 collect into paper sacks, and store the sacks out of the direct sun. As soon as I return home I prepare the seeds in plastic bags with dry vermiculite and store them in my refrigerator. I use dry vermiculite as green acorns are full of moisture and as it escapes the seed, it moistens 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 radical sometimes within days of collection, and should be planted right away. If I notice a germinated acorn has an exit hole from a weevil I just throw it away, because chances are it will not survive. I plant each in a 2 in. × 2 in. × 2⁵/₈ in. Anderson Die bottomless tree band and place each completed flat in minimally heated greenhouse. Most of the germinated acorns do not send up their shoots until the following spring and spend the winter dormant. We do have heaters in our greenhouses but because we want our plants to be vernalized we set our thermostats to 15 °F, so to protect our plants from extreme root killing low temperatures.

For those acorns which wait until spring to germinate, like *Q. gambelii*, we store the acorns in alternating layers of moist vermiculite and seed, in 5-gal buckets with drainage holes cut into the bottom. We label each bucket and stored them in an underground root cellar which maintains an even temperature of 36 to 40 degrees throughout the winter. We check the acorns every month for signs of root radical emergence, and plant them accordingly.

We have learned that it is best to plant 2 to 3 times as many acorns than 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 saleable. It is better to throw

out (or give away) the little guys which have \$1.00 in cost rather than invest years of growing on a plant which could have been replaced with a plant with vigor just by growing more than you needed.

Step 4. Growing Tips. Probably the most important step for the ultimate health of my oak seedlings is the addition of ecto-mycorrhizae to the root zone. By using this symbiotic organism, I have healthier plants, use less fertilizer, have next to zero problems with damping off fungus which has in turn eliminated my use of potentially harmful fungicides in my greenhouses. I use a host specific liquid mycorrhizae which I purchase from Mycorrhizal Applications of Grants Pass, OR. This liquid contains several mycorrhizal fungi known to colonize the roots of the genus *Quercus*. The fungus which 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 over-fertilizing plants grown with mycorrhizae as too much phosphorus can be detrimental to the health of these fungus.

Another important step I recommend is to space the seedlings once they reach 6 in. tall. I sort by size accordingly, throw out the dead and the runts and place an empty pot between each kept seedling to improve airflow and light penetration to each leaf.

LITERATURE CITED

- Maze, J. 1968. Past hybridization between *Quercus macrocarpa* and *Quercus gambelii*. *Brittonia* 20:321–333.
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