Selection and Production of Mexico Oaks©

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INTRODUCTION

With 161 species, Mexico has the greatest number and diversity of oak species of any country in the world (Valencia, 2004). Of these, 36 are listed as globally threatened (Mendoza, 2007). In Mexico, oak and pine forests occur mostly in mountainous regions with temperate and semi-humid climates. These temperate forests cover 21% of the country and include 24% of the recorded flora. Unfortunately, biodiversity losses from these forests have been severe, and 25% of the original temperate forests have been converted to agriculture or livestock use (Rzedowski, 1998). These forests have been determined to be vulnerable to long-term climate changes. It has been predicted that an additional 13% of the temperate forests will be lost because of the effects of climate change (Villers and Trejo, 1998). There is scant literature available on performance of Mexico oaks in Southern U.S.A. landscapes, but there is a reasonable body of anecdotal information suggesting that the oaks of Mexico deserve further evaluation and perhaps promotion north of their accepted range.

TOP PERFORMING MEXICO OAKS AT STEPHEN F. AUSTIN GARDENS

Nacogdoches is Zone 8 with an average annual rainfall of 1219 mm (48 in.). June through August is characteristically hot and dry. In 2010 and 2011, Nacogdoches experienced all-time record drought and heat. In recorded history, 1 Sept. 2000 was the record high, 44.4 °C (112 °F), and 23 Dec. 1989 was the record low –17.8 °C (0 °F). In 2005 and 2008, Nacogdoches was damaged by hurricanes with winds in excess of 139 km/h (100 mph) that toppled many large trees in our region. Lynn Lowrey (1940–1997) had much to do with many of the early plantings at the Stephen F. Austin (SFA) Mast Arboretum in the mid and late 1980s. Lynn was the consummate plantsman (Grant and Creech, 1997), quick to share plants, and the first Texan to seriously promote *Quercus polymorpha*, *Q. canbyi*, and Q. *rysophylla*. His visits to Mexico were during a different era. The countryside was friendly, the forests less disturbed, and the paperwork to move plants across the border less strident. Things have changed. While Lynn collected a wide array of plant materials, oaks held a special place in his heart. Carl Schoenfeld and John Fairey of Yucca Do Nursery also introduced many Mexican oak species to the nursery world in the late 1980s and 1990s. Beginning in 1986, a wide range of Mexico oaks were planted in the landscape of the SFA Mast Arboretum. The following represents those that have performed well for many years, organized in order of my own personal preference.

***Quercus rysophylla,* loquat leaf oak.** Our original tree was planted in 1988 as a 1-gal container and is now over 18 m (60 ft) tall, a striking specimen in full sun. Two years after establishment, the tree survived the 23 Dec. 1989 freeze [–18 °C (0 °F)], two hurricanes (2005 and 2008), and the record heat and drought in 2010 and 2011. Evergreen in our climate, the thick, rough leathery leaves are dark green and glabrous, 6 to 22 cm (2 to 8.2 in.) long, elliptical to oboval-lanceolate. New growth varies from copper to salmon color and old leaves are shed quickly in the spring. The

tree has never been affected by tent caterpillars, which have occasionally ravaged the nearby native oaks in the garden and on our campus. Loquat leaf oak is very drought resistant. Native to Nuevo Leon, Tamaulipas, and San Luis Potisi, this species is usually encountered in the mountains at mid to lower elevations. A tall tree, this species can reach over 25 m (82 ft) in height. Acorns are small, 1 to 1.5 cm (0.4 to 0.6 in.) long, pointed, in singles to several on a stout peduncle with the cup enclosing about 1/3 to 1/2 of the nut. In our region, the tree performs best in a well-drained soil and full sun. While often spelled *rhysopylla* or *risophylla*, we have chosen to reflect the original spelling by Weatherby (Weatherby, 1910), *Q. rysophylla*.

***Quercus grisea,* gray oak.** This is a rarely encountered Mexico oak with Christmas tree form to 4 to 7 m (13 to 23 ft), sometimes to 10 m (33 ft), but generally smaller in cultivation. Our oldest tree is 4.6 m (15 ft) tall in 16 years and is clean, dense, and well branched to the ground. While yet to bear acorns, this tree has weathered heat, drought, and heavy rains and remains essentially evergreen, shedding leaves as new growth begins in the spring. Two freeze events in 2010 and 2011 with temperatures both years dropping to –12 °C (10 °F) caused some leaf shedding at the top of the tree, but no stem or bud damage was evident and new growth resumed normally in the spring. Bluish-gray leaves are 2 to 8 cm (0.8 to 3.1 in.) long and 1 to 4 cm (0.4 to 1.6 in.) wide, entire, oval elliptic, with base rounded and a modestly pointed apex. Range is described as southwest Texas, Arizona, and Northern Mexico and the species prefers dry, rocky soils. Acorns are 1.2 to 2 cm (0.5 to 0.8 in.) long, usually singly or paired on a short peduncle with the cup scaly, half-round and enclosing 1/3 to 1/2 of the nut.

***Quercus canbyi,* Canbyi oak.** This is a mid-sized semi-evergreen oak that can be found in the Texas nursery and landscape trade. Our oldest specimen was planted in 1986 at the front of the SFA Mast Arboretum along Wilson Drive. It has never received irrigation and features attractive glossy foliage. It has proved to be very drought and alkaline tolerant in Texas. Sometimes referred to as the chisos oak, slender oak, or graceful oak, the range includes Nuevo Leon and Tamaulipas in Mexico, and the Chisos Mountains in Texas. The species is encountered in rocky canyons and is rarely abundant. Growth habit is 4 to 15 m (16 to 50 ft) tall and long branches are somewhat drooping, with a graceful form. Shiny green leaves are 7.5 to 10 cm (2.9 to 3.9 in.) long and 2 to 3 cm. (0.8 to 1.2 in.) wide and are lanceolate to narrowly elliptical with apex pointed. Acorns are 1.5 cm (0.6 in.) long, somewhat narrow and without a significant peduncle. The cup is shallow and covers only 1/4 to 1/3 of the cup. The nomenclature of *Q. canbyi* is complicated and there are a number of synonyms. It has been described as a variety of *Q. graciliformis* in the south of its range, northern Mexico, but most authors consider *Q. gracilformis* as a form of Canbyi oak. It is also associated with *Q. langtry*, which is also thought to be a form of *Q. canbyi* found near Langtry, Texas.

***Quercus polymorpha*, Monterrey white oak.** A medium-sized Mexico oak that is popular in Texas landscapes. The species enjoys a wide range in Mexico on the Atlantic slope and can also be found in Guatemala. In 1992, *Q. polymorpha* was discovered in a small isolated box canyon along the Devil's River near Dolan Falls in Val Verde County, and can thus be now considered a Texas native plant. In cultivation, the tree reaches 10 to 20 m (32.8 to 65.6 ft) tall and usually features an irregular form. Leaves are 6 to 13 cm (2.4 to 5.1 in.) long and 3 to 6 cm (1.2 to

2.4 in.) wide, and leaf shape can be highly variable. Acorns are 2 to 2.5 cm (0.8 to 1.0 in.) long, 1.2 cm (0.5 in.) in diameter, oblong, and are presented singly or paired on a short peduncle. Tolerant of a wide range of soil conditions, this species is now in cultivation in Europe. Monterrey white oak is closely related to *Q. splendens*, which can be found on the Pacific slope of Mexico.

***Quercus germana*, royal oak.** This cloud forest, Mexican oak is rarely encountered in the U.S.A. It is native to east and northeast Mexico, usually found at 800 to 1,800 m (2,625 to 5,905 ft). The species reaches 25 m (82 ft) tall, but should be much smaller in cultivation. We have two royal oaks over 10 years old and have been distributing acorns to interested nurserymen. Leaves are lustrous, green, and glabrous, 9 to 13 cm (3.5 to 5.1 in.) long and 3 to 5 cm (1.2 to 2 in.) wide. Leaves are persistent or semi-evergreen, oblong to oboval or oblanceolate. Acorns can be up to 4 to 5 cm (1.6 to 2.0 in.) long and 2 to 3 cm (0.8 to 1.2 in.) wide, and single on a short peduncle. Almost the entire nut is enclosed by a warty, pubescent cup. Two trees in the SFA Gardens have experienced winter freeze events less than –12 °C (10 °F) with only minor foliage damage. While wet mountainous forests describe the native habitat, the species appears quite heat and drought tolerant once well established.

***Quercus glaucoides*, lacey oak.** Lacey oaks are especially popular in central Texas. Lacey oak is a Texas Superstar™ and is promoted for the central Texas Hill country. In more eastern landscapes, the tree benefits by being planted on a berm with good soil drainage. The tree is slow growing and somewhat irregular but leaves are blue-green and quite striking. Lacey oak is native to north east Mexico (Nuevo Leon, Tamaulipas, Coahuila, and San Luis Potosi), west Texas (Edwards Plateau), and is generally found at 800 to 2,500 m (2,625 to 8,202 ft). The tree should reach 3 to 10 m (9.8 to 32.8 ft) tall. Leaves are leathery, blue-green above, paler beneath, and 3.7 to 15 cm (1.5 to 5.9 in.) long and 2 to 6 cm (0.8 to 2.4 in.) wide. Trees at SFA have been deciduous but leaves persist into the winter. Acorns are 0.8 to 1.3 cm (0.3 to 0.5 in.), ovoid, singly or in pairs to three on a 2 to 6 cm long peduncle, and the nut is enclosed $^1/_3$ to $^1/_2$.

***Quercus hypoleucoides*, whiteleaf oak or silverleaf oak.** This is perhaps the most beautiful of all oaks. This species can be found also found in North Mexico; south west Arizona; New Mexico ("Copper Mines"), and in the Davis mountains of Texas, generally encountered at 1,100 to 2,700 m (3,609 to 8,858 ft). The tree can exceed 10 m (32.8 ft) tall, but is often shrubby, 2 to 5 m (6.6 to 16.4 ft), with slender, ascending branches. Leaves are evergreen, 5 to 10 cm (2.0 to 3.9 in.) long and 1.2 to 2.5 cm (0.5–1.0 in.) wide. Leathery leaves are usually lanceolate to narrowly oval, shiny green and hairless above, densely whitish or yellowish tomentose beneath. Acorns are 1.2 to 1.5 cm (0.5 to 0.6 in.) long, narrow, singly or paired on a short peduncle and the cup encloses about $^1/_3$ of the nut. In its natural range it appears to prefer wet mixed forests and canyons and is tolerant of a range of soil types.

PERFORMANCE OF MEXICO OAKS IN THE U.S.A.

While literature related to the performance of Mexico oaks in southern U.S.A. landscapes is rare, there is some reason for optimism. In 1995, J.C. Raulston of the North Carolina State University Arboretum (now JCR Arboretum), wrote, "*Quercus* sp. (Mexican oaks) — an enormous group of widely variable plants with over half of all North American oak species occurring in Mexico. Plants range from de-

ciduous to evergreen, and from tiny groundcovers to majestic trees. All tried at this point have done surprisingly well in our nursery of heavy clay soils subject to flooding. *Quercos canbyi* is fine textured with red oak type scalloped foliage, very rapidly growing with up to 1.8 m (6 ft) per year. *Q. polymorpha* is quite variable (as the name indicates) with large, thick leathery semi-evergreen foliage, more moderate in growth with 30 to 91 cm (1 to 3 ft) per year. *Q. risophylla* is perhaps the most beautiful with heavily textured and scalloped foliage which emerges with pink-bronze color on new shoots — evergreen to deciduous depending upon winter temperatures encountered. Hardy to at least –15 °C (5 °F). Commercial potential of oaks often depends on availability of acorns for seed propagation. Early trials indicate some of the Mexican oaks have potential for cutting production."

For the purpose of this article, I queried a number of colleagues and friends — in Texas and outside — with firsthand experience growing Mexico oaks. Paul Cox, past Director of the San Antonio Botanical Garden (SABG), San Antonio, Texas, commented: "When I showed my wife Michelle her first silverleaf oak, *Q. hypoleucoides*, her comment was "It is such an elegant tree." That it is — as well as very durable. The term "regal" would have to go to *Q. germana*, the Mexican royal oak. While San Antonio is far from the cloud forests of Mexico, *Q. germana* has performed admirably here and produced several nice specimens. Loquat leaf oak, *Q. rysophylla*, does better with a little extra water but does not show signs of stress without it. Mexican white oak, *Q. polymorpha*, is the Mexican oak most commonly used in our area. Dr. Elray Nixon, retired botanist, Stephen F. Austin State University, maintained that oaks had not finished speciating out because when species from different areas were exposed to each other they crossed readily. *Quercus polymorpha* certainly bears this out. Acorns planted from the first *Q. polymorpha* in San Antonio showed signs of crossing with *Q. virginiana*, *Q. buckleyi*, *Q. laceyi*, and *Q. muehlenbergii*. While the species is as rugged as any in the land, this tendency to hybridize with our native species must surely cause the native plant purists considerable consternation. *Quercus canbyi* does very well here, and there used to be a nice representative at the SABG, but the tree has never really caught on like the others."

Mark Weathington, assistant director of the JC Raulston Arboretum at North Carolina State University, Raleigh, North Carolina. Mark wrote, "The JC Raulston Arboretum has been evaluating Mexican oaks (we're up to 18 species!) for quite a while now and they just continue to impress us. The droughts and extreme high temperatures we have experienced over the past several years have shown us that fresh water is a limited resource even on the east coast. The southwestern and Mexican oaks take this adversity without missing a beat. The evergreen *Q. crassifolia* is among our favorites with thick, heavily textured, deep green leaves providing an ideal background for the bright red new growth and yellow catkins in spring. In over a decade, we have not had a bit of winter damage to our plant. Others which have been top performers for years include *Q. polymorpha*, *Q. rugosa*, and *Q. germana*. We feel there would be a huge potential for Mexican oaks, especially the evergreen to semi-evergreen, medium-sized species, to become major players in the southeastern U.S.A. nursery industry, if a reliable seed source was available. To date, our efforts at rooting most of them have met with limited success, but we are still trying to crack that nut (acorn?)."

Bob McCartney of Woodlanders (<http://www.woodlanders.net/>), in Aiken, South Carolina (SC), wrote, "At the citywide Arboretum, Aiken, SC, we are botanically very diverse. The varied habitats, which range from swamp forests to desert-like sandhills, support many native oak species. Oaks are prominent features in Aiken's broad tree-filled parkways, in a 809-ha (2,000-acre) urban forest known as Hitchcock Woods, and on many private properties. We have been impressed with the performance of a good number of Mexican and U.S. Southwestern oaks. The mild Zone 8 climate and well-drained sandy soils in the City of Aiken provide good growing conditions for not only the native oaks but a very wide range of oaks that are native elsewhere. For over 30 years Woodlanders, Inc., a rare plant specialty nursery located in Aiken, has planted a great variety of rare trees throughout the city. One notable group is the genus *Quercus* with oaks from throughout the Northern hemisphere. Aiken has been credited by the International Oak Society with having the most comprehensive collection of oaks in the U.S.A. Almost all U.S.A. species plus many of the species native to Mexico, Europe, the Middle East, and Asia are represented in this growing collection. Specimens range from large venerable trees to recently planted rare species."

Eric Hammond of Heritage Seedlings (<www.heritageseedlings.com/>) in Salem, Oregon commented that they are constantly looking for new plants for the landscape and Mexico oaks are making their mark. He remarked that, "Some of our favorites include *Q. hypoleucoides* because of its great form and the clean foliage, and *Q. crassipes*, which is totally unavailable, is very hardy here in western Oregon and is breathtakingly beautiful. Its evergreen foliage is glossy while the undersides are covered with brown fuzz and the bark is even beautiful; it just does not get better. *Quercus greggii* and *Q. mexicana* both do well too. We think that there are a great number of Mexican oaks that will perform well here in the U.S.A. Northwest and the only limiting factor is the availability of seed. Also we are producing *Q. canbyi*, *Q. polymorpha*, *Q. mexicana* (grows very well in western Oregon), and *Q. rysophylla*. And undoubtedly there are others we should produce but are not. There are many oaks native in the west and few are used to their full potential. Mexico is just an extension of that, with an international border and a few banditos tossed in."

Sean Hogan of Cistus Nursery, (<http://cistus.com/>) in Portland, Oregon adds, "Both personally and at the nursery, Mexican and Southwest oaks have been of great interest. As street trees in Portland, along with the western summer-dry oaks, we have been using several drought-resistant Mexican species (including those from the southeast Arizona to Big Bend, Texas). As Portland receives about 508 to 914 mm (20 to 36 in.) of rainfall yearly, and that nearly entirely between November and March, weaning the city off high water, cold-requiring mostly eastern deciduous species is a major goal. As well in an area of winter growth, more use of broadleaf evergreen decreases the dreary look of a nearly all deciduous canopy. Favorites have been *Q, hypoleucioides* (now an official street tree), *Q. fusiformis* (syn. *Q. virginiana* var. *fusiformis*), *Q. polymorpha*, *Q. canbyi*, *Q. rysophylla*, Q. *mexicana* (with its beautiful horizontal branch pattern), *Q. arizonica*, *Q. laceyi*, *Q. rugosa*, and the related *Q. greggii* as a very nice 7.6-m (25-ft) avenue tree. *Quercus crassifolia* with its elephant-skin-like bark, furry indumentums, and shocking pink new growth, and Lynn Lowrey's lost oak with an almost miniature red oak look but for bronze red color on evergreen leaves in winter, and with spring flushes. These are the best so far!"

Gary Foss, Oaks of the Wild West (<www.oaksofthewildwest.com/>) in southeastern Arizona recently wrote: "Dave, you asked about my favorite oaks. I'm at 1,341 m (4,400 ft) here in southeast Arizona and we have hard freezes. My best performers are specimens of *Q. hypoleucoides*, *Q. emoryi*, *Q. fusiformis*, *Q. buckleyi*, *Q. shumardii*, *Q. canbyi*, *Q. robur*, *Q. muhlenbergii*, *Q. petraea* (Europe), *Q. rysophylla,* and *Q. polymorpha*. I have small *Q. vaseyana* and *Q. wislizeni*, so I'm not sure about them yet."

PROPAGATION

In our region, Mexico oak acorns are harvested on the tree or shortly after they fall as fallen acorns are soon quickly infested with weevils. We have also observed Mexico oak acorns germinating while still attached to the tree (vivipary), particularly when wet, humid conditions accompany acorn fall. Our general strategy is to harvest acorns in late November and sow in tubeling flats that are kept cool and moist in the shade house — or are placed in a heated greenhouse for the winter. We have learned through experience that care must be taken not to overwater. Germination and emergence has been erratic for most species of Mexico oaks, some germinating immediately while others take months to emerge. We have made a few modest attempts at cutting propagation of the evergreen Mexico oaks and have yet to achieve any success. While hybridization is certainly a problem, we have been surprised at the uniformity of most of the seedling plants derived from Mexico acorns collected in the gardens. A major impediment to expanded use of many of the Mexican oaks is — and will continue to be — the availability of acorns.

CONCLUSIONS

The oaks of Mexico are relatively unexploited in the nursery and landscape trade and there is scant literature on their performance in the southern USA. Yet, there is a gathering body of mostly anecdotal evidence, which suggests optimism for expanded use in Zones 7 to 9. With hotter summers and extended droughts predicted, Mexico oaks may find increased popularity as landscape trees as their performance under those conditions becomes more widely known.

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