

Selected White Oaks of the Texas Panhandle Plains and adjacent Oklahoma

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A brief, technical work consisting of a table of species and dichotomous key for several chosen species in the white oak group (*Quercus* sect. *Quercus*). Hybrids between the selected species and their morphological characteristics are also discussed. The relevant study area is, using defined regions from the EPA Level III Ecoregions, covers the High Plains, Southwestern Tablelands, and Central Great Plains in Texas and Oklahoma (Level III Ecoregions can be found at <https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states>).

Species were chosen based on relevance to a project studying *Q. havardii* and *Q. stellata* distribution and hybridization in Texas. *Q. havardii* and *Q. stellata* were studied as they were the main species studied in the project. *Q. mohriana* hybridizes with *Q. havardii* in certain regions and was also included. Other species were chosen due to their similarity or tendency to intergrade with the other species in order to minimize misidentification. *Q. margaretae* was once considered a subspecies of *Q. stellata*, and occurs within the study area, and plants with intermediate characteristics between *Q. margaretae* and *Q. stellata* have been found. The highly variable *Q. sinuata*, may be superficially similar to *Q. mohriana* and *Q. havardii*, although reported hybridization between *Q. sinuata* and other species of study appears to be practically nonexistent. White oak species or groups which were both more familiar to the author or considered easier to distinguish from the above-mentioned species, such as *Q. muehlenbergii* and the live oaks (*Q. fusiformis*, *Q. virginiana*), were excluded, as well as plants in the red oak group (*Quercus* sect. *Lobatae*) for similar reasons.

Taxa covered: *Quercus havardii*, *Quercus margaretae*, *Quercus mohriana*, *Quercus sinuata*, *Quercus stellata*

Information largely adapted from Flora of North America (online) <http://floranorthamerica.org>. Additional references listed on the last page.

Selected *Quercus* spp. ID Chart

	<i>Q. mohriana</i>	<i>Q. havardii</i>	<i>Q. stellata</i>	<i>Q. margerettae</i>	<i>Q. sinuata</i> var <i>breviloba</i>
Habitat	Limestone hills and slopes, calcareous substrates	Deep, shifting or stabilized sand dunes	Dry gravelly and sandy ridges and uplands, dry clays	Deep sands and gravels	Limestone
Height	0.5-3 m [1.5-10 ft]	0.3-1.5 m [1-5 ft]	To 20(-30) m [65.5(-98.5) ft]	To 12 m (40 ft)	(0.5-)1-3(-5) m [(1.5-)3-10(-16.5) ft]
Form	Rhizomatous shrubs or small trees	Clonal, rhizomatous shrubs to 10 m [33 ft] across	Tree	Small tree or shrubs, occasionally rhizomatous	Shrubs or trees, often clonal with multiple trunks
Bark	Pale, rough, deeply furrowed 	Light gray, scaly-papery on large stems 	Light gray, scaly  https://www.inaturalist.org/observations/119514806	Light gray, scaly  https://www.inaturalist.org/observations/24861289	Flaky to papery to exfoliating  Nathanael Pilla, SEInet
Twigs ø (1st year)	1-2 mm, yellowish or whitish, felty tomentose	1-2.5 mm, brown/grayish, glabrous or densely short-tomentulose; glabrate with age	(2-)3-5 mm, yellowish/grayish, densely stellate pubescent	1-2(-3) mm, green/reddish, becoming gray, glabrous	1-2(-3) mm, light gray/gray, glabrous or rarely minutely puberulent
Abaxial leaf indumentum	Densely grey/white tomentose w/ curly, stellate hairs	Densely greyish/yellowish tomentulose or stellate pubescent, sometimes sparsely	Yellowish green with minute, crowded, yellowish glandular hairs and scattered minute, 6-8-rayed, appressed/semi-appressed stellate hairs, not-velvety	Light green, with interlocking, erect, 2-4(-6)-rayed stellate hairs, velvety	Silvery or dull green, Scattered to crowded, minute, appressed-stellate, 8-10-rayed hairs; glabrate/glabrous in shade forms
Leaf form	Oblong to elliptic, unlobed, entire or sharply toothed or denticulate, sometimes undulate	Polymorphic, shallowly lobed (gen. 2-3 rounded/sharp teeth per side), undulate	Shallowly to deeply lobed; distal pair of lobes sometimes forming a cruciform shape	Moderately to deeply lobed; distal pair of lobes sometimes forming a cruciform shape	Oblong to oblanceolate or narrowly rhomboid, irregularly toothed or sinuately lobed; lobes rounded.

Artificial Key to Selected *Quercus* spp.

1. Mature plants much taller than 3 m (10 ft); Leaf blades moderately to deeply lobed, sinuses often greater than ½ distance from midrib ; distal, lateral 2 lobes often diverging to form a cruciform shape	> 2
1. Mature plants 3 m or shorter; Leaf blades entire, toothed, or shallowly lobed (sometimes moderately lobed in <i>Quercus havardii</i>), sinuses rarely greater than ½ distance from midrib	> 3
2. Twigs yellowish or grayish, densely stellate-pubescent , (2-)3-5 mm; leaf blades 40-150(-200) × 20-100(-120) mm; leaf abaxially yellowish green, with minute, crowded, yellowish glandular hairs and scattered minute, 6-8-rayed, appressed or semi-appressed stellate hairs, not velvety to touch; trees to 20(-30) m	<i>Quercus stellata</i> ¹
2. Twigs, reddish or greenish, glabrous , 1-2(-3) mm; leaf blades (25-)40-80(-135) × 20-40(-80) mm; leaf abaxially light green, with interlocking, erect, 2-4(-6)-rayed stellate hairs, velvety to touch; small trees or shrubs to 12 m	<i>Quercus margarettae</i> ¹
3. Twigs glabrous (rarely minutely puberulent in <i>Quercus sinuata</i>)	> 4
3. Twigs densely tomentose or tomentulose (older branches glabrate in <i>Quercus havardii</i>)	> 5
4. Bark loose, easily peeling off in thin, 2-3 mm flakes, often curling away from the trunk ; shrubs or small trees growing on limestone, rarely granitics	<i>Quercus sinuata</i> var <i>breviloba</i>
4. Bark scaly-papery, but not as described; rhizomatous shrubs forming clonal groves in deep sand	<i>Quercus havardii</i> ²
5. Twigs yellowish or whitish, felty-tomentose ; Bark rough and deeply furrowed ; Leaves unlobed ; margins entire or sharply toothed or denticulate; trees to 3 m on limestone or calcareous substrates, rocky hills and slopes	<i>Quercus mohriana</i>
5. Twigs brown or greyish, glabrous or densely short-tomentulose (glabrate in age) ; Bark scaly-papery ; Leaf shallowly to moderately lobed; margins with rounded or sharp teeth; rhizomatous shrubs to 1.5 m in deep sand	<i>Quercus havardii</i> ²

Twigs refers to current year/first year twigs; indumentum on second and third year growth becomes inconsistent.


¹ Some populations in the Cross Timbers Region appear intermediate between *Q. stellata* and *Q. margarettae*, and also occur sporadically throughout the range of *Q. stellata*.

² Intermediates with *Q. mohriana* occur where the habitat of the two species meet, and with *Q. stellata* throughout the range of *Q. havardii*, though more common towards the eastern end of its range.

Hybrid characteristics: *Q. havardii* x *stellata*

	<i>Q. havardii</i>	<i>Q. havardii</i> x <i>stellata</i>	<i>Q. stellata</i>	<p>“The short, white pubescence of the lower leaf surface characteristic of <i>Q. Havardi</i> may be replaced by obviously spreading pubescence of gray or tan hairs of <i>Q. stellata</i>; the normally oblong, entire or toothed leaf may be much broader and obscurely or markedly round-lobed; the rather large fruit may be only half as large and the usually deep, fringed cups with attenuately narrowed scales may be more shallow, lacking a fringe, and the scales not markedly narrowed. Most of the characters except height vary quite independently of one another. Examination of thousands of clones, especially in areas with a high percentage of variants, failed to reveal a single obvious leaf or fruit variant not associated with increased height.”</p> <p>Cornelius H. Muller “Ecological Control of Hybridization in <i>Quercus</i>: A Factor in the Mechanism of Evolution” (1952)</p>
Habitat	Deep, shifting or stabilized sand dunes	Deep sand on hills and plains?	Dry gravelly and sandy ridges and uplands, dry clays	
Height	0.3-1.5 m [1-5 ft]	1-3 m [3-10 ft]	To 20(-30) m [65.5(-98.5) ft]	
Form	Clonal, rhizomatous shrubs to 10 m [33 ft] across	Shrubs or small trees	Tree	
Bark	Light gray, scaly-papery on large stems	???	Light gray, scaly	
Twigs	Brown/grayish, glabrous or densely short-tomentulose; glabrate with age	Densely tomentose or glabrate	Yellowish/grayish, densely stellate pubescent	
Abaxial leaf indument	Densely greyish/yellowish tomentulose or stellate pubescent, sometimes sparsely	Stellate-tomentulose or sparsely stellate, spreading yellowish glandular hairs	Yellowish green with crowded yellowish glandular hairs and scattered minute, 6-8-rayed, appressed/semi-appressed stellate hairs, not-velvety	
Leaf form	Polymorphic, shallowly lobed (gen. 2-3 rounded teeth per side), undulate	Broader leaf, toothed or more or less round-lobed (like <i>Q. stellata</i>)	Shallowly to deeply lobed; distal pair of lobes sometimes forming a cruciform shape	

Hybrid characteristics: *Q. havardii* x *mohriana*

	<i>Q. havardii</i>	<i>Q. havardii</i> x <i>mohriana</i>	<i>Q. mohriana</i>	<p>These individuals exhibit a high degree of morphological variability suggestive of segregation incidental to backcrossing. In some instances the hybrid plants are nearly identical with one or the other parent while others are 'approximately intermediate in form. The population thus formed shows a strong tendency toward differential distribution. As shown in figure 1, <i>Q. Havardi</i> occurs in nearly pure stand on deep sand (at A) ,while <i>Q. Mohriana</i> is similarly confined to exposed limestone (at B). The brow of the bluff is composed of a mixture of sand and limestone fragments (at C). This intermediate habitat is occupied almost exclusively by the hybrid individuals. In no instance were strongly intermediate individuals found outside the intermediate habitat.</p> <p>Cornelius H. Muller “Ecological Control of Hybridization in <i>Quercus</i>: A Factor in the Mechanism of Evolution” (1952)</p>
Habitat	Deep, shifting or stabilized sand dunes	Intermediate habitat where limestone bluffs meet sand deposits	Limestone hills and slopes, calcareous substrates	
Height	0.3-1.5 m [1-5 ft]		0.5-3 m [1.5-10 ft]	
Form	Clonal, rhizomatous shrubs to 10 m [33 ft] across	Low shrubs	Rhizomatous shrubs or small trees	
Bark	Light gray, scaly-papery on large stems	???	Pale, rough, deeply furrowed 	
Twigs	Brown/grayish, glabrous or densely short-tomentulose; glabrate with age	White/gray tomentose	1-2 mm, yellowish or whitish, felty tomentose	
Abaxial leaf indument	Densely greyish/yellowish tomentulose or stellate pubescent, sometimes sparsely	White-tomentose or glaucous and sparingly stellate-pubescent	Densely grey/white tomentose w/ curly, stellate hairs	
Leaf form	Polymorphic, shallowly lobed (gen. 2-3 rounded teeth per side), undulate	Oblong to ovate, entire or coarsely round-toothed	Oblong to elliptic, unlobed, entire or sharply toothed or denticulate, sometimes undulate	

References

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