



The Oak Collection at the Botanic Garden in Puebla University



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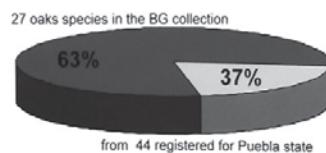
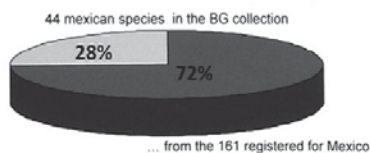
Mexico is one of the two diversification centres in the world for oaks with 160-200 species. The richest states in Mexico are Oaxaca, Jalisco, Nuevo León, Chihuahua, Puebla and Veracruz.



Since the foundation of the Botanic Garden, Quercus has been an important tree. here, *Quercus acutifolia* and *Q. glaucooides* were introduced in 1987.

The oak collection in the Botanic Garden in the University started in 1987 with the first specimens of *Q. acutifolia*, *Q. liebmannii*, *Q. castanea* and *Q. glaucooides*. Formal efforts to develop a *Quercus* collection started in 1995. Currently the collection has 61 species, 15 from abroad that have been donated by several institutions and 44 Mexican species, 23 from section *Quercus*, white oaks (Table 1) and 21 from section *Lobatae* or red oaks (Table 2).

Percentage oak species representation at a national and state level



The species held in our collection correspond to 88% of the species reported for Morelos state, 86% of those reported in DF and Tlaxcala, 76% for Hidalgo, 71% for Veracruz, 62.5% for Oaxaca and 44% from Guerrero.

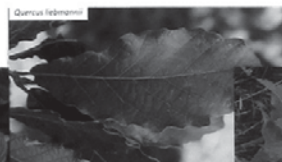
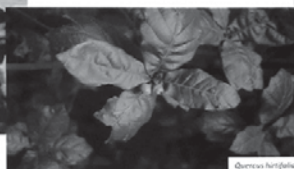
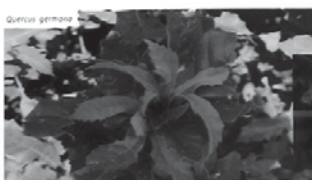


Table 1.- Section *Quercus* species or "white oaks" in the Botanic Garden-BUAP, And their distribution in Mexico.

Species	Distribution
<i>Quercus agrifolia</i>	Hgo. NL
<i>Quercus coccinea</i>	Chi, Gro, Oax, Pue, Ver
<i>Quercus deserticola</i>	DF, Gro, Hgo, Jal, Mex, Mich, Oax, Pue, Oax, Sin
<i>Quercus fustulifolia</i>	Chi, Jal, NL, Tamps
<i>Quercus germana</i>	Hgo, Oax, Pue, SLP, Tamps, Ver
<i>Quercus glabrescens</i>	DF, Hgo, Mex, Mich, Oax, Pue, SLP, Tamps, Ver
<i>Quercus glaucooides</i>	Gro, Oax, Hgo, Jal, Mex, Mich, Mor, Nay, Oax, Pue, SLP, Sin, Zac
<i>Quercus grisea</i>	Chi, Hgo, Hgo, Nay, Oax, Pue, SLP, Tamps, Ver, NL
<i>Quercus imrayi</i>	Oax, Ver
<i>Quercus imrayana</i>	Chi, Oax, NL
<i>Quercus laevis</i>	Chi, NL
<i>Quercus laurifolia</i>	Agu, Chi, Gro, DF, Dgo, Gro, Hgo, Jal, Mex, Mich, Mor, Nay, Oax, Pue, SLP, Sin, Oax, Zac
<i>Quercus laurifolia</i>	Chi, Ver, Pue
<i>Quercus leucophylla</i>	Hgo, Oax, Pue, Ver
<i>Quercus liebmannii</i>	Gro, Oax, Pue
<i>Quercus macrocarpa</i>	Agu, Chi, Gro, Hgo, Jal, Nay, NL, Oax, Pue, Oax, SLP, Tamps, Ver
<i>Quercus obtusata</i>	DF, Dgo, Gro, Gro, Hgo, Jal, Mex, Mich, Mor, Nay, Oax, Pue, Oax, SLP, Ver, Zac
<i>Quercus olivoides</i>	Chi, Oax, Hgo, Oax, Pue, SLP, Tamps, Ver, Zac
<i>Quercus polystachya</i>	Chi, Hgo, NL, Oax, Pue, SLP, Tamps, Ver
<i>Quercus rugosa</i>	Agu, Chi, Chi, Gro, DF, Gro, Gro, Dgo, Hgo, Jal, Mex, Mich, Mor, NL, Oax, Pue, Oax, SLP, Sin, Ver, Zac
<i>Quercus sabilla</i>	Chi, Hgo, NL, Oax, Pue, SLP, Tamps, Ver
<i>Quercus subaequalata</i>	Chi, Jal, Sin, Oax
<i>Quercus turbinata</i>	BC, Chi, Sin

Table 2.- Section *Lobatae* species or "red oaks" in the BG-BUAP and their distribution in Mexico.

Species	Distribution
<i>Quercus acanthophylla</i>	Hgo, Pue y Ver
<i>Quercus acutifolia</i>	Gro, Jal, Mex, Mich, Mor, Nay, Oax, Pue
<i>Quercus affinis</i>	Chi, Hgo, NL, Oax, Pue, Gro, SLP, Tamps, Ver
<i>Quercus agrifolia</i>	BC
<i>Quercus canariensis</i>	NL, Tamps
<i>Quercus canariensis</i>	Chi, Chi, DF, Dgo, Gro, Hgo, Jal, Mex, Mich, Mor, Nay, Oax, Pue, Sin, Ver
<i>Quercus castanea</i>	Chi, Chi, DF, Dgo, Gro, Gro, Hgo, Jal, Mex, Mich, Mor, Nay, Oax, Pue, Sin, SLP, Sin, Ver
<i>Quercus canariensis</i>	Dgo, Jal, Nay, Oax, Zac
<i>Quercus coccinea</i>	Chi, Chi, DF, Dgo, Chi, Gro, Hgo, Jal, Mex, Mich, Oax, Pue, Oax, SLP, Tamps, Ver, Zac
<i>Quercus coccinea</i>	Chi, DF, Gro, Hgo, Jal, Mex, Mich, Mor, Oax, Pue, Oax, Tlax
<i>Quercus depressa</i>	Hgo, Oax, Pue y Ver
<i>Quercus x dybowskii</i>	DF, Gro, Hgo, Mex, Mich, Tlax y Ver
<i>Quercus laurifolia</i>	Hgo y Pue
<i>Quercus laurifolia</i>	DF, Gro, Gro, Hgo, Jal, Mex, Mich, Mor, Oax, Pue, Oax, Tlax, Ver
<i>Quercus mexicana</i>	Chi, DF, Hgo, Mex, NL, Pue, Oax, SLP, Tamps, Tlax y Ver
<i>Quercus pinobalanoides</i>	NL, Chi, SLP, Tamps y Ver, Hgo
<i>Quercus rubra</i>	Gro y Oax
<i>Quercus sphenophylla</i>	Hgo, NL, Ver
<i>Quercus serratii</i>	Hgo, Pue, Oax, Tamps y Ver
<i>Quercus serratii</i>	Chi, Oax
<i>Quercus serratii</i>	Hgo, SLP, Tamps, Ver

Mexican *Quercus* species in the Botanic Garden at Puebla University

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Quercus is a genus of trees and shrubs with between 300 and 600 species depending on current opinion.

Mexico is known as the primary center of diversity of the genus and according to Valencia (2004) there are 161 species in Mexico, all belonging to subgenus *Quercus*. 81 of these are in Section *Quercus*, 76 in Section *Lobatae* and 4 in Section *Protobalanus*. The Mexican states with the greatest species diversity are Oaxaca, Jalisco and Nuevo Leon. However, more than half of the states have records of at least 20 species, and the state of Puebla currently has more than 33 species registered.

The Botanic Garden of the Benemerita University of Puebla started in 1995 the development of an oak collection including some from other countries. After several trials, the collection has 170 individuals belonging to 61 species, of which 44 are Mexican. Of these, 23 belong to Section *Quercus* (Table 1), and 21 to Section *Lobatae* (Table 2). In addition there are two new species which are currently being described, one native to Oaxaca and Puebla and the other native to Hidalgo.

The oak species grown here include more than 80% of those reported for the states of Morelos, Federal District, Tlaxcala and Hidalgo. The collection is expanding but we need more introductions from states such as Guerrero, Nuevo Leon and Jalisco.

The species with the widest distribution are *Q. rugosa* Née, *Q. castanea* Née and *Q. crassifolia* Bonpl. while the more restricted (1 or 2 states) are *Q. alpelescens* Trel., *Q. insignis* M. Martens & Galeotti, *Q. laceyi* Small, *Q. agrifolia* Née, *Q. canbyi* Trel., *Q. hirtifolia* M.L. Vázquez et al., *Q. rubramenta* Trel. and *Q. skinneri* Benth., without including the new species.

The oldest oaks in the collection are *Q. acutifolia* Née, *Q. liebmannii* Oerst. ex Trel., *Q. castanea* Née, *Q. germana* Schldl. & Cham. and *Q. glaucoides* M. Martens & Galeotti which were introduced in 1987 when the botanic garden planting started. Some species such as *Q. berberidifolia* Liebm., *Q. pinnativenulosa* C.H. Mull., *Q. hirtifolia* M.L. Vázquez et al. and the 2 new species were collected in 2007 and 2008 and are waiting to be planted.

We have learned about growing oaks here through trial and error. In Puebla we have a lack of humidity, and cool and hot temperatures in the same day can kill the plants easily. These experiences have shown us that it is not easy to grow oaks in Puebla city and therefore it is necessary to avoid further reduction in the oak forests here. Torrential rains and use of forest leaf litter to be sold as pot compost promote soil compaction and impoverishment.



Quercus liebmannii in spring.

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Quercus liebmannii

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We are now sure that our collection will grow steadily and every time we work in the field we find something interesting or a new location giving us more knowledge about oaks in Puebla. Undoubtedly, our garden is a good place to look at Mexican oaks.

Table 1. Oak species in Section *Quercus* in the Botanic Garden, showing the states where each species is reported in Mexico and the provenance of the collection.

Species	Distribution in Mexico	Provenance
<i>Quercus alpestris</i>	Hgo, NL	Hgo
<i>Quercus corrugata</i>	Chis, Gro, Oax, Pue, Ver	Ver
<i>Quercus deserticola</i>	DF, Gto, Hgo, Jal, Méx, Mich, Oax, Pue, Qro, Sin	Pue
<i>Quercus fusiformis</i>	Coah, NL, Tamps	NL
<i>Quercus germana</i>	Hgo, Oax, Pue, SLP, Tamps, Ver	Ver . Pue
<i>Quercus glabrescens</i>	DF, Hgo, Méx, Mich, Oax, Pue, SLP, Tlax, Ver	Pue
<i>Quercus glaucoides</i>	Gro, Gto, Hgo, Jal, Méx, Mich, Mor, Nay, Oax, Pue, SLP, Sin, Zac	Pue
<i>Quercus greggii</i>	Coah, Dgo, Hgo, Nay, Oax, Pue, SLP, Tamps, Ver, NL	NL
<i>Quercus insignis</i>	Oax, Ver	Ver
<i>Quercus invaginata</i>	Chih, Coah, NL	Coah
<i>Quercus laceyi</i>	Coah, NL	NL
<i>Quercus laeta</i>	Ags, Coah, DF, Dgo, Gto, Hgo, Jal, Méx, Mich, Nay, NL, Pue, SLP, Sin, Oax, Zac	Pue
<i>Quercus lancifolia</i>	Chis, Ver, Pue	Pue
<i>Quercus leiophylla</i>	Hgo, Oax, Pue, Ver	Ver
<i>Quercus liebmannii</i>	Gro, Oax, Pue	Pue
<i>Quercus microphylla</i>	Ags, Coah, Gto, Hgo, Jal, Nay, NL, Oax, Pue, Qro, SLP, Tamps, Ver	Pue
<i>Quercus obtusata</i>	DF, Dgo, Gro, Gto, Hgo, Jal, Méx, Mich, Mor, Nay, Oax, Pue, Qro, SLP, Ver, Zac	Gro, Pue
<i>Quercus oleoides</i>	Cam, Chis, Hgo, Oax, Pue, SLP, Tab, Tamps, Ver, Yuc	SLP
<i>Quercus polymorpha</i>	Chis, Hgo, NL, Oax, Pue, SLP, Tamps, Ver	NL
<i>Quercus rugosa</i>	Ags, Chis, Coah, Col, DF, Gro, Gto, Dgo, Hgo, Jal, Méx, Mich, Mor, NL, Oax, Pue, Qro, SLP, Son, Ver, Zac	Pue
<i>Quercus sebifera</i>	Chis, Hgo, NL, Oax, Pue, SLP, Tamps, Ver	Pue
<i>Quercus subspathulata</i>	Chih, Jal, Son, Gro	Gro
<i>Quercus turbinella</i>	BC, Chih, Son	?

Table 2.- *Quercus* species in Section *Lobatae* showing the states where they have been reported in Mexico and the provenance of the collection.

Species	State distribution in Mexico	Provenance
<i>Quercus acherdophylla</i>	Hgo, Pue, Ver	Pue
<i>Quercus acutifolia</i>	Gro, Jal, Méx, Mich, Nay, Oax, Pue	Pue
<i>Quercus affinis</i>	Gto, Hgo, NL, Oax, Pue, Qro, SLP, Tamps, Ver	Pue
<i>Quercus agrifolia</i>	BC	BC, USA
<i>Quercus canbyi</i>	NL, Tamps	NL
<i>Quercus candicans</i>	Chih, Chis, DF, Dgo, Gro, Hgo, Jal, Méx, Mich, Mor, Nay, Oax, Pue, Sin, Ver	Gro
<i>Quercus castanea</i>	Chis, Col, DF, Dgo, Gto, Gro, Hgo, Jal, Méx, Mich, Mor, Nay, Oax, Pue, Sin, SLP, Son, Ver	Pue
<i>Quercus konzattii</i>	Dgo, Jal, Nay, Oax, Zac	Oax
<i>Quercus crassifolia</i>	Chih, Chis, DF, Dgo, Gto, Gro, Hgo, Jal, Méx, Mich, Oax, Pue, Qro, SLP, Tlax, Ver, Zac	Pue
<i>Quercus crassipes</i>	Col, DF, Gto, Hgo, Jal, Méx, Mich, Mor, Oax, Pue, Qro, Tlax	Pue
<i>Quercus depressa</i>	Hgo, Oax, Pue, Ver	Hgo
<i>Quercus hirtifolia</i>	Hgo, Pue	Pue
<i>Quercus laurina</i>	DF, Gro, Gto, Hgo, Jal, Méx, Mich, Mor, Oax, Pue, Qro, Tlax, Ver	Pue
<i>Quercus mexicana</i>	Coah, DF, Hgo, Méx, NL, Pue, Qro, SLP, Tamps, Tlax, Ver	Pue
<i>Quercus pinnativenulosa</i>	NL, Qro, SLP, Tamps, Ver, Hgo	Hgo
<i>Quercus rysophylla</i>	Hgo, NL, Ver	NL
<i>Quercus rubramenta</i>	Gro, Oax	Gro
<i>Quercus sartorii</i>	Hgo, Pue, Oax, Tamps, Ver	Hgo, Ver
<i>Quercus skinneri</i>	Chis, Oax	Oax
<i>Quercus xadysophylla</i>	DF, Gto, Hgo, Méx, Mich, Tlax, Ver	Pue
<i>Quercus xalapensis</i>	Hgo, SLP, Tamps, Ver	Ver

State abbreviations

Ags – Aguascalientes

BC – Baja California

Chih – Chihuahua

Chis – Chiapas

Coah – Coahuila

Col – Colima

DF – Distrito Federal

Dgo – Durango

Gro – Guerrero

Gto – Guanajuato

Hgo – Hidalgo

Jal – Jalisco

Méx – Estado de México

Mich – Michoacán

Mor – Morelos

Nay – Nayarit

NL – Nuevo León

Oax – Oaxaca

Pue – Puebla

Qro – Querétaro

Sin – Sinaloa

SLP – San Luís Potosí

Son – Sonora

Tamps – Tamaulipas

Tlax – Tlaxcala

Ver – Veracruz

Zac – Zacatecas