The Mexican Oak National Collection

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The role that every botanical garden plays in conservation is of vital importance when its collection policy is part of a National or Inter national conservation strategy. Although accurate accounts are not yet available, Mexico is considered one of the most bio-diverse countries in the world. This fact, coupled with the high rate of habitat destruction in many Mexican territories, makes it far more difficult to develop a conservation strategy that effectively maintains and protects this diversity.

In this context, the Mexican Association of Botanic Gardens decided in 1995 to invite all its garden members to support the establisment of

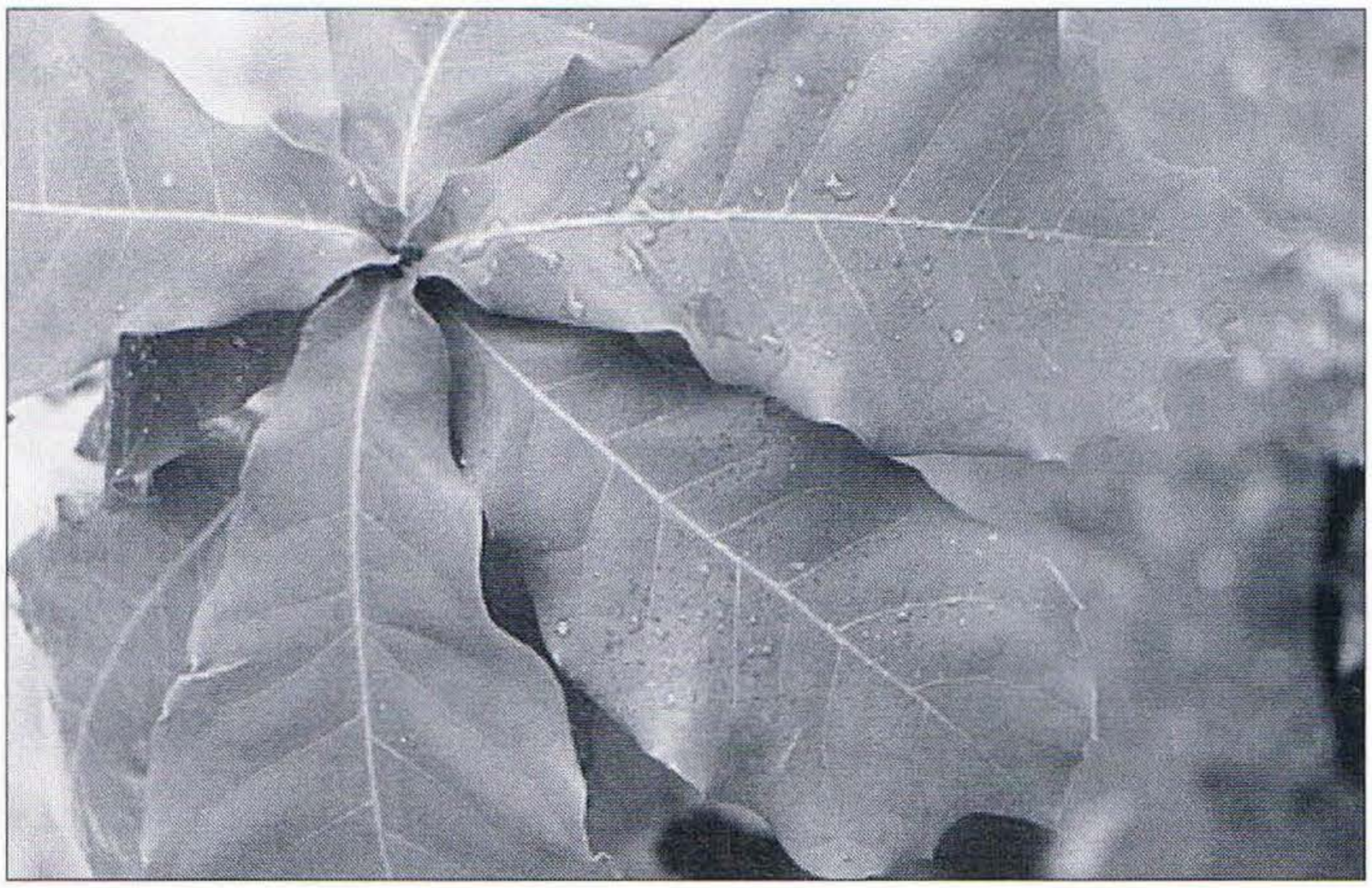

photo by Maricela Rodriguez - Acosta

Quercus germana *is one example of white oaks being cultivated in Mexico. White oaks show a better growth rate than some red oak species.*

National Plant Collections as a very specific way of contibuting to the conservation efforts taken by the Mexican goverment. The Louise Wardle de Camacho Botanic Garden decided to accept this invitation by starting the Mexican Oak Collection (Rodríguez, 1996), which has been established now for two years.

There are several reasons for supporting the idea of National Collections, however the following were some which apply specifically to the collection of *Quercus*.

a) In Mexico oak forests occupy an estimated 5.5 percent of the territory (Rzedowski, 1981).
b) There is a very high diversity of *Quercus*, calculated at between 150 and 200 species (Nixon, 1991; Rzedowski, 1981; Zavala, 1995)
c) There is a very strong relation between oak forest and human activity, which poses a threat to *Quercus* species in different regions of the country (Nixon, 1991).
d) Until 1994, *Quercus* were very poorly represented in Mexican Botanic Gardens (Razgado, 1994).
e) There is an enormous lack of knowledge regarding the cultivation of this group of plants.
f) There is a considerable amount of work to be carried out on the taxonomy of the genus.

The first step in this project was the herbarium work in the National Mexican Herbarium (MEXU) at the National University (UNAM), and the reviewing of previous papers and books about this genus by different mexican researchers, in order to develop a col-

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Table 2. *Quercus* cultivated in the Louise Wardle de Camacho Botanic Garden.

Q. acherdophylla	*Q. fusiformis*	*Q. peduncularis*
Q. acutifolia	*Q. germana*	*Q. polymorpha*
Q. acutifolia x *mexicana*	*Q. glabrescens*	*Q. praeco*
Q. affinis	*Q. glaucescens*	*Q. rugosa*
Q. candicans	*Q. glaucoides*	*Q. rhysophylla*
Q. candicans x *laurina*	*Q. hintonii*	*Q. sapotifolia*
Q. conspersa	*Q. insignis*	*Q. sartorii*
Q. convallata	*Q. laeta*	*Q.* aff. *sartorii*
Q. castanea	*Q. laeta* hybrid	*Q. sebifera*
Q. castanea x *eduardii*	*Q. lancifolia*	*Q. subspathulata*
Q. crassifolia	*Q. laurina*	*Q. scytophylla*
Q. crassipes	*Q. liebmannii*	*Q. striatula* x *tinkhamii*
Q. deserticola	*Q. magnoliifolia*	*Q. tinkhamii*
Q. deserticola x *laeta*	*Q. mexicana*	*Q. uxoris*
Q. x *dysophylla*	*Q. microphylla*	*Q. xalapensis*
Q. eugeniifolia	*Q. microphylla* hybrid	
Q. elliptica	*Q. obtusata*	

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lection strategy which could help us to increase our knowledge about Mexican oaks and to make the field work easier.

As a result of the herbarium work, around 3000 records were compiled containg 194 *Quercus* species. This work is not finished yet, however, we believe that the remaining 30 percent of the specimens are not going to change the results significantly. Regarding the actual topics studied by Mexican researchers, three are the most important: Taxonomy, Ecology and Wood technology.

After obtaining this information, it was possible to know all the *Quercus* species collected in Mexico together with their distribution. Using this information, it was possible to make a very artificial classification dividing the species into four groups:

Group 1. Species with a very restricted distibution area: *Q. hintonii* (Estado de México), *Q. hintoniorum* (Nuevo León, Coahuila) and *Q. hypoleuca* (Chihuahua).

Group 2. Species with a Central-North or Central-South distribution: *Q. tinkhamii* (San Luis Potosí, Hidalgo, Chihuahua), *Q. hypoleucoides* (Chihuahua, Sonora, Coahuila, Durango), *Q. liebmannii* (Oaxaca, Guerrero, Michoacán), *Q. insignis* (Veracruz, Jalisco, Chiapas, Guerrero)

Group 3. Species with a wide but disjunct distribution: *Q. hypoxantha* (Coahuila, San Luis Potosí, Nuevo León, Oaxaca), *Q. conzatti* (Oaxaca, Jalisco, Durango, Zacatecas), *Q. trinitalis* (Hidalgo, Tamaulipas).

Group 4. Species with a wide and continuous distribution: *Q. castanea* (21 states), *Q. laeta* (20 states) and *Q. crassifolia* (18 states).

Table 1. States with the highest *Quercus* diversity in Mexico.

State	Number of species	State	Number of species
Chihuahua	62	Coahuila	43
Oaxaca	62	Tamaulipas	43
Nuevo León	55	Puebla	42
Jalisco	55	Guanajuato	41
Durango	53	Michoacán	40
Veracruz	50	Estado de México	40
Hidalgo	48	Chiapas	40
San Luis Potosí	46		

The richest states in species diversity are: Chihuahua, Durango, Nuevo León, Coahuila, Tamaulipas, Jalisco, Guanajuato, Hidalgo, Michoacán, Estado de México, Puebla, Veracruz, Oaxaca and Chiapas (Table 1) , however, some of these differences may be due to lack of field work in some areas. Chihuahua in the north and Oaxaca in the south are far the most important with a total amount of 90 different species, 16 common to both states. These figures show that almost 50 percent of *Quercus* species can be found in only two states of the Mexican Republic. In addition, we can say that species which are located at the north have a more restricted distribution in comparison to those located in Oaxaca, which show a wider distribution in the rest of the country.

Even though this information has been very useful in the establishment of our collection strategy, it is necessary to make some consideration to it.

1. There is an unknown number of synonyms in the 194 species recorded,. which makes it difficult to know the exact number of *Quercus* species in México.
2. Many of the herbarium specimens lack fruits, making identification difficult.
3. Exploration work in Mexico is incomplete.

These points make more urgent the necessity to work in the three directions: Taxonomy, collection and exploration. This is not always as easy as it seems. The need for collection permits, contacting local authorities, collection reports and financial support, make field exploration work more difficult. Even after these problems have been solved, there still exists one of the most important characteristics of oaks: that is the unpredictability in the fruiting times which means it is often necessary to visit a site over several years in order to obtain acorns.

photos by Maricela Rodriguez - Acosta

Two examples of Quercus *cultivated at the Louise Wardle de Comacho Botanic Gardens: (top) Q. rugosa; (left) Q. magnoliifolia.*

After almost two years of work, 90 different *Quercus* species and hybrids have been found and a little more of 50 percent of them bearing fruit (Table 2). From the collections made, red and white oaks are now equally represented in the collection. They do not appear to have the same cultivation requirements, red oaks seeming to be a little more susceptible to pests than white oaks. They also show different growth

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under natural conditions. The white oaks, such as: *Q. germana*, *Q. lancifolia* and *Q. rugosa* show a better growth rate than the red oaks such as *Q. acherdophylla*, *Q. candicans* and *Q. affinis*. However, the collection is young and it is necessary to make observations over a longer period of time before we will know fully the growth characteristics and requirements of the species in the collection.

It is neccesary to say how important has been the collaboration we have established with different institutions interested in increasing the knowledge of *Quercus*. These have been invaluable to the development of the National Collection project. The Institutions which have participated with us in this are The Sir Harold Hillier Gardens and Arboretum, England; the Sciences Faculty Herbarium and National Herbarium in México; and the Puebla University Herbarium in Puebla, Mexico.

After the experience gained during these two years, the following activities should be given priority in order to improve the development of the National Mexican Oak Collection:

a) To strengthen our network at a national level.
b) To increase exploration and field work.
c) To attract financial support from a wider variety of sources.
d) To increase the number of collaborators in this project.

With these activities we believe it is possible to increase not only the number of species in the collection, but also knowledge of Mexican oaks. It is in this way that this Botanical Garden has responded to the Mexican Association of Botanic Gardens.

However, while more oak forests are explored, it is also necessary to carry out more research work in them. More hard work is needed before we can say that we have the National Mexican Oak Collection. At the moment the only thing we can say is that so far the Louise Wardle Botanic has the largest *Quercus* species collection in México.

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