

Treasures of The Sierra Madre Oriental

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My home is Monterrey, México, a city of three million inhabitants right at the footsteps of the Sierra Madre Oriental, (Eastern Sierra Madre), on the frontier between the desert and the mountain forests. My first experiments in propagation of native plants began 2 years ago on a very small scale.

Everything started on weekend trips to the sierra. On these trips I was not only surprised by its beauty and majesty, but also with the great diversity of conifers, oaks, and other plants that grow on its slopes, rivers, and cliffs. There were trees and plants I had never seen before in the city and yet of unique beauty. Then the idea of learning more about the native species as well the techniques to propagate them, came to me.

In November, 1992, I had the opportunity of visiting South Africa. What surprised me on this trip was to see that in a country where there are no native pines, they have planted them on thousands of acres. According to Department of Forestry, Republic of South Africa, in the year 1990, they planted an average of 300,000 trees per day. These trees were to supply not only their domestic needs for pulp and lumber, but also to export some of their surplus to neighboring countries. It is very meaningful that a great percentage of those trees come from seeds imported from the Sierra Madre Oriental.

The range called Sierra Madre Oriental, backbone of the Mexican northeast, has been for millennia the nest that has protected the proliferation of plant and animal species. It runs from northwest to southeast, 300 miles long and 70 miles wide. It crosses the states of Coahuila, Nuevo León, and Tamaulipas, only 150 miles south of the Texas border.

Up to 60 million years ago, at the end of the Cretaceous period, this region was covered by waters from the Atlantic Ocean. Then, thanks to plate tectonics, the pressure of the Pacific Plate against the continental North American Plate, caused the big folding of the earth's crust that gave birth to the Sierra Madre Oriental.

Later on during the Tertiary Period, the continental uplift made this range rise even higher. Some of its peaks like Cerro de la Viga, Cerro del Potosí, and Peña Nevada rise up to 12,500 ft above sea level. Very intense rains washed its basins of the marine salts, in such a way, that the sierra as we know it today, can embrace one of the most precious treasures of the earth's flora.

The abrupt climatic changes that occur every year have produced a great variety of ecosystems, rich in the number of plant species. Here you can find climates from dry summers to freezing winters, to hurricanes that now and then blow from the Gulf of Mexico bringing heavy rain to places generally dry.

According to prestigious researches like N. Mirov and J. Perry, in this small extension of land smaller than the state of Vermont, almost 20% of the pine species of the world grow as natives. Some of them like *Pinus catarinae* and *P. johannis* are of recent discovery. Others like *P. pinceana*, *P. nelsonii*, and *P. culminicola* are considered very rare, in danger of extinction.

Other conifers like firs, douglas firs, yews, cypresses, spruces, and junipers are abundant in this region. Last December, on a botanical excursion with Dr. Miguel

A. Capo, Director of the Forestry School of Universidad Antonio Narro of Saltillo, to Puerto el Conejo in the limits of the states of Coahuila and Nuevo León, we counted up to 12 different native conifers, growing on just a few acres of land.

Mingled with the conifers we found oak forests. In this region grow more than 40 species. Among the most distinguished are *Quercus fusiformis*, *Q. polymorpha*, *Q. canbyi*, and *Q. rysophylla*, which are very much sought after by foreign nurseryman for their beauty and adaptability to the urban environment.

In the valleys, canyons, and river banks one can find a great range of trees and shrubs like ebonies, bald cypresses, madrones (*Arbutus*), aspen trees, sycamores, bumelias (*Bumelia*), anacuas (*Ehretia anacua*), red buds, dogwoods, buckeyes, Mexican plums, palms, magnolias, maples, native pecans (*Carya*), elms, and many others, very beautiful and apt to be grown in nurseries.

Many botanists have spent many years exploring, collecting, and classifying the Sierra's species. Nevertheless, the treasure chest has been only partly open. How many more conifers, oaks, trees and plants wait to be discovered?

In spite of the unique beauty of the flora hidden in the Sierra, one visit to the city is enough to realize the abandonment and desolation of our parks and gardens. There is a dramatic contrast between the natural diversity of regional trees and plants and the poverty of vegetation in the urban landscape.

When the conquerors first arrived, they found a fertile valley covered by a forest of oaks, ebonies, anacuas, hackberries, bald cypresses, sycamores, mesquites, huizaches, and other species. Throughout the years, this natural garden was cut down to open up new land for agriculture, for construction lumber, and railroad ties and coal for cooking. Four hundred years after the foundation of the city, I tried to find some relics of the original forest. It is a shame to say, but the only oak I could find was the one that appears in its coat of arms. Of the rest, there were not even samples for tourists to admire.

What has happened with the attempts towards urban reforestation?

In the belief that all the exotic plants are better than native ones, nurseryman have cultivated only imported species for more than 50 years, often from the other side of the world. We can find that almost 95% of the trees that beautify the city are exotics. The other 5% grow, thanks to the fact that the original woodcutters forgot to cut them down.

Among the species we can find in the gardens, we can mention the following: ashes from Arizona, aleppo pines (*Pinus halepensis*) from Syria, eldarica pines (*P. brutia* ssp. *eldarica*) from the transcaucasus, deodar cedars from the himalayas, tallows from China, jacarandas (*Jacaranda*) from Brazil, *Eucalyptus* from Australia, and magnolias from the southwest.

Some of them have adapted well to the regional climate. Others grow sickly or show the scars of past frosts or droughts. This was nonsense having so many botanical riches on hand. Time has come to rediscover ourselves and bring back the trees that the aborigines and first conquerors enjoyed. Of course, not all the species that grow in the mountains are suited to the climate and soil of the city. Therefore we must select and experiment with the most desirable ones in order to propagate them on a larger scale.

My first step was experimenting with a selection of trees. The criteria I used was to begin with those that, due to their geographical location, had the greatest probability of surviving in the city. Some disperse samples gave me some clues as

to which ones were good candidates. Second, criteria were established to select those that were personally attractive to me.

When the fall came, I devoted myself to the collection of acorns from the nearest mountains as well as seeds of ebonies, anacuas, red buds, comitas, and buckeyes. In March, after soaking the seeds in water for 24 h, I placed them in humid folded newspapers in a germinating box at 72F. To my surprise, a good percentage of them germinated after a week. As soon as the roots broke, I planted them in small plastic containers, using a mixture of peat moss and perlite supplemented with Osmocote 18N-6P-12K and Micromax as fertilizer. I used the same method for ebonies, anacuas, bumelias, red buds, and mountain laurels, which did very well.

As for the pines, their seeds being very small, we set them in a tray with peat moss in a germinating chamber at 72F and have had very good results. For those trees whose seeds were over 1 inch in diameter, such as the native pecans and the buckeyes, I planted them directly into 1-gal containers. The seedlings stayed in the greenhouse for 2 months.

My first big surprise was when I put the first set of mountain laurels out in the sun, they were burned in a single day. Fortunately, it was only a small percentage of the crop. In Monterrey in 1993, we had an extremely hot summer, with temperatures over 100F for 3 months.

To solve this problem, I built a tunnel covered by a plastic net of 60% shade. All the seedlings that were placed in this tunnel withstood the summer heat satisfactorily.

After 4 months, the seedlings were transplanted to 1-gal containers, using a pot mix of pine bark, sand, peat moss, soil, and Osmocote 17N-7P-12K and Micromax as fertilizer. All the seedlings were placed in the shade tunnel over a wire net to allow root pruning by dehydration.

The mix used in the 1-gal containers worked fairly well for all, except for the pines. Their needles grew yellowish and very weak. When they were planted in the field, many were lost.

Ten months after their germination, trees were transplanted in the field in fabric containers. After one year, they have had to face many problems such as fire ants, weeds, root fungi, nematodes, worms, grasshoppers, pruning bees, and intense summer heat. Those that were strong and well-developed continued their growth without many problems; the weaker ones died on the way.

It is now too soon to evaluate the results. We have to wait 3 to 4 years for the trees to mature before their final transplanting into the gardens. Meanwhile the test continues, trying new native species like yellow chapotes and other pine species. It is very important to mend the errors and improve the methods of cultivation in order to avoid the problems that can be controlled. Time will tell which species will adapt to the urban landscape and which will remain only as jewels amid the mountain forest.

To conclude this presentation, I wish to say that the Sierra Madre Oriental, due to its geographical location and its diverse microclimates, has become a gigantic biological laboratory for the planet earth. Here, the evolutionary and creative process of new species development has not ended yet. And as Mirov has said "*in the tropical highlands of Mexico, there has developed a secondary center of evolution and speciation of the genus Pinus*" (Mirov, 1967). And as Perry states "it seems then, that a number of writers are in general agreement that among the Mexican and

Central American pines there are indeed many very variable species and that there is widespread interspecific hybridization. This is an ancient process and at the same time a very real and current one. Evolution is not something that only happened a million years ago, it happens every year" (Perry, 1991).

Therefore, there is a great opportunity for me to learn in my own backyard, living in this gigantic natural laboratory. These are only the very first steps of a life-long, and maybe, multi-generational project towards restoring and putting back 60-million years of splendor into our urban landscape.

LITERATURE CITED.

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