

URBAN FORESTRY ACTIVITIES IN MEXICO¹

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Mexico is located south of the United States of America and northwest of Guatemala and Belize. Over its 1,958,201 km² of extension, deserts, boreal forests, jungles, and coastal plains, temperate ecological associations occupy large areas. Due to the fact that Mexico is the link between the temperate and boreal North America and tropical Central America, this country has a remarkable ecological diversity. Consequently Mexican flora and fauna are considered among the most varied of the world. This fact is encouraging from the point of view of potentialities of trees and plants for urban use worldwide.

The Mexican Republic has been characterized by a notable population growth rate, mainly in recent years. This country has a population of 6.2 millions in 1820; 15.1 millions in 1910 and is reaching 80 millions in 1986. The growth rate has decreased however, from 3.4% during the 1940-1974 period to 2.7% (Anonimo, 1985).

As a result of a continuing migration from rural areas to the cities, more than half of the population of Mexico (68%) is at present concentrated in urban areas. This trend is causing numerous problems, since most of the cities were not prepared for such sudden expansion. This problem has reached a dramatic point in the case of Mexico City, which has now the largest human concentration in the world (21 millions). Similar problems though with a lower level of complexity are also present in Guadalajara (3.5 million); Monterrey (3.0 millions); Puebla and Leon.

Mexico City offers today an alarming perspective. With an extension of 1,479 km², its relative population density has become the highest in the world. As a result, a severe detrimental impact on the environment has occurred. In order to reduce this huge problem, the federal and city authorities have been undertaking relevant actions, among which the urban forestry program is particularly important.

Urban Forestry Historical Development

The Mexican society is a distinct mixture of two cultures: that of the native inhabitants and of the Spanish conquerors. The interaction of these cultures can be appreciated not only in the physical characteristic of the population but in their work. In this respect, urban forestry development is not the exception.

Prehispanic cultures created regular spaces within which they distributed housing, agriculture, and ornamental and medicinal gardens. The conception of these gardens was open and informal. In these, native varieties of trees and shrubs were cultivated. There, the first examples of topiary art in America were practiced (De Herrera, 1980).

After the conquest, the Spaniards brought to New Spain (former name for Mexico), the influence of the Arab gardens, as is the case of interior patios in housing and the public plazas in towns. The plazas were designed with a good sense in the use of space, geometrically, usually adopting a rectangular shape. At their sides the main municipal, commercial, and religious buildings were located. Splendid native and exotic trees and beautiful gardens characterized those plazas, which made them some of the most attractive places in town and a spot of social relevance. Much of this tradition still remains in small towns.

At the end of the 18th century, many of the most important thoroughfares in the nation were characterized by long rows of trees planted along their sides. Many of these are now important avenues. Ash, poplar, alder, willow, olive, and cypress trees were among the species most used in Mexico City. It was during this time when the forest stands located inside the urban centers and those in the periphery of cities were severely reduced. Their wood was used by the city population as construction material or as fuel (Departamento del Distrito Federal, 1985).

During the years of the French intervention in

1. Presented at the annual conference of the International Society of Arboriculture in San Antonio in August 1986.

Mexico (1864-1867), new concepts regarding the use of green space were introduced. The layout of green areas became very geometrical and rigid, following set patterns. An example of this is seen in the "Alameda Central" in downtown Mexico City. This influence prevailed until the beginning of the present century.

During the last years of the 19th century and the first decades of the present century, a strong forestry movement arose in Mexico. As a consequence, work was done to increase the number of green areas in Mexico City, Veracruz, Cordoba, and other cities. During these years, the establishment of avenue garden islands with diverse types of vegetation and the planting of trees along sidewalks was promoted (Quevedo, 1935).

In recent decades, efforts have been directed toward the establishment of city parks in the suburbs and new urban developments, and the restoration of forest stands on lands located in the vicinity of the cities.

In Mexico City, an important agency, the "Comision Coordinadora para el Desarrollo Agropecuario" is responsible for the planning, designing, and management of the urban green areas. Work is concentrated on streets, city parks, gardens, historical sites, monuments, and zoos, in the quest of better environmental conditions for the city dwellers (Departamento del Distrito Federal, 1985).

Present Urban Forestry Practices

Even though urban forestry as a practical activity has been applied in Mexico for a long time, it had not been considered a technical discipline until recently. Even at present, urban forestry is still not included as a formal course in the curriculum of the Mexican Forestry Schools. As a result, the management of urban vegetation is highly empirical, depending to a large extent on the experience of practical gardeners and arborists.

The management of the urban vegetation is very irregular throughout all Mexican cities, and depends on the particular interest of local authorities and available funding. In Mexico City and the larger cities of Mexico, urban forestry displays three different conditions. The first can be recognized in the downtown sections. It includes the historical and oldest parts of the cities.

In this section, there is usually a traditional Central Park with big and beautiful trees. Urban forestry under these conditions reflects old traditions and practices. This is probably where authorities are most concerned with giving good care to the vegetation. The second condition is observed in the new urban developments, usually at the periphery of the cities. Here, urban forestry is being carried out with a modern conception and with patterns developed in cities of the United States. The third condition occurs in the poor suburbs where a violent rural migration to the cities has not allowed for adequate planning. The extremely high population density in these areas has resulted in a total lack of or very deficient green areas. Some concerned inhabitants have planted trees within their lots, in a disorderly and irregular manner.

Because of the great ecological and climatic diversity that exists nationwide, urban forestry differs considerably throughout Mexico. A brief discussion is presented of the differences observed between the tropical, arid, and temperate regions.

The urban forestry effort nationwide is carried out mainly in parks, streets, and access highways.

Temperate regions. A typical temperate region is located in the high plateau of the Valley of Mexico, the geographic center of the country. Mexico City, Puebla, Toluca, Pachuca, and several other important cities lie in this region. It is in this region, also, where the greatest urban concentration has developed, and as a consequence where most of the urban forestry effort in the nation has been carried out.

In the parks and gardens of Mexico City and some of the most important cities of the region, a mixture of tree species is frequently found. The most usual broad leaf species are: eucalypts (*Eucalyptus* spp); ash trees (*Fraxinus* spp); liquidambar (*Liquidambar styraciflua*); laurel (*Laurus nobilis*); oak (*Quercus castanea* and *Q. laurina*); and poplars (*Populus deltoidea* and *P. tremula*). Two introduced species, *Tamarix parviflora* and *Shinus molle*, have proven to possess remarkable rusticity in northern Mexico. The conifer species of greatest demand for the temperate regions are: white cedar (*Cupressus* sp); Libanese cedar (*Cedrus deodara*); araucaria (*Araucaria excelsa*) and some pines, among which Radiata pine is the

most important. Two types of palms, *Phoenix dactylifera* and *Washingtonia filifera* are used widely in parks and avenue garden islands.

Arid regions. It is estimated that about 90 million ha., which constitute about 46% of the total national area, are covered by arid lands. These regions are located mainly in northern Mexico. Some of the most important cities of the country lie in the arid regions, that is the case of Monterrey (the third largest city), Chihuahua, Hermosillo, and La Paz, to cite a few.

Urban forestry practices in arid lands imply the cultivation of drought tolerant trees and shrubs. But it is not unusual to find other types of vegetation (mainly tropical), where water supplies are not so limited. In Monterrey, the typical trees along the city streets, are ash (*Fraxinus americana*); poplar (*Populus tremuloides* and *P. arizonica*) and Jacaranda (*Jacaranda acutifolia*). Other species not so widespread are palms (*Washingtonia robusta*) and sycamore (*Platanus occidentalis*). In parks and gardens, in additions to the former species, Araucaria (*Araucaria* spp.); Magnolia (*Magnolia grandiflora*); Indian laurel (*Ficus nitida*) and "Primavera" (*Melia azederach*) trees are also found.

Some types of palms, mainly *Washingtonia filifera* and *Phoenix dactylifera* together with yuca (*Yucca* sp.) are a frequent scenery in cities of arid northern Mexico.

Barker (1985) noticed in Chihuahua, that trees in parks are placed at very narrow spacings, with severe crown cuttings, circumstances that do not allow the obtainment of the greatest benefits from these trees.

Tropical regions. Southeastern Mexico (the Yucatan peninsula) and the coastal plains along the Pacific Ocean and the Gulf of Mexico are classified as tropical lands, and are probably the most complex ecosystems in the whole nation. They are characterized by high temperatures (usually ranging from 20 to 30°C); heavy rainfalls (1000-2500 mm) and the highest degree of ecological diversity (more than 40 species per hectare). These regions are the home of red cedar, mahogany, chewing gum trees, and many other species of trees. The tropical region occupies an extension of 29 million hectares (Secretaria de Agricultura y Recursos Hidraulicos,

1983).

Several tropical trees behave fairly well under urban conditions. Some of these have specially attractive features such as, stem form (*Taxodium mucronatum*); flower beauty (*Jacaranda* spp. and *Delonix regia*); pleasant general appearance (*Brosimum alicastrum*); exuberant foliage (*Ficus* spp.); etc.

Among the adverse factors that affect urban trees in tropical Mexico, different species of ants (*Ata* sp.) are probably the main cause of serious damage.

Damaging agents. Urban trees are usually affected by diverse biotic and abiotic agents. The biotic agents are pests and diseases, which cause damages according to species and local conditions. Some of the most important pests are listed in Table 1.

Table 1. Main pests of urban forest trees in Mexico.

Pest	Main species affected
<i>Lepericinus</i> sp	ash (<i>Fraxinus</i> sp)
<i>Phloeosinus tacubayae</i>	white cedar (<i>Cupressus</i> sp)
<i>Dendroctonus mexicanus</i>	pinus (<i>Pinus</i> sp)
<i>Ata</i> sp	tropical brodleaves
<i>Tropidosteptes chapingoensis</i>	ash (<i>Fraxinus</i> sp)
<i>Roschildia orizabae</i>	ash (<i>Fraxinus</i> sp.) Pirul (<i>Schinus molle</i>) and Troeno (<i>Ligustrum</i> sp)
<i>Corythucha salicata</i>	poplar (<i>Populus</i> sp)
<i>Phylloxera</i> sp	poplar (<i>Populus</i> sp)
<i>Ucinula</i> sp	poplar (<i>Populus</i> sp)
<i>Malacosoma</i> sp	willow (<i>Salix</i> sp)
<i>Paraleucoptera</i> sp	willow (<i>Salix</i> sp)
<i>Tetranychus</i>	troeno (<i>Ligustrum</i> sp)
<i>Gynaikothrips ficorum</i>	figus sp
<i>Saissetia</i> sp	figus sp

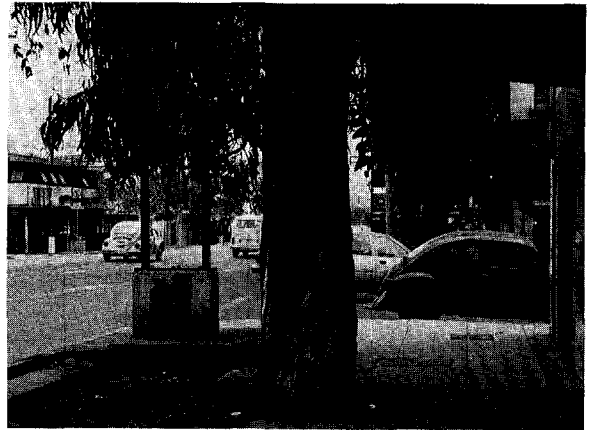
In general, pests and diseases have not become a serious threat to urban vegetation in Mexico, despite the fact that in some cities monocultures are frequent. A serious exception occurred recently in the "Bosque de Chapultepec," one of the most important parks in Mexico City. Here the combined damage caused by people, rodents, defoliators, and bark beetles put in danger the existing forest.

Future Perspectives

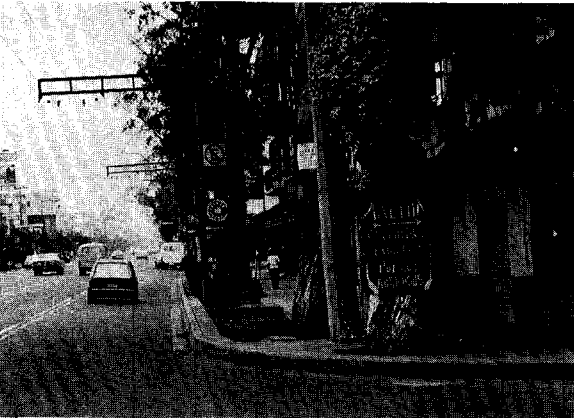
The rapid growth of Mexican urban centers in



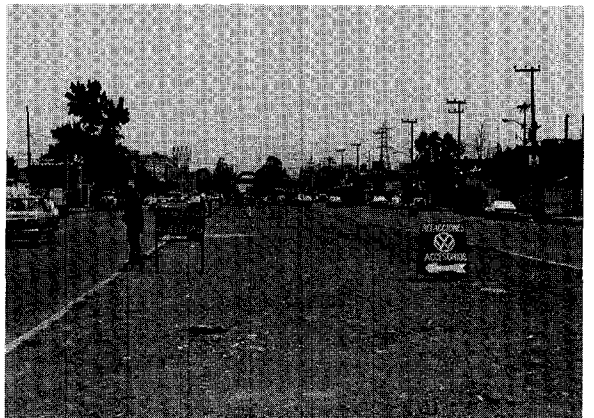
Palms and other types of urban trees in a Mexico City garden island



Selection of species and planting techniques are empirical thus leading to frequent mistakes



Urban trees are used in many cases for various purposes



Many sections of the cities, mainly in the poor suburbs, are still lacking of trees and vegetation



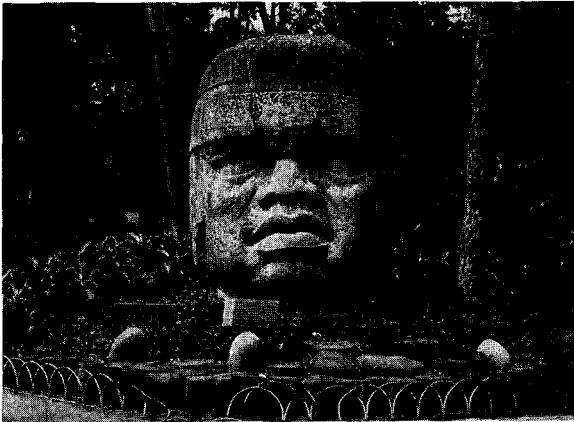
Urban trees in a poor suburb as contrasted with trees in a new urban development



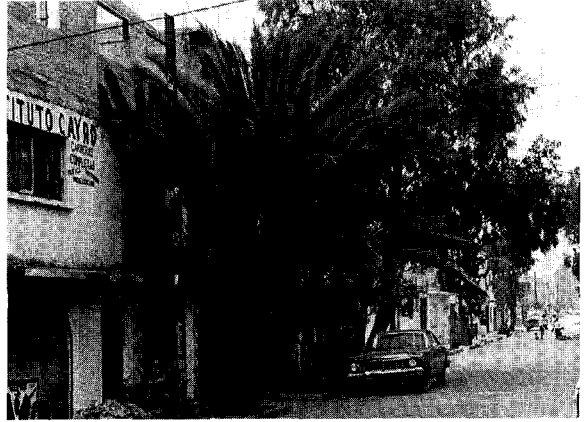
Mexican topiary art is common in streets and parks



Rubber trees (*Ficus elastica*) are frequently used in Mexico City streets



Olmec head surrounded by vegetation in "parque hundido", Mexico City



Example of indiscriminate use of urban trees with no consideration for future growth requirements



Different aspects relative to the maintenance and care of urban vegetation in Mexico

recent years has given rise to the urgent need for an aggressive urban reforestation program. In this respect, Mexico City presents the greatest urgency, but it also displays the most valuable experiences. Despite present policies of decentralization by the Federal Government, it appears that city growth has not yet reached its peak. Apparently, Mexico City and the largest Mexican cities will continue their expansion during coming years, and this poses a serious threat to urban foresters.

Mexico City has approximately 2.7 m² of green areas per inhabitant. This figure is far below what the World Health Organization suggests as an acceptable ratio (9m²/inhabitant) (Anonimo, 1985). After the September, 1985 earthquake, areas occupied by buildings that collapsed have been set aside as future green areas. This policy will provide the opportunity to expand urban vegetation and improve living conditions for the city dwellers.

Since the level of atmospheric contamination has been increasing at an alarming rate in our largest cities, a dynamic urban reforestation program has been undertaken by our authorities in recent times. The results, however, are not yet satisfactory. Many problems are being faced, among which the following are outstanding:

1. *Vandalism*. The destruction of vegetation under this concept, varies in the different sectors of the cities. In the poorer suburbs of Mexico City, the figure of lost materials reaches a peak of 60%.

2. *Insufficient maintenance in all urban green areas*. To a large extent due to limited funding, the present labor and resources devoted to keeping all urban vegetation in satisfactory conditions are far from adequate.

3. *Inadequate species and inappropriate management techniques*. Trees are used in cities according to nursery availability. Quite frequently seedlings in stock are not the most adequate for

the planting area. On the other hand, as it has been pointed out, most of the tree management techniques used in Mexican cities are of a traditional and empirical nature. In many cases, those techniques are not appropriate. Problems of this nature are evident in relation to tree spacing, pruning, trimming, insect and disease control, etc. (Barker, 1985).

In order to overcome the above cited problems and limitations, a good planning scheme must be prepared for the coming years. Training at different levels must be included as an important component of this plan. However to successfully implement a plan of this nature requires solid political support. The understanding and backing of the same by federal, state, and regional authorities will play a very important role in the future development of Mexican urban forestry. The uncontrolled growth of our cities and the urgent needs to improve the quality of life in most urban centers, however, is increasing the awareness of the Mexican people toward the importance and great potentialities of urban forestry.

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