

## Floristic composition in deciduous tropical forest to west of Irapuato, Guanajuato

### Composición florística del Bosque tropical caducifolio al oeste de Irapuato, Guanajuato

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#### Abstract

The flora of Irapuato has been poorly explored, because it is an area dedicated to agriculture and there are few strains of tropical deciduous forest and subtropical scrubland. The objectives of the study were to know the floristic composition in Cerro del Veinte, compare the richness of species with other locations that have the same type of vegetation and determine the conservation status of the species according to NOM-059 SEMARNAT-2010. The sampling was through free transects of approximately 1 km in the Barrancas La Escondida and El Paiste. A total of 59 families, 137 genera, 171 species and four varieties were obtained. The best represented families are Asteraceae, Fabaceae and Pteridaceae. According to the Chao 2 estimator, the sampling effort in the study area was 87%. Floristic affinity in Cerro del Veinte was greater with the Hoya de Rincón de Parangueo (38%) and Sierra de Pénjamo (32%). In addition, there are three new species reported for Guanajuato, *Govenia lagenophora* and *Sacoila lanceolata* (Orchidaceae) and *Solanum edmundoi* (Solanaceae). The taxa *Cedrela odorata* and *Erythrina coralloides* are included in NOM-059-SEMARNAT-2010.

**Cerro del Veinte, Chao 2 estimator, Orchidaceae**

#### Resumen

La flora de Irapuato ha sido poco explorada, debido a que es un área dedicada principalmente a la agricultura y quedan pocos manchones de bosque tropical caducifolio y matorral subtropical. Los objetivos del estudio fueron conocer la composición florística en el Cerro del Veinte, comparar la riqueza de especies con otras localidades que presentan el mismo tipo de vegetación y determinar el estado de conservación de las especies de acuerdo a la NOM-059 SEMARNAT-2010. El muestreo fue por medio de transectos libres de aproximadamente 1 km en las Barrancas La Escondida y El Paiste. Se obtuvo en total 59 familias, 137 géneros, 171 especies y cuatro variedades. Las familias mejor representadas son Asteraceae, Fabaceae y Pteridaceae. De acuerdo al estimador Chao 2 el esfuerzo de muestreo en el área de estudio fue de 87 %. La afinidad florística en el Cerro del Veinte fue mayor con la Hoya de Rincón de Parangueo (38%) y Sierra de Pénjamo (32%). Además, se tienen tres nuevas especies reportadas para Guanajuato, *Govenia lagenophora* y *Sacoila lanceolata* (Orchidaceae) y *Solanum edmundoi* (Solanaceae). Y los taxones *Cedrela odorata* y *Erythrina coralloides* están incluidas en la NOM-059-SEMARNAT-2010.

**Cerro del Veinte, Estimador Chao 2, Orchidaceae**

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## Introduction

Mexico is a country with great floristic diversity with a record of 23 314 species of vascular plants (Villaseñor, 2016), also presents different types of vegetation throughout its territory, one of these communities is the tropical deciduous forest (BTC) or Low deciduous forest (Rzedowski, 2006). The tropical deciduous forest is characterized by having a very diverse flora and approximately 60% of its elements are endemic. The distribution of the forest in the Bajío region has a semi-warm climate with the lowest minimum temperature of 6°C and altitudes above 1700 meters above sea level (Trejo-Vázquez, 1999). The BTC on flat land has disappeared due to the ease of access to establish cultivation areas or agostaderos, causing fragmentation of isolated locations that are currently part of secondary vegetation (Zamudio, 2012).

In the state of Guanajuato, the BTC originally occupied large areas, to the south in the biogeographic province that corresponds to the Neovolcanic Axis where it mainly covered hillsides and ravines; but in the last 20 years its extension has decreased, due to agriculture and logging; Currently, there is a record of less than 10% of the total area of the state, and there are only fragments in isolated locations or becoming secondary vegetation such as subtropical scrubland (Rzedowski and Calderón de Rzedowski, 1987; Zamudio, 2012).

Another factor that has influenced the loss of the BTC is the immoderated logging of some timber species used in construction, such as poles and fuels (Rzedowski, 2006).

The floristic components of the tropical deciduous forest are variable depending on each zone and even this plant community in the country is scarcely similar in its flora (Rzedowski and Calderón de Rzedowski, 2013). The presence or absence of some floristic elements depends on environmental factors such as temperature, humidity and precipitation, in addition these forests generally do not have a dominant species because they are very diverse.

In Guanajuato it is common to find tree species such as *Lysiloma microphylla* (stick prieto), *Albizia plurijuga* (white stick), *Bursera cuneata* (copal), *Ceiba aesculifolia* (ceiba or pochote), *Ipomoea mururoides* (huntrress), *Vachellia farnesiana* and *V. schaffneri* (huizache), *V. pennatula* (tepame), *Bursera fagaroides* (cuajiole or copal), *Opuntia streptacantha* (nopal cardón), *Heliocarpus terebinthinaceus*, *Myrtillocactus geometrizans* (garambullo), *Agonandra racemosa*, *Eysenhardtia polystachya* (sweet stick), coral stick) *Senna polyantha*, *Parkinsonia aculeata* (reed), *Prosopis laevigata* (mesquite), *Casimiroa edulis* (white sapote). And shrub species such as *Calliandra humilis*, *Condalia velutina*, *Senna floribunda*, *Mimosa aculeaticarpa* and *Verbesina sphaerocephala* (Rzedowski, 2006; Zamudio, 2012). In Guanajuato and in other states there is no dominant species in the BTC, but the presence and abundance of Fabaceae family species that has persisted and evolved in these environments is evident (Hernández-Ramírez and García-Méndez, 2015).

The vascular flora in the state of Guanajuato is estimated at 3,206 species, of which 3032 are flowering plants, 150 lycopods and ferns and 24 gymnosperms and only seven taxa are reported as endemic in the entity (Villaseñor, 2016).

The floristic studies in the municipality of Irapuato are few, López and Martínez (2009) in the ANP Cerro de Arandas recorded a list of 22 taxa, the dominant species being *Vachellia farnesiana* and *Ipomoea mururoides* and Hernández-Hernández et al., (2017) 30 species of lycopodia and ferns report in Tamahula, Cerro del Veinte.

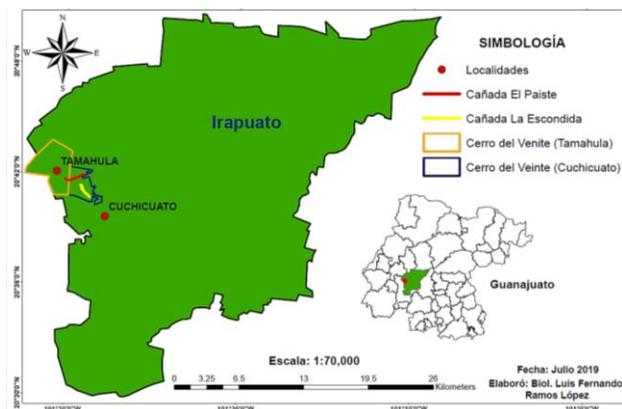
The objectives of the present study were to obtain the floristic list in two canyons of Cerro del Veinte to establish a comparison with other localities of Guanajuato that present the same type of vegetation (BTC) and also determine if any of the species is in some criterion of conservation according to NOM-059- SEMARNAT-2010 (SEMARNAT, 2010).

## Study area

The Cerro del Veinte is located in the western portion of the municipality of Irapuato and northeast of Abasolo, occupies an area of approximately 6120.52 ha (INEGI, 2015).

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The study covered two ravines located in the community of Cuchicuato, Irapuato, 1) Barranca la Escondida is located south of the hill at  $20^{\circ} 41' 26.6''$  N and  $101^{\circ} 30' 18.6''$  W, at an altitude range between 1815 to 2023 meters above sea level and 2) Barranca el Paiste is located east of the hill at  $20^{\circ} 41' 49.47''$  N and  $101^{\circ} 30' 18.0''$  W, at 1866 to 2094 meters above sea level (Figure 1).



**Figure 1** Geographical location of Cerro del Veinte, Irapuato, Gto.

It has a sub-humid semi-warm climate, with an annual average cumulative precipitation of 688 mm, the rainiest month is August with 160 to 170 mm and the one with the lowest rainfall is February with 5 mm. The average annual temperature is  $18.7^{\circ}$  C, the warmest month is May with  $28^{\circ}$  C and the coldest January with  $16^{\circ}$  C (INEGI, 2015).

The municipality of Irapuato is part of the Lerma River basin (hydrological region 12), which in turn is divided into three sub-basins, 1) Guanajuato, 2) Temacatío and 3) Pénjamo - Irapuato-Silao; This last sub-basin is where the study area is located (Cruz-José et al., 2012).

The type of soil present in the hill is vertisol, they are shallow soils of 50 cm, shallow and stony brown to black, clayey texture with moisture retention capacity and low organic matter (Quijano-Carranza et al., 2012).

## Methodology

The collection of vascular plants was carried out during the period from February 2015 to January 2016, both in the rainy and dry season; the sampling was by the method of free transects of approximately one kilometer (Mostacedo and Fredericksen, 2000) in the two canyons of Cerro del Veinte.

The identification of the plants was with the help of specialized literature and field guides (Rzedowski and Guevara-Féfer, 1992; Mickel and Smith, 2004; Calderón de Rzedowski and Rzedowski, 2004; Cretcher et al., 2010; Sahagún-Godínez et al., 2014). Herbalized material was deposited in the collection of the Higher Technological Institute of Irapuato.

## Statistic analysis

The sampling effort was measured by means of species accumulation curves, based on random sampling. Species richness was calculated using the Chao 2 diversity estimator (Jiménez-Valverde and Hortal; 2003), in the EstimateS 9.1.0 program (Colwell, 2013).

The Sørensen Similarity Index was applied to estimate the number of shared species, with four locations in Guanajuato, the criterion was that the localities presented tropical deciduous forest, and thus determine the similarity between sites based on the number of related species (Moreno , 2001).

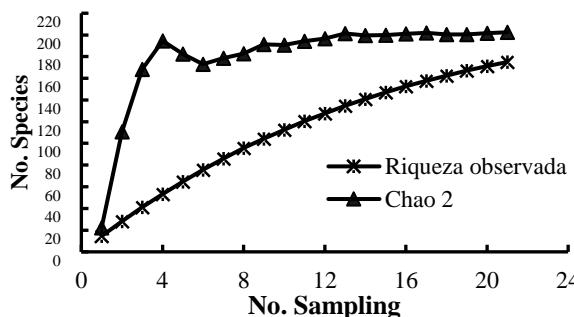
## Results

A total of 319 specimens of vascular plants corresponding to 59 families, 137 genera, 171 species and 4 varieties were reviewed. The families with the highest number of species are Asteraceae (20), Fabaceae (16) and Pteridaceae (14). The largest number of species corresponds to the herbaceous stratum as elements of the undergrowth, the tree stratum with 20 species that constitutes the major part of the vegetation cover and vines with 11 taxa (Annex 1).

The species included in NOM-059-SEMARNAT-2010 are *Cedrela odorata* subject to special protection and *Erythrina coralloides* as threatened.

Some rare species that are found only once on the hill, are *Dichromanthus cinnabarinus*, *Govenia lagenophora* and *Sacoila lanceolata* belonging to the Orchidaceae family; *Jarilla caudata* is an edible plant in the study area; other scarce taxa are *Pavonia candida* and *Solanum edmundoi* and some *Bursera penicillata*, *Colubrina triflora* and *Manihot caudata* trees.

The Chao 2 estimator predicts 212 species (with 95% completeness) and so far 87% of the flora in the Cerro canyons has been inventoried with the observed wealth of 175 taxa (Fig. 2).



**Figure 2** Accumulation curve of species present in the El Paiste and La Escondida Canyon of Cerro del Veinte

The floristic similarity of the BTC in the Cerro del Veinte and other towns of Guanajuato was greater with Hoya de Rincón de Parangueo (38%) and Sierra de Pénjamo (32%) and less with Cerro de Arandas and San José de Iturbide (Table 2 ).

**Table 2.** Floristic comparison between communities with tropical deciduous forest in Guanajuato. In parentheses the total number of species of each shared area / taxa and altitude is presented.

Locations	Hill of Twenty (175 spp.) 1974- 2036 m. Similarity percentage
Cerro de Arandas, Irapuato (22/11 spp.), 2000 m	11.6
Hoya Rincon de Parangueo (228/77 spp.), 1850 m	38
Sierra de Pénjamo (258/74 spp.), 1783-1950 m	34
San Jose Iturbide (69/10 spp.), 2100-2500 m	8

## Discussion

The tropical deciduous forest is characterized by presenting great floristic diversity; however, at a specific level there is no complete estimate of the species that inhabit these Forests, but there is a report of 749 genera of phanerogams of which 96 are dominant and frequently grow in Mexico (Rzedowsky and Calderón de Rzedowsky, 2013), for the hill of Twenty there is a total of 124 genera that is 16.55% of those recognized in the country and the dominant and similar genera corresponds to 16.66%;

Trejo-Vázquez (1999) mentions the low floristic similarity of the BTC between the different entities of the Mexican Republic.

In the Bajío Guanajuatense region, the BTC is regularly distributed in cerrile portions and at altitudes greater than 1800 meters above sea level (Trejo-Vázquez, 1998), Cerro del Veinte presents these conditions, that is, it is an area with steep slopes and is located between 1974 to 2036 masl.

The families of angiosperms important for their abundance in the BTC are Asteraceae, Fabaceae, Malvaceae, Acanthaceae, Cucurbitaceae, Malpighiaceae, Euphorbiaceae and Sapindaceae (Rzedowski and Calderón de Rzedowsky, 2013), in the Hill the best represented families are Asteraceae (20 spp.) and Fabaceae (16 spp.) with the highest number of species, in Acanthaceae and Euphorbiaceae there are 6 species and the remaining families with only two taxa; Aguilera (1991) in the crater Hoya de Rincón de Parangueo also reported 22 species of Asteraceae and in Fabaceae 23.

Another relevant group, although scarcely diverse in the BTC are lycopodia and ferns, in the Sierra de Pénjamo 37 species were found and the representative family is Pteridaceae with 16 (Hernández-Hernández et al., 2016), this family was also abundant in The work area with 14 taxa. The species included in NOM-059-SEMARNAT-2010 are Cedrela odorata in the category subject to special protection and Erythrina coralloides as threatened.

On the other hand, Manihot caudata is a rare species in the shoal (Aguilera, 1991) and Bursera penicillata is in danger of disappearance in the shoal (Rzedowski and Guevara-Féfer, 1992). The species Govenia lagenophora and Sacoila lanceolata belong to the Orchidaceae family and are new records for the state of Guanajuato, it had not been inventoried in the literature (Zamudio and Galván-Villanueva, 2011; Villaseñor, 2016), these orchids are of terrestrial habit and Very few in the BTC, they usually grow in places with favorable atmospheric humidity, at higher altitudes as is the case in the study area and are also considered as sensitive to disturbance (Rzedowsky and Calderón de Rzedowsky, 2013).

Taking into account these abiotic factors, it can be affirmed that the state of conservation in the El Paiste ravine of Cerro del Veinte is suitable for the establishment of these orchids, on the other hand in the La Escondida ravine, the *Dichromanthus cinnabarinus* orchid was already registered with Priority in the state (Zamudio and Galván-Villanueva, 2011).

The species *Solanum edmundoi* (Solanaceae) was recently reported for Mexico, the type specimen described comes from the Sierra de Cacoma, Jalisco (Cuevas-Guzmán and Núñez-López; 2015; Villaseñor, 2016), and had not been found in Guanajuato and grows in the El Paiste ravine in a preserved area. According to the Chao 2 estimator, the sampling effort was appropriate on the hill of Twenty, 87% was inventoried and 37 species would be missing to reach the asymptote.

The similarity in the composition and richness of BTC species in Cerro del Veinte compared to the four areas of Guanajuato, had greater affinity with the Sierra de Pénjamo by sharing 74 species (Guadian-Marín, 2012) and the Hoya de Rincón de Parangueo with 77 taxa (Aguilera, 1991) and was smaller with San José de Iturbide with only 10 species in common (Gutiérrez and Solano, 2014), in the Guanajuatense basin this vegetable community is distributed between 1700 to 2000 m, within higher altitude areas in the Mexican Republic (Rzedowski and Calderón de Rzedowski, 1987). In addition, the floristic composition of the BTC usually differs mainly due to abiotic factors such as climate, altitude and geographical arrangement of each region and the floristic affinity of most BTC taxa are of Neotropical origin (Trejo-Vázquez, 1999).

## Conclusion

The floristic diversity of the BTC in the Cerro del Veinte consists of 175 taxa of vascular plants, where conservation indicator species such as terrestrial orchids are still growing. According to the Chao 2 estimator, 13% of the vascular flora in the hill remains to be collected, so it is recommended to continue with the botanical exploration.

This study is a contribution to floristic knowledge in Irapuato, Guanajuato and could serve as a basis for proposing the area in conservation programs, being a relict of BTC in the municipality.

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**Anexo 1** List of families, genera and species present in the ravines El Paiste (PTE) y La Escondida (ESC) del Cerro del Veinte. H = Herbácea, B= Bejucos, Arb = Arbusto, A = Árbol.

Family / Species	Ravine		Habit
	Pte	Esc	
<b>Lycopodiaceae</b>			
<i>Selaginella Delicatissima</i>	X		H
<i>Selaginella Lepidophylla</i>	X	X	H
<i>Selaginella Rupincola</i>	X	X	H
<b>Helechos</b>			
<b>Aspleniaceae</b>			
<i>Asplenium Exiguum</i>	X		H
<i>Asplenium Gentryi</i>	X	X	H
<b>Cystopteridaceae</b>			H
<i>Cystopterys Fragilis</i>	X		H
<b>Polypodiaceae</b>			
<i>Pleopeltis Polypodioides</i>	X		H
<i>Pleopeltis Thysanolepis</i>	X	X	H
<b>Pteridaceae</b>			
<i>Adiantum Concinnum</i>	X	X	H
<i>Argyrochosma Incana</i>	X		H
<i>Argyrochosma Pallens</i>		X	H
<i>Astrolepis Sinuata</i>	X	X	H
<i>Bommeria Pedata</i>		X	H
<i>Cheilanthes Lozanii Var. Seemannii</i>		X	H
<i>Gaga Kaulfussii</i>	X		H
<i>Myriopteris Allosuroides</i>		X	H
<i>Myriopteris Aurea</i>	X	X	H
<i>Myriopteris Cucullans</i>	X	X	H
<i>Myriopteris Myriophylla</i>	X	X	H
<i>Pellaea Cordifolia</i>	X	X	H
<i>Pellaea Ovata</i>	X		H
<i>Pellaea Villosa</i>	X		H
<b>Woodsiaceae</b>			
<i>Woodsia Mexicana</i>	X		H
<i>Woodsia Mollis</i>	X		H
<b>Dicotyledoneae</b>			
<b>Acanthaceae</b>			
<i>Anisacanthus Pumilus</i>	X		Arb
<i>Dyschoriste Hirsutissima</i>	X	X	H
<i>Henrya Insularis</i>	X	X	H
<i>Justicia Candicans</i>		X	Arb
<i>Ruellia Lacaea</i>	X	X	H
<i>Tetramerium Nervosum</i>	X	X	H
<b>Amaranthaceae</b>			
<i>Amaranthus Hybridus</i>	X		H
<i>Gomphrena Serrata</i>	X	X	H
<i>Iresine Grandis</i>	X	X	Arb
<b>Apiaceae</b>			
<i>Prionosciadium Watsonii</i>	X		H
<b>Apocynaceae</b>			
<i>Asclepias Linaria</i>	X		H
<i>Funastrum Pannosum</i>		X	B
<i>Mandevilla Foliosa</i>		X	Arb
<i>Matelea Chrysanthia</i>	X		B
<b>Asteraceae</b>			
<i>Acoutia Reticulata</i>	X		H
<i>Ageratum Corymbosum</i>	X		H
<i>Barkleyanthus Salicifolius</i>			
<i>Bidens Bigelovii</i>	X		H
<i>Bidens Odorata</i>		X	H
<i>Bidens Triplinervia</i>	X		H
<i>Erigeron Bonariensis</i>	X		H
<i>Dahlia Coccinea</i>	X		H
<i>Galeana Pratinensis</i>	X		H
<i>Lactuca Serriola</i>	X		H
<i>Montanoa Bipinnatifida</i>	X	X	Arb
<i>Psacalium Platylepis</i>	X		H
<i>Roldana Heracleifolius</i>		X	Arb
<i>Barkleyanthus Salicifolius</i>	X		Arb
<i>Sonchus Oleraceus</i>	X		H
<i>Tagetes Lucida</i>	X		H
<i>Tagetes Lunulata</i>	X	X	H
<i>Tagetes Micrantha</i>	X		H
<i>Trigonospermum Annuum</i>		X	H
<i>Vernonia Alamanii</i>	X	X	Arb
<i>Zinnia Peruviana</i>	X	X	H
<b>Begoniaceae</b>			
<i>Begonia Gracilis</i>	X	X	H

Bignoniaceae		
<i>Tecoma Stans</i>		X
Brassicaceae		
<i>Lepidium Virginicum</i>	X	
Burseraceae		
<i>Bursera Bipinnata</i>		X
<i>Bursera Fagaroides</i>		X
<i>Bursera Palmeri</i>	X	
<i>Bursera Penicillata</i>		X
Cactaceae		
<i>Coryphantha Elephantidens</i>	X	
<i>Mammillaria Magnimamma</i>	X	X
<i>Myrtillocactus Geometrizans</i>	X	X
<i>Peniocereus Serpentinus</i>	X	
<i>Stenocereus Pruinosus</i>	X	X
Cannabaceae		
<i>Celtis Caudata</i>	X	X
Caricaceae		
<i>Jarilla Caudata</i>		X
Convolvulaceae		
<i>Evolvulus Alsinooides</i>		X
<i>Ipomoea Hederifolia</i>	X	
<i>Ipomoea Mururoides</i>	X	X
<i>Ipomoea Purpurea</i>	X	X
Crassulaceae		
<i>Echeveria Subrigida</i>		X
<i>Sedum Ebracteatum</i>		X
<i>Sedum Jaliscanum</i>	X	
Cucurbitaceae		
<i>Cyclanthera Ribiflora</i>	X	
<i>Schizocarpum Parviflorum</i>	X	X
Euphorbiaceae		
<i>Cnidoscolus Angustidens</i>		X
<i>Croton Ciliatoglandulifer</i>	X	X
<i>Croton Morifolius</i>	X	X
<i>Euphorbia Tanquahuete</i>	X	X
<i>Jatropha Dioica</i>		X
<i>Manihot Caudata</i>	X	X
Fabaceae		
<i>Brongniartia Intermedia</i>	X	X
<i>Cologania Broussonetii</i>	X	X
<i>Dalea Foliolosa</i>		X
<i>Erythrina Coralloides</i>	X	X
<i>Eysenhardtia Polystachya</i>		X
<i>Hesperalobzia Occidentalis</i>	X	X
<i>Lysiloma Microphylla</i>	X	X
<i>Macropilium Atropurpureum</i>		X
<i>Macropilium Gibbosifolium</i>	X	
<i>Nissolia Microptera</i>	X	X
<i>Phaseolus Vulgaris</i>	X	X
<i>Senna Hirsuta Var. Glaberrima</i>	X	
<i>Senna Polyantha</i>	X	X
<i>Vachellia Farnesiana</i>	X	X
<i>Vachellia Schaffneri</i>	X	
<i>Zapoteca Formosa</i>	X	X
Juglandaceae		
<i>Juglans Mollis</i>	X	X
Loasaceae		
<i>Mentzelia Aspera</i>		X
<i>Mentzelia Hispida</i>	X	
Loranthaceae		
<i>Psittacanthus Palmeri</i>		X
Lythraceae		
<i>Cuphea Wrightii Var. Wrightii</i>		X
<i>Heimia Salicifolia</i>	X	X
Malpighiaceae		
<i>Aspicarpa Cynanchoides</i>		X
<i>Heteropterys Brachiata</i>	X	X
Malvaceae		
<i>Anoda Maculata</i>		X
<i>Ceiba Aesculifolia</i>	X	X
<i>Helicocarpus Terebinthinaceus</i>	X	X
<i>Pavonia Candida</i>	X	X
Meliaceae		
<i>Cedrela Odorata</i>	X	
Nyctaginaceae		
<i>Mirabilis Jalapa</i>	X	
<i>Mirabilis Longiflora</i>		X
<i>Pisoniella Arborescens</i>	X	
Oleaceae		
<i>Fraxinus Uhdei</i>	X	
Onagraceae		
<i>Lopezia Racemosa</i>	X	X
<i>Ludwigia Octovalvis</i>	X	
Opiliaceae		
<i>Agonandra Racemosa</i>	X	X

Orobanchaceae			
<i>Aphyllon Dugesii</i>	X	X	H
<i>Castilleja Tenuiflora</i>	X		H
Oxalidaceae			
<i>Oxalis Alpina</i>	X	X	H
Piperaceae			
<i>Peperomia Bracteata</i>	X	X	H
Plumbaginaceae			
<i>Plumbago Pulchella</i>	X	X	H
<i>Plumbago Zeylanica</i>	X	X	H
Polemoniaceae			
<i>Bonplandia Geminiflora</i>	X	X	H
<i>Loeselia Glandulosa</i>	X		H
<i>Loeselia Mexicana</i>	X	X	Arb
<i>Loeselia Pumila</i>	X	X	H
Polygonaceae			
<i>Persicaria Segetum</i>	X		H
Ranunculaceae			
<i>Clematis Grossa</i>	X		B
Rhamnaceae			
<i>Colubrina Triflora</i>		X	Ar
Rubiaceae			
<i>Bouvardia Laevis</i>		X	Arb
<i>Bouvardia Multiflora</i>	X	X	Arb
<i>Randia Canescens</i>	X	X	Arb
Sapindaceae			
<i>Cardiospermum Halicacabum</i>		X	B
<i>Serjania Triquetra</i>	X	X	B
Saxifragaceae			
<i>Heuchera Mexicana</i>	X		H
Scrophulariaceae			
<i>Buddleja Sessiliflora</i>	X	X	Arb
Solanaceae			
<i>Jaltomata Procumbens</i>	X	X	H
<i>Physalis Philadelphica</i>	X	X	H
<i>Solanum Diversifolium Subsp.</i>			
<i>Diversifolium</i>	X	X	Arb
<i>Solanum Edmundoi</i>	X		B
<i>Solanum Nigrescens</i>	X		B
Talinaceae			
<i>Talinum Paniculatum</i>	X	X	H
Verbenaceae			
<i>Lantana Camara</i>	X		Arb
<i>Lantana Hirta</i>	X	X	Arb
<i>Lippia Queretarensis</i>	X	X	H
<i>Verbena Carolina</i>	X		H
Violaceae			
<i>Pombalia Attenuata</i>	X		H
Monocotyledoneae			
Asparagaceae			
<i>Echeandia Flavescens</i>	X		H
<i>Milla Biflora</i>	X		H
Alstroemeriaceae			
<i>Bomarea Edulis</i>	X		B
Bromeliaceae			
<i>Tillandsia Achyrostachys</i>	X		H
<i>Tillandsia Dugesii</i>	X		H
<i>Tillandsia Grossispicata</i>		X	H
<i>Tillandsia Recurvata</i>	X	X	H
<i>Viridantha Atroviridipetala</i>		X	H
Commelinaceae			
<i>Commelina Erecta</i>		X	H
<i>Thyrsanthemum Floribundum</i>	X	X	H
<i>Tradescantia Crassifolia</i>	X	X	H
<i>Tripogandra Amplexicaulis</i>		X	H
<i>Tripogandra Purpurascens</i>	X		H
Dioscoreaceae			
<i>Dioscorea Galeottiana</i>	X	X	B
Iridaceae			
<i>Tigridia Vanhouttei</i>	X	X	H
Orchidaceae			
<i>Dichromanthus Cinnabarinus</i>		X	H
<i>Govenia Lagenophora</i>	X		H
<i>Sacoila Lanceolata</i>	X		H
Poaceae			
<i>Lasiacis Nigra</i>	X		H
<i>Melinis Repens</i>	X	X	H
Pontederiaceae			
<i>Heteranthera Peduncularis</i>	X		H