The Institute of Biology's Botanical Garden
A Gem Nestled in the UNAM

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Botanical gardens are living museums, where the publiccan see and learn about biodiversity and its importance.Today, they also play a vital role in ex situ conservation of flora by maintaining their collections of endemic, rare or endangered plant species. There are more than 1,800 botanical gardens in 148 countries of the world. Their collections preserve examples of more than 80,000 species, almost one-third of all the world's vascular plants, those considered of a higher evolutionary level because they have lignified tissues that allow substances to be distributed throughout their structure. Today, very few countries are without at least one botanical garden. In Mexico we have about 40.

José Guadarrama (left), Arturo Gómez-Pompa (center), Javier Valdez (right) and Ramón Riba (kneeling), on one of the first trips to collect plants for the Botanical Garden. Photo: Fototeca del Jardín Botánico (Botanical Garden Photo Archive)

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Panoramic view of the National *Agavaceae* Collection.

Ramón Riba

Removing the *Beaucarnea gracilis* ("elephant foot") from its natural habitat in the Tehuacán Valley, 1963.

The UNAM's Botanical Garden was founded in 1959 and the first stages of its growth were intimately linked to the development of modern botany in Mexico.

The UNAM Institute of Biology's Botanical Garden is the second oldest of its kind in Mexico and our country's most important in terms of size, diversity and the scientific value of its collections. It was founded in 1959 by botanists Faustino Miranda and Manuel Ruiz Oronoz, with support from medical physiologist Efrén del Pozo, at that time our university's secretary general.A few years after its inauguration, the garden came under the aegis of the Institute of Biology. The first stages of its growth were intimately linked to the development of modern botany in Mexico. Originally from Spain, Miranda, a botanist and tropical ecologist, forged a team of young enthusiasts to collect samples of plants from all over the country. That team included Ramón Riba, Arturo Gómez-Pompa and Javier Valdez,who years laterwould become outstanding specialists in botany in Mexico. Other illustrious scientists who participated in different ways in

Abisaí García

A flowering *Fourcraea martinezii*, 2003.

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The "elephant foot" collected in Tehuacán Valley 47 years ago.

Among the outstanding plants is an "elephant foot" (*Beucarnea gracilis*), which is more than 300 years old.

the project were Teófilo Herrera, Eizi Matuda, Otto Nagel, Helia Bravo, Francisco González Medrano, Hermilo Quero, Claudio Delgadillo and Mario Souza.

Considered by renowned specialists from the United States and Europe as one of the world's most important, the garden is the leader of its kind in Latin America. From the very start, its objective was to keep a collection of live plants representating the diversity of Mexico's flora that would be a basis for botanical research and education.

Located in the southeastern part of the university campus, the garden is also home to the Faustino Miranda Greenhouse, which dates from the first stages of its development and is in the campus's historic area. The garden totals 12.7 hectares: 2.75 hectares are open to the public and the rest is filled with working greenhouses and other installations, plus the natural vegetation native to the San Ángel Lava Rocks Ecological Reserve. Since 2005, it has been one of the reserve's buffer zones. Between its outside collections and those in the greenhouses, it has more than 300 rows of gar-

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Greenhouse for plants intended for sale.

den boxes, housing about 5,500 plants that represent 1,200 Mexican plant species.

The collections are organized using taxonomic, ecological, geographical, utilitarian and biodiversity conservation criteria. Today there are 15 different collections, some of which are thematic, like those of ornamental, medicinal, tropical, wild and aquatic plants, as well as the arboretum. Other collections are taxonomic, like the yuccas and *Dasyliria*, orchids, cacti, wild prickly pear cacti (*Opuntia* and *Nopalea*), *Crassulaceae*, and *Agavaceaes*. The last three have been recognized as National Collections by the Mexican Association of Botanical Gardens because they include samples of more than 60 percent of the Mexican species in these groups, they have accessible information about where the samples came from and are a reference point and source of samples for biological and technological studies. The cacti collection is the largest of its kind in Mexico and includes the main species from this botanical family, both from the deserts of Chihuahua andArizona-Sonora, as well as the arid regions of central and southern Mexico.

The Desert Garden was conceived of as an educational and training tool for technical personnel involved in controlling illegal trafficking in plants from arid regions.

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Researchers and technicians explaining plant domestication processes to the public on National Botanical Garden Day.

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Tigridia, the garden's store.

It also has a 300-square-meter Desert Garden dedicated to the memory of Helia Bravo, a pioneer in the study of Mexican cacti. Here are gathered samples of plants from arid regions that are used in illegal trade. The collection was conceived of as an educational and training tool for technical personnel involved in controlling illegal trafficking in plants.

Some of the most noteworthy species found in the Botanical Garden are the barrel cactus (*Echinocactus* and *Ferrocactus*), the old-man cactus (Cephalocereus), as well as the "burro-ear" (*Echeverria gibbiflora*) and laui (*Echeveria laui*) echeverias and the *Graptopetalum* from the *Crassulaceae* family. Other outstanding plants are the agaves for making pulque (*Agave salmiana*) and for making mescal (*Agave potatorum* and 20 other species from this genus), as well as the Spanish bayonets (*Yucca* spp), the sotols (*Dasylirion* spp) and the "elephant foot" beucarnea (*Beucarnea gracilis*), one of which is more than 300 years old and has been part of the garden's collection since it was founded. This particular plant was used as the symbol of the garden's fiftieth anniversary celebration in 2009.

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Tropical plants in the Faustino Miranda Greenhouse.

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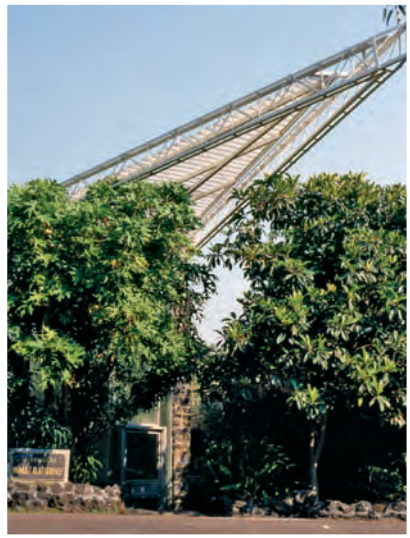
An *Echinocactus grusonii*, known as "mother-in-law's chair."



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Manuel Ruiz Oronoz Greenhouse.

It is important to mention that the garden is the only one inMexico with a research area with different programs about the knowledge, use and conservation of plant diversity. The areas are cytogenetics, anatomy, taxonomy and the molecular systems of biologically very important groups of plants, like cacti, palms, orchids, *Crassulaceae* and *Agavaceae*. Studies are also done on the propagation of plant fibers through cultivation of endangered species and species that could be of economic interest, as well as ethno-botanical studies about the evolution of domesticated plants and the use and sustainability of plant resource management among indigenous populations.

The non-sustainable extraction of plant resources, changes in soil use, global warming and other factors caused by human activity have come to a critical point and are endangering at least 60,000 plant species throughout the world. This process has reached alarming levels in Mexico, one of the five countries in the world with the broadest biodiversity. Mexican norm NOM-059 states that at least 981 of the more than 22,000 Mexican plant species are extinct, endangered or require some kind of special protection.

This is why the UNAM Institute of Biology participates actively through the garden in implementing an international plan to save endangered plant species. Based on the Convention on Biological Diversity of Rio de Janeiro, this plan is known as the Global Strategy for Plant Conservation and has been signed by governments, educational and research institutions and civil society organizations. It establishes measurable goals for actions on a global, regional, national and local level focusing on documentation, conservation and the sustainable use of plant species.

So, the Botanical Garden's collections contribute to the ex situ conservation of 577 of the 7,320 plants endemic to

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A variety of cultivated dahlias, our national flower.

Víctor Chávez

Multiple shoots of *Bletia urbana* (Orchidaceae) obtained through tissue culture.

This botanical garden is the only one in Mexico with a research area with different programs about the knowledge, use and conservation of plant diversity.

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Agave americana and *A. celsii* from the National *Agavaceae* Collection.

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The learning garden.

The garden also participates in identifying priority areas and species for conservation, and collaborates with federal authorities in dealing with confiscated plants.

Mexico. They also contribute to the conservation of at least 245 species that are at some level of risk according to NOM-059, including 48 percent of the *Agavaceae*, 58 percent of the cacti and 100 percent of the *Crassulaceae* in the country that are under threat or endangered. The garden's researchers and technicians also participate in identifying priority areas and species for conservation, and the garden collaborates with federal authorities in dealing with confiscated plants.

The development of cultivation protocols, both using conventional methods and in vitro cultivation, make it possible to propagate plants that are then used, in joint efforts with rural communities and producers, for recovering natural populations. Until now, 84 species of cacti and *Crassulaceae* that NOM-059 cites as under some kind of risk have been cultivated, one-third of which are already sold in the Botanical Garden's Tigridia Shop. This is part of a pilot plan to discourage their illegal trade and over-exploitation. Also, ethno-botanical research documenting the use and handling of more than 4,000 species of Mexican flora by different

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Equisetum hyemale and *Nimphaea mexicana* of the Water Plants Collection.

indigenous groups contributes to the sustainable management of plant diversity.

The Botanical Garden plays a very important role in implementing the Global Strategy for Plant Conservation in the fields of education, dissemination of scientific knowledge and creating public awareness about the value of plant diversity and the importance of its conservation. Every year more than 50,000 visitors to the garden have access to guided tours, courses, workshops, advisory services and other activities.

As if all this were not enough, this is one of the few educational and leisure spaces where the inhabitants of one of the world's most populated cities can come into contact with nature and learn that plants are a vital part of the planet's biological diversity and an essential resource for human well-being. Its contribution to research, education and the conservation of biodiversity undoubtedlymakes the Institute of Biology's Botanical Garden one of the gems of the UNAM.

The Botanical Garden is open in winter from
Monday to Friday, 8:30 a.m. to 4:30 p.m.
In summer, from 8:30 a.m. to 5:30 p.m.
We open Saturdays all year long from 8:30 to 3 p.m.,
except for UNAM's winter vacations.
Admission is free. Guided visits for groups available.
For more information, contact:
Área de Difusión y Educación del Jardín Botánico del IB-UNAM
Phones: 52 (525) 5622-9947/63
www.ibiologia.unam.mx

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"Magueyito" (*Echeveria agavoides*).

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View of the National *Agavaceae* Collection, including agaves, dasylirions and yucca trees.