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Ethnobotany in Iturbide, Nuevo León: The Traditional Knowledge on Plants Used in the Semiarid Mountains of Northeastern Mexico

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Abstract: Iturbide is in the northeast of Mexico and has a rich native and exotic flora; however, there are no ethnobotanical records, therefore, it requires attention in the documentation of traditional knowledge and practices of its botanical resources. In 2021, twelve field trips were carried out, applying 110 semi-structured interviews. Plant samples were collected, identified and deposited in an herbarium. We used the Chi-square test to compare the anthropocentric categories concerning others reported in Mexico. To determine the cultural importance, three ethnobotanical indices were applied (UVI, ICF and FL). We recorded 250 species with ethnobotanical implications associated with 121 genera and 83 families, including 140 native and 110 exotic species. The most common plant families were Asteraceae, Lamiaceae and Fabaceae. The main categories of uses were: ornamental, medicinal and food. The species with the highest UVI values were *Lepidium peruvianum*, *Ocimum basilicum* and *Salvia rosamrinus*. The multifunctionality of the native and exotic flora demonstrates the extensive knowledge associated with botanical resources. For example, the role of ornamental plants, with a direct impact on human well-being, the resilience of healers and traditional inhabitants by using different species for the treatment of various ailments or indigenous edible plants in the daily diet.

Keywords: ethnobotanical indices; ethnobotanical uses; native and exotic species; local community; semi-structured interviews; natural resources in mountainous areas; traditional knowledge and management; ornamental plants

1. Introduction

Worldwide, ethnobotany is a discipline with extensive contributions from its beginnings to the present with work on all continents, highlighting remote regions and different indigenous groups. It is surprising how much ethnobotanical information is available, e.g., a study in the Kathua region of the Himalayas describes the knowledge and use of

121 plant species by various indigenous groups, i.e., Duggars, Paharis, Punjabis and Gujjars; who, furthermore, share their ancestral knowledge [1]. These results are strengthened by other research in the same region of Kupwara, where there is a high diversity of medicinal plant use, highlighting the transmission of traditional medical knowledge directly from the elderly to the young [2]. Another recently explored region is Pakistan in the Shiwalik Range, where its population depends directly on wild floras for their livelihood [3]. It is the same subsistence case for the Nauka (language in danger of extinction), settled in the Bering Strait, Russia, who, in addition to depending on wild plants, were forced to change their ancestral knowledge and practices due to armed conflicts [4].

Other areas of the planet and their diverse cultures contribute with spectacular ethnobotanical works, e.g., the groups originating in Australia, the Bunganditj, who have deep traditional medicinal knowledge; in addition, they collaborate with researchers to design protocols for prospecting the use of their medicine [5]. One of the zones with the greatest ethnobotanical records is the Mapuche region, Patagonia, Argentina, where 505 medicinal flora species are reported, highlighting an interesting mix of native and exotic species [6]. Another of the most diverse regions of the planet is the Amazon, where 274 species of medicinal native plants are reported for a single community in the Brazilian Region [7].

Relating the richness and diversity of worldwide ethnobotany, we can say that Mexico is one of the countries with a deep ethnobotanical tradition, that is, the human groups established in the different ecoregions have developed a wide perception, knowledge and use of plants [8,9]. Mexican ethnobotanical documentation estimates the knowledge and exploitation of between 5000 and 7000 plant species, among which a wide range of native and introduced species stand out, using different parts of them, many with strong cultural and multifunctional roots [9].

Mexican ethnobotany, as well as in other regions of the world, reflects socio-ecological patterns of a complex socio-cultural dimension, highlighting the understanding the forms of transmission of ethnobotanical traditional ecological knowledge (TEK) especially analyzed the flow of traditional knowledge and practices between the different generations of local inhabitants [10], at the level of inter-ethnic and intra-ethnic communities [11] or gender, where women stand out for their deep local ethnobotanical knowledge [12]. Other approaches are those related to determining the cultural importance of plants among people who live in different ecosystems and with different degrees of biodiversity [13], the analysis of influence generated by environmental changes [14], as well as the anthropocentric characterization of the utilization of plants [15], other studies focus on understanding the complex systems of traditional medicine and food [9]. These socio-ecological patterns consist of a set of local knowledge and practices specific to each cultural group, defined as: Traditional Ecological Knowledge (TEK [16,17]). The TEK is integrated into three main conceptual fields: (a) perception = *kosmos* (set of beliefs associated with plants, e.g., ceremonial and ritual uses), (b) cognitive = *corpus* (sets of knowledge about plant resources, e.g., flock nomenclature, knowledge about biological and ecological aspects) and (c) practical = *praxis* (set of utilization and/or exploitation practices, e.g., categories of use, domestication [18]). Ethnobotanical studies in the country have contributed to the development and consolidation of global ethnobotanical knowledge, e.g., Hunn [19] with the Tzeltal Indians, where he proposes one of the bases for the study of traditional classification. Later, he reaffirms his work, studying the lifestyles of the Zapotec Indians of San Juan Gbée, where he documents more than 700 names of plants in the indigenous language [20]. Novel ethnobotanical research is currently continuing, e.g., Nabhan and collaborators [21] have shown the role that plants play in a socio-ecosystem and its relevance for human health in the face of climatic stress. During the monsoons (rains in the Sonoran Desert where the Comcaac'c indigenous people live) when terpenes are released from the desert plants, in which more than 60 species have been identified with 115 biogenic volatile oils, they contribute to human health by improving sleep patterns, regulating emotional hormones, improving digestion and reducing depression and anxiety, preventing oxidative stress diseases [21].

The distribution of indigenous groups in Mexico is concentrated in the central, southern and south-southeastern areas, mainly where there is a high diversity of geoforms, climates, ecosystems and a high biological diversity; the established indigenous groups have a profound knowledge of their biocultural diversity and their ethnobotanical resources [8]. Some indigenous groups settled in the northern region of the country, grouped in the northwestern area. Therefore, in the northeast region, there are only the Kipapo and Negros Mascogo settlements (migrants from the United States settled in the mid-1800s [22]). In general, the north of Mexico is characterized by being a wide extension of arid and semiarid zones, forming one of the most diverse desert regions on the planet [23], due to its local environmental heterogeneity, mainly in the northeast region; in this area, there are hundreds of mestizo rural communities, which, like the indigenous communities, have a deep knowledge of their ethnobotanical biocultural diversity [13,24–27]. This is due in part to the fact that rural populations tend to live more isolated, using natural resources of their surroundings as medicine, food, ornamental, firewood or domestic tools [24–27].

The ethnobotany in the north of the country and particularly in the northeast zone is as relevant as that documented in other regions, even in indigenous areas and when comparing different types of ecosystems where the richness of species is varied [13]. Unfortunately, this knowledge is at risk due to socio-cultural factors, such as migration [28] and lack of interest in younger generations, contrary to what has been documented for some indigenous people [2]. Other factors are associated with changes in economic systems [29]; to socio-ecological factors, such as changes in traditional medicine practices and local food systems, so it is necessary to safeguard important taxa as part of the biocultural heritage food [30]. In addition, there are changes in agroecological systems, where there is a threat and loss of related wild crops [31]. The degradation of ethnobotanical TEK is even associated with environmental changes and loss of biological diversity [32]. A respite in the face of the notable loss of ethnobotanical biocultural wealth is given through the documentation and local revaluation of knowledge and practices of plants [1–7], where the new generations and women have an important role [10,33]; through linking communities with the academic sector, generating regulation and bioprospecting protocols [5].

The main objectives of this ethnobotanical research are: (a) to know the diversity of flora taxa with ethnobotanical potential; (b) to compare the diversity of plants with ethnobotanical implications with those reported in other regions of northeastern Mexico; (c) to document the knowledge and traditional uses of native and exotic flora; (d) analyze the traditional medical knowledge of local plant species, their forms of administration and parts used; through the application of ethnobotanical indices: Informant Consensus Factor (ICF), Use Value Index (UVI) and Fidelity Index (FI). All this would help preserve the ethnobotanical knowledge and traditional practices of plant taxa used in this area by their community, facilitating environmental education and the sustainable development of Iturbide in the face of the increasing loss of ecosystems, a low economy in the area and migration of the young population.

2. Materials and Methods

2.1. Study Site

In general, the relief of Mexico is among the most rugged on the planet [23,34]. This particular orography is one of the factors that confer the existence of diverse and unique flora in many parts the country. The northern region ecologically is characterized by large extensions of arid and semiarid zones, with heterogeneous mosaics of high floristic diversity [34].

Geographically, the state of Nuevo León is characterized by its extensive lowland, high plains and mountains that, in some cases, can reach up to 3600 m above sea level [35], where the local population is mestizo [36]. Our study area, Iturbide, is a small municipality located in the semiarid mountains in the southern reaches of the state of Nuevo León [36] with a landscape that comprises 85% rugged surface and 15% flat areas. The two main vegetation types found in the municipality of Iturbide are semiarid scrubland and oak-pine forest,

both of them hosting a very rich flora with high levels of endemism. The Sierra Madre Oriental (state of Nuevo León) contains almost 269 endemic plant species [37]. Almost 60 of these species are considered exclusive of the municipality of Galeana, adjacent to Iturbide. Among these species, it highlights some with high levels of endemism, belonging to the families Asteraceae (*Ageratina*, *Erigeron* and *Verbesina*), Cactaceae (*Mammillaria* and *Turbinicarpus*) and Fabaceae (*Dalea* [38]). Most of the native and exotic floras in this area are widely used by the local community for medicinal, ornamental, food, forage and construction purposes [13,24–27].

According to the 2010 National Population and Housing Census, approximately 3600 people inhabit Iturbide Municipality, with 95% living in the town of Iturbide and the remainder in surrounding rural areas. On average, half of the residents of Iturbide Municipality are male and half are female [36]. The primary local language is Spanish. The main economic activities in Iturbide are agriculture and livestock, which highlights the relevance of the study of natural resources in this area. The main crops are corn, wheat and oats, as well as fruit harvesting, principally apples, plums, apricots, quince and peaches [36]. Local artisans produce wooden furniture, embroidery and other handmade products, thereby using natural resources for their creations. The federal government offers subsidized training for the development of technical skills such as baking, sewing, carpentry and blacksmithing. Additionally, there is federal financial support for disabled people. However, in Iturbide, there are relatively few inhabitants aged 17–25 years. This is because the young people of Iturbide have begun to emigrate to larger cities and regions with higher access to education and diverse employment opportunities that offer higher salaries [36].

The origin of its population is related to the establishment of cattle ranches in 1800; its current population is totally mestizo, proud to belong to the “northern culture”. Education levels are high compared to other municipalities in the entity; there is basic, upper secondary and higher education, highlighting the School of Forest Sciences and the Astronomical Observatory of the Autonomous University of Nuevo León. In recent years, tourism has been promoted as an economic alternative, mainly associated with ecotourism due to its natural and scenic beauty.

Iturbide is located in south-central Nuevo Leon, 24°23' N 99°59' W (Figures 1 and 2a). It is placed in the Sierra Madre Oriental and it comprises mountains, extensive valleys and canyons, as well as plateaus above a 1200-meter altitude. Iturbide is located in the dry part of the mountains on the leeward side. Its climate has two variants: at lower elevations (1200 m), it is semi-warm, while at higher elevations (2400 m), the climate is cold, temperate and subhumid. The annual precipitation ranges from 300 mm to 950 mm, with a mean precipitation of 705 mm. The driest months are from December to March; the rainiest months are from July to September. The average annual temperature ranges between 12 and 18 °C, with the hottest months being April and May and the coldest from November to January [38]. There are two permanent rivers in the municipality of Iturbide: The San Antonio River, which crosses the municipality from north to south, and the La Muralla River, located at the extreme north. The highest parts of the area with a temperate climate are covered by oak and oak-pine forest, while the driest parts shelter microphyllous scrublands [38,39].

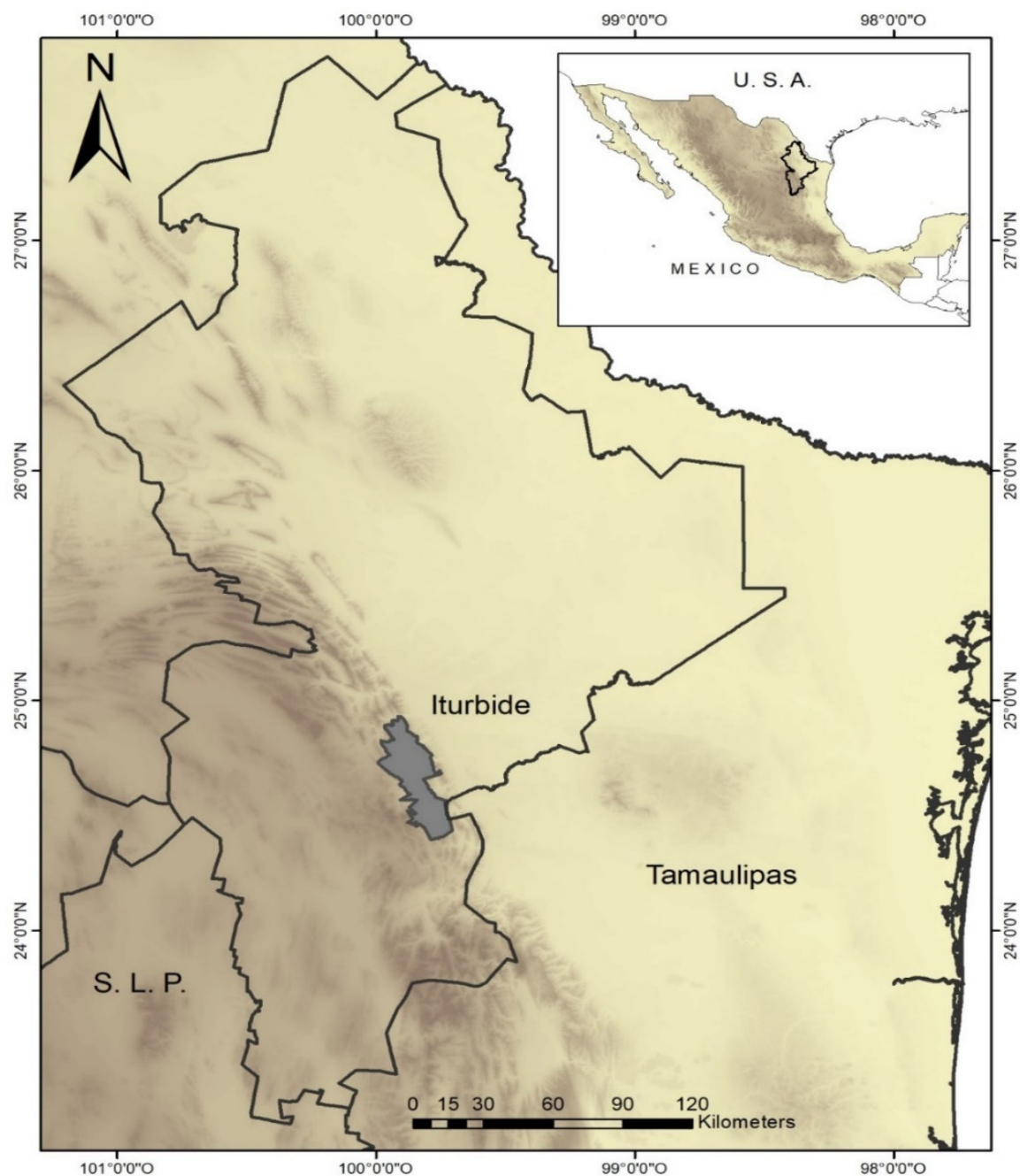


Figure 1. Location of the study area, Iturbide, Nueva León, Mexico.

2.2. Field Work and Interviews

A total of twelve field trips were made for plant identification and collection. Two previous exploratory visits were made in June 2021. The first was held to explore the plant communities adjacent to Iturbide and collect plant specimens of the native flora representative of the area, and the second one was to interview people (see below) regarding local plants and their uses. We obtained the permission of local authorities to collect plants in public areas and talk with private property owners for the same purpose [13]. From July to December 2021, 12 field trips for plant species collection were carried out. All species recorded were photographed to create an ethnobotanical database containing all information and data gathered. The taxonomic identification of plants was based on the study of the floras of the state of Nuevo León, as well as monographs of families and genera distributed in this area [38,39]. When possible, the interviewed individuals accompanied

us on field trips to identify species in situ. All collected and identified specimens were stored at the CFNL herbarium of the Faculty of Forest Sciences, Autonomous University of Nuevo León, México. The collection number belongs to Eduardo Estrada (EE), and the identified species were corroborated with herbarium specimens [40].

Based on ethnobotanical studies previously carried out in the northeast of the country, we focused our interviews on housewives, shepherds, bricklayers, elementary teachers, business owners, midwives and healers older than 30 years [24]. The ages of the interviewees ranged from 32 to 84 years. Each interviewee had lived continuously in the area for at least 20 years. To maximize data collection and allow interviewees to speak freely, interviews were semi-structured [41]. Four questions were asked to all interviewed: (1) What is the name of the plant? (2) What are the uses you know of this plant? (3) What parts of the plant are utilized (root, stem, leaf, inflorescence, flower, fruit)? (4) How is the product/utensil prepared (raw, cooked, roasted, ground)? [42,43]. All interviews were conducted with the prior informed consent of each of the informants (<http://ethnobiology.net/codeofethics/>, accessed on 7 June 2021 [42]). During the interviews, we showed pictures of the regional plant species found to additionally confirm species identification by local people (ethnographic technique of visual stimuli [43]). All interviews were recorded in Spanish. In Figure 2b,c, we can observe the work team and the relationship that was established with the informants to obtain the ethnographic information.

2.3. Data Analysis

In order to know the ethnobotanical significance of Iturbide with respect to other localities of Mexico studied (Nuevo León, Coahuila, Baja California, Puebla and Michoacán), a Chi-square tests was applied using PAST software [44,45]. The Chi-square test is used by means of contingency tables to examine the relationship between two or more categorical, non-numerical variables. It is also used to explore the distribution of a categorical variable among different samples [44]. This test works with frequencies (observed and expected), and its calculation is based on the degrees of freedom and the level of significance to determine which hypothesis is accepted (the null or the alternate). The null hypothesis is rejected when the number of known plant species at other sites is similar to that of Iturbide ($p < 0.05$). To quantitatively analyze the ethnobotanical information collected, three indices were applied: (1) Use Value Index (UVI [13]); (2) the informant consensus factor (ICF [46]) and (3) Fidelity Level (FL [47]), all commonly used in the ethnobotanical research [1,2,13].

The UVI analyzes the local relevance of each of the ethnobotanical species; it is obtained applying the formula: $UVI = \sum U_i / n$, where U_i = corresponds to the number of uses known by each informant for the species i , and n = the total sample number ethnographic (interviewees). The IFC evaluates the relative importance of the ethnobotanical species within each medicinal category; is calculated as: $IFC = n_{ur} - n_t / n_{ur} - 1$, where the subindex n_{ur} = frequency of medicinal mention for the species i , and n_t = sum of the species mentioned for each of the medicinal categories. The premise in this index indicates that the species that obtain the highest values are those that are considered by the informants as more effective in the treatment of certain diseases. Finally, through the Fidelity Index, the relative importance of each species i in a specific medicinal category is calculated, with respect to the total degree of consensus among the informants. Calculated as: $FL(\%) = I_p / I_u (100)$, where I_p = total number of interviewees who independently indicated the use of species i to treat the disease particular, and I_u = corresponds to the frequency of informants who mention the species i to counteract a specific disease within a category of specific medicinal use.



Figure 2. Ethnobotanical work in Iturbide, Nuevo León, Mexico. NOTE: Prior and informed consent was obtained during the application of the interviews for the taking of photographs, as well as the authorization of informants photographed for publication [42,43]. (a) Local square of the municipality of Iturbide, (b,c) work team during the application of the interviews, (d) sale of ornamental plants through the streets of various colonies of Iturbide, (e) caring for ornamental plants in private gardens by residents, (f) taking photographs of ornamental plants for their taxonomic identification, (g) kitchen table used as a support to cut fruits, vegetables and meats for food preparation.

3. Results and Discussion

3.1. Taxa Diversity, Origin and Life Forms

A total of 250 taxa with ethnobotanical importance from 121 genera and 83 families were recorded in this research (Table 1), of which are 140 native and 110 introduced (Appendix A). The diversity of native species is mediated by the environmental heterogeneity associated with the topography, a fundamental characteristic in richness and composition of plant communities [38], and leads to contrasting vegetation patterns between northern and southern areas [37]. While the diversity of introduced taxa is associated with anthropocentric needs [25–27]. Table 2 shows contrasting physiognomic vegetation among northeastern, northwestern, central and southern Mexico, where ethnobotanical research have been carried out: these sites are characterized by heterogeneous scrublands and oak-pine forests. However, relatively similar vegetation was found in northwestern (Baja California [48]) and southern Mexico, as, for instance, in the Monarch Butterfly Biosphere Reserve (Michoacán [49]).

Table 1. Richness of ethnobotanical taxa known and used by residents of Iturbide, Nuevo León, Mexico. These plants were separated between eudicots, monocots, conifers and allies and ferns and allies.

	Eudicots	Monocots	Conifers and Allies	Ferns and Allies	TOTAL
Families	65	13	3	2	83
Genera	82	31	6	2	121
Species	204	34	10	2	250

Table 2. Diversity of taxa with ethnobotanical applications recorded in northeastern (NE), northwestern (NW), central-west (CW) and southern (S) Mexico.

Locations		Families	Genera	Taxa	Habitats
NE, Mexico	Iturbide, Nuevo León	83	121	250	Oak-pine, desert scrub
NE, Mexico	Cumbres de Monterrey National Park (CMNP), Nuevo León [26]	69	170	240	Oak-pine forest, desert scrub
NE, Mexico	Rayones, Nuevo León [27]	91	228	252	Mainly desert scrub, oak-pine forest
NE, Mexico	Bustamante, Nuevo León [25]	66	176	218	Desert scrub, oak-pine forest
NE, Mexico	Cuatro Ciénegas, Coahuila [13]	57	132	158	Desert scrub
NW, Mexico	Sierra Juarez, Baja California [48]	27	39	48	Desert homogeneous scrubland
CW, Mexico	Monarch Butterfly Biophere Reserve, Michoacán [49]	65	132	213	Oak-pine, pine forest
S, Mexico	Zapotitlán de las Salinas, Puebla [50]	79	219	298	Different scrublands

NOTE: Column two represents the sites located in the northeast region and other regions of the country, where other ethnobotanical works have been carried out, with which we have compared our results in terms of the number of taxonomic riches (families, genera and species).

Our results affirm that rural mestizo communities also have a deep ethnobotanical tradition, compared to research carried out in inhospitable regions and with different indigenous groups; e.g., Shigh and collaborators [1] report 121 species, 105 genera and 53 families in the Himalayas. Silva et al. [7] report 274 ethnobotanical taxa used exclusively in traditional medicine for inhabitants of the Brazilian Amazon. However, a greater effort is still needed in the ethnobotanical documentation of extensive rural mestizo areas to compare data such as those reported for the Mapuche in Patagonia (505 species of medicinal and edible flora [6]).

The difference in plant biocultural diversity among the above mentioned regions was significant at every taxonomic level: at the family level ($X^2_{d.f.=7} = 24.23$, $p < 0.001$), genus level ($X^2_{d.f.=7} = 103.25$, $p < 0.001$) and species level ($X^2_{d.f.=7} = 133.60$, $p < 0.001$). Regions with heterogeneous vegetation communities (Iturbide, Cumbres de Monterrey National Park (CMNP) [26], Rayones [27], Bustamante [25], Cuatrociénegas [13] and Zapotitlán [50]) contain more plant species with ethnobotanical uses than regions having relatively more homogeneous vegetation such as coniferous, oak-pine forests (Michoacán [49]) or scrublands (Baja California [48]; Table 2).

We found that the most abundant and species-rich plant families in Iturbide are Asteraceae, Fabaceae, Poaceae, Euphorbiaceae and Cactaceae (Figure 3a); the same pattern of taxonomic families is predominant in the northern, central and southern regions of Mexico [38,39], as well as in other regions of the world, where the two main reported families are Asteraceae and Fabaceae [1,2,6,7]. Furthermore, it is common for the abundance of plants in taxon to correlate with the number of ethnobotanical uses identified; therefore, the families with the highest species richness are constantly those with the highest frequency of mention in ethnobotanical studies [46]. The enormous number of ethnobotanical applications registered in Iturbide is evidenced by the great variety of taxa used for ethnobotanical purposes, especially in small and rural areas far from large cities; using plant species for diverse ethnobotanical utilizations is a strongly rooted tradition, greatly extended in the day-to-day needs of some communities [3,7,9,13].

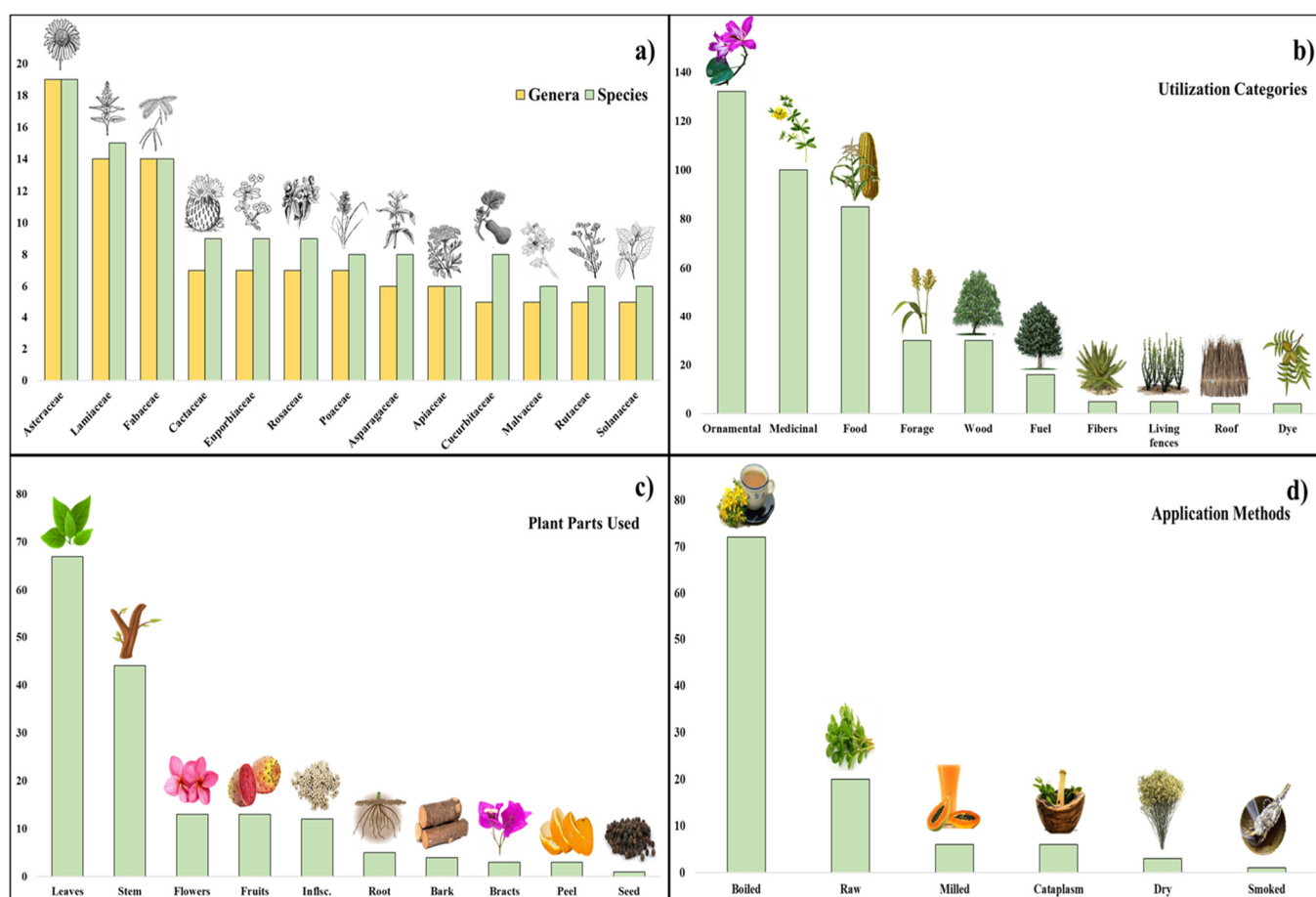


Figure 3. (a) Best represented families, in terms of genera (in yellow) and species (in green), of ethnobotanical importance in the study site (Iturbide, Nuevo León, Mexico), (b) main ethnobotanical uses of plants registered in the flora, according to the interviewed, (c) number of mentions of the plant part used to heal ills and diseases by the interviewed individuals and (d) identified methods by the interviewed for the medical use of the sampled species in Iturbide, Nuevo León.

Of the ethnobotanical exploitations registered in Iturbide, 140 are native while 110 are exotic (Appendix A). The introduced plants represent a high value, as in other zones of the northeast [13], but lower than in other remote regions [1,6]. Herbaceous taxa were the most abundant (120), followed by shrubs (58), trees (55) and succulents (17). The relatively cool climatic conditions allow the presence of varied floras most of the year. The streets, parks and sidewalks are predominantly dominated by evergreen vegetation and many herbaceous plants that flower even in the coldest months (December and January).

The most common uses of the plant species in Iturbide are ornamental, medicinal, food, forage, wood and fuel (Figure 3b). These patterns of plant harnessing are similar to other works from the northeast region [13,24–27]. We observe that, unlike other sites in Mexico, ornamental plants are highly relevant [13], displacing the medicinal and edible categories in second and third place (Figure 3b). This new phenomenon of cultural appreciation of ornamental plants may be related to the need to mitigate solar radiation in gardens and public parks, as well as in homes [13]. While, on the other hand, it is currently known that plants in desert regions of northwestern Mexico provide health benefits in the face of climatic stress, generating a feeling of euphoria and relief among the population. An effect associated with the monsoons (torrential summer rains) and the release of terpenes from plants, these biogenic organic compounds are considered to help mitigate oxidative stress diseases, improve sleep quality, stabilize emotional hormones, improve digestion, increase mental clarity and reduce depression and anxiety [18]. Therefore, the inclusion of ornamental species in the ethnobotanical cultural baggage of Iturbide and other regions of northeastern Mexico may have a similar effect to that reported for the northwestern part of the country, since the climatic and vegetation conditions are very similar [13,24,38,39]. In addition, species such as *Sambucus canadensis*, *Baccharis salicifolia*, *Prosopis glandulosa* and *Larrea tridentata* are shared between both regions and reported in both investigations [18].

3.2. Ethnobotanical Uses

3.2.1. Ornamental

The individuals interviewed showed a greater knowledge of the ornamental utilization of plants, recognizing 132 taxa, corresponding to 52.8% of the total, concerning the medicinal ones, with only 100 (Appendix A). This phenomenon differs from the results of other ethnobotanical studies conducted in Nuevo León [26,27] and other regions of Mexico [10,48,50]. Currently, the importance of ornamental plants is documented, for example, in Cuatrociénegas, Coahuila where they are important in gardens and public squares [13]. As in Cuatrociénegas, in Iturbide, the presence of ornamental plants is noticeable in streets and private properties. In addition, on weekends, plant vendors come to the area to sell exotic herbaceous and shrubby species, which is why the inhabitants of Iturbide use introduced ornamental species more, instead of native ones (Figure 2d–f). This phenomenon is associated with the adaptation of the taxa to the environmental conditions of the place, as well as the care that the owners provide them. Therefore, ornamental plants have a socio-cultural relevance on the well-being of local inhabitants through landscape beauty [51]. In addition, very possibly, as in the Sonoran Desert, they provide well-being in human health through the release of biogenic organic compounds [18].

Among the exotic species, herbaceous plants (37) presented the highest frequency of mention, followed by trees (22) and shrubs (19; Appendix A). The most abundant herbaceous species were *Hypoestes phyllostachya*, *Dianthus caryophyllus*, *Cymbopogon citratus*, *Vinca minor*, *Zantedeschia aethiopica*, *Asparagus setaceus*, *Canna indica*, *Impatiens hawkeri*, *Tulipa gesneriana*, *Pelargonium hortorum* and *Lavandula angustifolia*. The most abundant shrubs were *Lagerstroemia indica*, *Alcea rosea*, *Cascabela thevetioides*, *Lonicera japonica*, *Euphorbia milii* and *Hibiscus syriacus*. Among the most frequently mentioned ornamental exotic trees in Iturbide were *Schinus molle*, *Cupressus lusitanica*, *Cupressus sempervirens*, *Thuja occidentalis*, *Sapium sebiferum*, *Punica granatum*, *Ficus carica* and *Prunus persica*. In private gardens, it is common also to see orange, lemon, baretta, peach and apricot trees as ornamental species. These taxa are commonly found also in many other areas and, importantly, are being used in botanical gardens for ethnobotanical purposes [52].

Among the most common herbaceous native species appreciated ornamentally were *Beloperone gutatta*, *Spathiphyllum wallisii*, *Dahlia coccinea*, *Zinnia elegans*, *Commelina coelestis*, *Plumbago pulchella* and *Nephrolepis exaltata*. The most common shrubs were *Rhus trilobata*, *Tecoma stans*, *Euphorbia pulcherrima*, *Bauhinia purpurea* and *Parthenocissus quinquefolia*. Many of these taxa have similar ethnobotanical implications in other regions of Mexico or in other regions of northern Latin America [53]. The most common native trees

with ornamental use in Iturbide were *Acer negundo*, *Juniperus flaccida*, *Carya illinoensis*, *Juglans major*, *Magnolia grandiflora*, *Morus celtidifolia*, *Pinus cembroides*, *Casimiroa pringlei*, *Salix nigra*, *Fraxinus americana* and *Quercus virginiana*. Of the ornamental species, 45 have other types of exploitation such as food, medicine and construction material (Appendix A). Some of these species hold multiple ethnobotanical uses, such as *Matricaria recutita* and different species of *Opuntia*, *Quercus*, *Prunus*, *Citrus* and *Capsicum*. According to interviewees, ornamental herbaceous taxa are specially selected for their physiognomy. The selection of ornamental shrubs and trees is based on their general appearance, life form, maximum height and forms of exploitation, such as providing shade in cities, food, firewood and construction material (Appendix A). Some shrubby or ornamental tree species with succulent stems are used as living fences, notably the columnar cacti [54].

3.2.2. Medicinal

Medicine was the second relevant anthropocentric category in the study, with 100 species, representing 40% of the total flora, found. A value was raised considering that it is a mestizo region in comparison with the number of species reported for indigenous regions [1,2,7,49]. The mentioned taxa are used to cure or alleviate different illnesses. At least thirty-six different plant families have some medicinal application, with Asteraceae (sixteen genera and sixteen species), Lamiaceae (twelve genera and thirteen species), Euphorbiaceae (five genera and five species) and Cactaceae (three genera and six species), being the most represented, the first families reported around the world [1,2,7]. These medicinal families are recurrent in different areas of Mexico [9,55]. In Iturbide, the plants are used in their entirety for some medicinal purposes (Figure 3c). Leaves from 67 different species are frequently used for medical purposes, of which 64 are native herbaceous species. Among the most common native herbaceous species mentioned by interviewees were *Equisetum laevigatum*, *Monarda citriodora*, *Chrysactinia mexicana*, *Hedeoma drummondii*, *Eryngium heterophyllum*, *Artemisa ludoviciana*, *Euphorbia dentata* and *Tagetes lucida*. The most common exotic herbaceous species in local medicine were *Matricaria recutita*, *Ocimum basilicum*, *Allium sativum*, *Ruta graveolens* and *Zingiber officinale* (Appendix A).

The stems of some shrubby species are frequently used as medicine, including *Baccharis salicifolia*, *Flourensia cernua*, *Croton suaveolens*, *Jatropha dioica* and *Leucophyllum frutescens*. A total of twenty taxa of trees (eleven native, and nine exotic) have medicinal properties, with the leaves, bark and fruits being the most used components. Among the most commonly mentioned medicinal native tree species were *Carya illinoensis*, *Juglans major* and *Persea americana*, while the most mentioned exotic species were *Azadirachta indica*, *Moringa oleifera*, *Eucalyptus camaldulensis*, *Eriobotrya japonica*, *Citrus limon* and *Citrus sinensis*. The fruits of twelve taxa (seven native and five exotic) are used to heal several ailments. The most frequently used were *Cordia boisieri*, *Crataegus mexicana*, *Ficus carica*, *Citrus* spp. and *Capsicum annuum*. It is noteworthy that although only one species and one variety (*Capsicum annuum* var. *glabriusculum*) are mentioned, there are several forms of this species with varying flavors and levels of spice (Appendix A) which interviewees identified by their common names, such as chili piquín, Japanese chili, serrano pepper and jalapeño pepper (Appendix A). Some dry fruits (pecans), including *Carya illinoensis*, and the immature fruits of *Sida rhombifolia* and *Malva parviflora* are used to treat varicose veins and digestive discomfort. Species with medicinal fruits are commonly cultivated in private gardens, developing a dual role of utilization. Some of these are seasonal, as in the case of tejocote (*Crataegus mexicana*), níspero (*Eriobotrya japonica*) and guayaba (*Psidium guajaba*), although they can be dried or prepared as a syrup and stored for later use. Except for *Eriobotrya* fruits, medicinal fruits are collected and sold in the local market. The medicinal application of inflorescences is highly correlated to the use of stems and leaves, more frequently in herbaceous and aromatic species. Stems and leaves are almost always combined and boiled [55], particularly those of *Gnaphalium viscosum*, *Chenopodium ambosioides*, *Grindelia inuloides*, *Tagetes lucida*, *Hedeoma drummondii* and *Turnera diffusa* [24]. The medicinal roots used in Iturbide all come from exotic plant taxa and are mainly used boiled or raw to

alleviate digestive ailments. These include *Lepidium peruvianum*, *Raphanus sativus*, *Aloe vera* and *Zingiber officinale*. The root of the native plant *Eryngium heterophyllum* is used to dissolve kidney stones and to treat hemorrhoids, diabetes and high cholesterol. Other native medicinal plants of Juglandaceae, *Juglans* (one species) and *Carya* (two species) are used as hair dye and also as antifungal and antibacterial agents; such antibacterial properties are proven [56].

Other medicinal treatments, involving the use of bracts and fruit shells, the boiled bracts of *Bougainvillea*, are frequently used to treat angina pain and cough, but they also have antibacterial and antidiabetic properties [57]. Lemon and orange peels, along with the leaves, are boiled and the solution is used to relieve chest pains, colds, coughs and throat pains. Among the most common methods for the preparation of medicinal plants in Iturbide, boiling, grinding, creating poultice and consuming raw are highlighted, the same use with same results; these applications are similar to others reported in scrub and desert regions in Mexico (Figure 3d, Appendix A [58,59]).

The most frequent illnesses mentioned by the interviewees were digestive, respiratory, nervous, endocrine and circulatory ailments (Table 3). This result correlates with the classification of diseases and related health problems recorded by the World Health Organization [60]. Digestive and respiratory ailments are mainly cured with boiled leaves in the form of infusion. Almost all medicinal taxa recorded in Iturbide are prepared this way, and the majority of them are herbaceous and shrubby species belonging to the families Asteraceae (*Gnaphalium viscosum*, *Grindelia inuloides*, *Flourensia cernua*, *Matricaria recutita* and *Tagetes lucida*), Euphorbiaceae (*Croton suaveolens*, *Euphorbia dentata* and *Tragia ramosa*), as well as almost all genera of Lamiaceae, *Allium cepa*, *A. sativum*, *Moringa oleifera*, *Eucalyptus camaldulensis*, *Purshia plicata*, *Verbena canescens* and *Larrea tridentata*. On the other hand, raw leaves, stems, roots and fruits are the second most frequent way to alleviate symptoms. The most commonly harvested taxa are, *Apium graveolens*, *Eryngium heterophyllum*, *Kalanchoe daigremontiana*, *Rorippa officinale*, *Lophophora williamsii*, *Opuntia ficus-indica*, *Jatropha dioica*, *Psidium guajaba* and *Larrea tridentata*. *Apium graveolens* roots are used also against the toxicity of trace elements [61]. *Kalanchoe daigremontiana* has antitumor, antihistamine and anti-inflammatory properties [62]. In addition to treating arthritis and muscle pain in the back and neck, *Lophophora williamsii* has compounds that produce hallucinations and cognitive impairment. In addition to hair dye and skin antifungal agent uses, it is mentioned that the roots of *Jatropha dioica* are crushed and placed directly on the gums as a preventive method in tooth loss.

Table 3. The diseases mentioned by Iturbide's informants were classified into 10 categories. Each category presents a variation in the frequency of mention (nt); therefore, there are different values in the Informant Consensus Factor (IFC) index.

Category of Use (System)	Number of Species Mentioned (nt)	nur	FIC
Digestive (XI)	29	259	0.89
Respiratory (X)	20	249	0.92
Skin and subcutaneous (XII)	17	38	0.57
Endocrine (IV)	16	74	0.79
Circulatory (IX)	13	73	0.83
Nervous (VI)	13	99	0.88
Musculoskeletal (XIII)	11	38	0.73
Infectious (I)	8	61	0.88
Genitourinary (XIV)	6	57	0.91
Ophthalmic (VIII)	3	22	0.90

In many cases, medicinal plant parts are used raw and do not require preparation; they are only disinfected with chlorine and crushed or ground, then applied as poultices to heal superficial wounds. They are also chewed and consumed to control blood sugar concentration, cholesterol and high blood pressure. Some local people mentioned that they

consume garlic, onion, coriander and parsley periodically to reduce the risk of diabetes and high blood pressure. Raw stems of several Cactaceae are very commonly used to heal endocrine illnesses, digestive issues and low cholesterol; they are prepared by washing the cladodes (stems), removing the thorns, grinding the material and drinking the solution. The milled pulp (*Lophophora*) is frequently mixed with alcohol and marijuana to be used as a cataplasm to heal arthritis and muscle pain in the limbs, a very common method of healing in Mexican culture [13,59]. A variety of plant families are prepared as poultices, including most of their parts, used in different ways: boiled, ground and raw. In Iturbide, one of the most common genera prepared in this way is *Amphipterygium*, whose bark is boiled and applied as a cataplasm to serve as an antibiotic. Its bark is used to prevent cytotoxic proliferation, as an antibacterial agent [63] and to heal gastritis and stomach pains. The leaves of plants in the genus *Buddleja* are used as a cataplasm to heal epidermic wounds; these taxa have photoprotective effects on the skin, due to their production of secondary phenolic metabolites [64]. *Opuntia* and *Cylindropuntia* stems are commonly used as forage, food and poultice in Iturbide, but also to treat diarrhea.

A solution of *Lophophora* stems mixed with alcohol is common in rural areas to treat arthritis in northern Mexico, but is also traditionally used as a hallucinogen [65]. Similarly, female *Cannabis inflorescences* are mixed with alcohol and used as a poultice to relieve arthritis and muscle pains, and the dried inflorescences are also smoked for recreational purposes [13]. The former use may be closely related to the fact that the contents of flavonoids, cannabinoids and terpenoids reportedly have anti-inflammatory, anticancer and neuroprotective properties [66]. Leaves from *Thymus* genus are frequently used to relieve respiratory and gastrointestinal ailments and skin infections. However, currently, derivatives from its essential oils are more widely used due to their reported antimicrobial and anticancer effects [67]. In Iturbide, *Melia* has properties to cure gastrointestinal symptoms, and *Melia* leaves in cold water have also been reported to cure diarrhea in South Africa [68]. Similarly, raw or boiled *Lycopersicon* fruits are used as a poultice for their antibacterial, antifungal and antiviral properties derived from its peptides. Parts of *Jatropha dioica* are crushed and milled, and the resulting pulp is applied directly to the hair, due to its black dyeing property; it is also used to prevent hair loss, control dermic head infections (dandruff) and as a shampoo. Its antifungal properties are due to the presence of alkaline esters and certain diterpenes such as citlaltirione, jatrophatrione, jatrophenolone A and jatrophenolone B present in stems and roots [69].

Traditional medicinal use of *Plectranthus coleoides* occurs from the drying, grinding with glycerine and spreading on the chest and nostril to treat respiratory problems such as chest pain and runny nose, among others. Other species of this genus also have a medicinal application to treat toothache, dermatitis, throat pain, antiseptic, vomiting, nausea, ear infections and burns. Blending *Capsicum annuum* fruits in water generates a relatively spicy solution that is consumed to treat coughs and extract phlegm. Other studies have reported that it is effective as a circulatory stimulant and that can be also used as an antioxidant, anti-inflammatory and gastric anticancerigen [70]. The plant parts of some taxa are used completely dry; the most commonly used in Iturbide are *Larrea tridentata* to treat foot odor and three species of Lamiaceae, *Monarda citriodora*, *Hedeoma drummondii* and *Poliomintha longiflora*, whose dry leaves and branches are put under the pillow at night to reduce the effects of insomnia. *Monarda citriodora* is also used to treat wounds and skin infections, regulate body temperature and prevent against diseases of the respiratory system. *Hedeoma drummondii* is used to treat infections and sore throats (Appendix A).

3.2.3. Food

The edible category was the third most common plant exploitation in Iturbide with 87 species (45 native and 42 exotic species; Appendix A), a considerable number with respect to other ethnobotanical works [3,6]. Most consumed plants are herbaceous (forty-eight species), followed by trees (twenty-one), shrubs (fourteen) and succulents (four). The parts of the plant with the greatest use are the fruits followed by leaves, seeds,

roots and flowers. The most frequently consumed fruits belong to introduced species such as *Mangifera indica*, *Ananas comosus*, *Citrullus lanatus*, *Cucumis melo*, *Cucurbita ficifolia*, *Ficus carica*, *Malus domestica*, *Prunus* spp. and *Citrus* spp. The fruits of several common native taxa are also used, including *Celtis pallida*, *Carica papaya*, *Cucurbita moschata*, *Persea americana* and *Physalis philadelphica*. Several of these species are widely used as food and are also traded in food markets in Mexico [9,10,20], as well as in many other parts of the world.

Many of the fruit trees that are commonly consumed in northeastern Mexico [10,13,25–27] are part of relatively large gardens, which also contain various applications, such as providing shade, beauty and food. This pattern is observed in Iturbide where fruit trees such as *Punica granatum*, *Prunus persica*, *Malus domestica*, *Citrus limon*, *Ficus carica*, *Persea americana* and *Eriobotrya japonica* are common, and all species are exotic (Appendix A).

Other taxa with an edible exploitation are *Apium graveolens*, *Spinacea oleracea*, *Coriandrum sativum*, *Origanum mejorana* and *Petroselinum crispum*; similar uses have been reported in Italy [71]. The leaves of two exotic taxa are frequently used raw as ingredients in salads or are cooked with other species *Portulaca mundula* (verdolaga) and *P. oleracea*. *P. mundula* is very common in Iturbide where it grows in abandoned farm fields and on sidewalks and roadsides. *P. oleracea* is considered a “medicinal food” due to its richness in omega-3 polyunsaturated fatty acids [72]. *Rorippa officinale* (berro) grows in urban riparian systems and is consumed raw or cooked. It is suggested that its consumption can potentially reduce the probability to get cancer [73] due to its antioxidant activity [74].

Seeds are the third most commonly consumed plant part in Iturbide as food. The most important seed-producing species in the area are *Phaseolus vulgaris* (beans) and *Zea mays* (corn). These important food products are part of Mexican diets nation-wide, which have been cultivated and consumed since pre-Hispanic times [75]. The bean, of Mesoamerican origin [76], is considered the most important domesticated legume in America, and together with *Zea* and *Cucurbita* constitutes the widespread food triad of the Mesoamerican culture. *Phaseolus vulgaris* is currently distributed throughout the globe, occupying other cultural roles; for example, in the Republic of Benin, it also has religious, forage and medicinal uses, the medicinal of which is derived from the leaves and seeds [77]. In Morocco, *Zea mays* is also commonly used as a medicinal species since this species has been popular for curing diseases of the genitourinary system [78].

The seeds of *Pinus cembroides* are commonly used as food and as an ingredient in various regional candies. Historically, the seeds of pinyon pine (piñonero) have been used by indigenous tribes of the southern USA and northern Mexico. They are rich in protein, low in starch and contain seven of the nine essential amino acids; they are especially rich in cystine and tryptophan [79].

Other introduced taxa whose seeds are widely used as a complementary part of the diet belong to the Leguminosae and Poaceae families. *Lens culinaris*, *Pisum sativum*, *Cicer arietinum* and *Avena sativa* have been historically used as food [80], and they are widely consumed around the world [81,82]. These seeds function as nutraceuticals, e.g., *A. sativa*, which contains several groups of psychoactive phytochemicals that have been shown to improve cognitive function [83].

In addition to seeds, the roots of several taxa are used in meal preparation, especially *Solanum tuberosum* (papa), *Ipomoea batatas* (camote), *Pachyrhizus erosus* (jicama) and *Daucus carota* (zanahoria). There are several Neotropical legumes with edible roots including *Vigna*, *Pedimelum*, *Apios* and *Pachyrhizus*. Of these, only *P. erosus*, a species native to Mexico, is widely cultivated in gardens or for export. It is cultivated throughout Mesoamerica, with a strong introduction in southeast Asia [84]. The potato *Solanum tuberosum* is an important food for the people of Iturbide; it is grown, but is mainly bought in stores and supermarkets. Two native root species are used to make alcoholic beverages: *Dasyllirion* and *Agave*. In addition, the sap of *Agave americana* is widely harnessed in Mexico for the extraction of “agua miel” (honey water, raw) or syrup or honey (cooked [85]). *Dasyllirion* is utilized for the manufacture of “sotol” (alcoholic beverage) and its leaves in many parts

of Mexico are used for making handicrafts; in the specific case of Rarámuri women for crafting baskets [86].

Within the Cactaceae family, the flowers of two native species of *Yucca*, *Y. treculeana* and *Y. filifera*, are collected seasonally and cooked with eggs to increase the flower's protein content [87]. These are also cooked with chili, tomato and onion to prepare a classic regional dish from the northeast of the country [25–27]. The stems of the native *Echinocactus platyacanthus* (biznaga burra) are cooked with white and brown sugar to make crystallized candies; this plant also has ornamental and medicinal uses [88] and serves as fodder for goats [25–27]. These practices are currently prohibited and regulated by Mexican legislation (NOM-059-SEMARNAT-2010). The stems of *Opuntia* are widely utilized for food or forage. *Opuntia ficus-indica* is a cactus of cultural and economic importance due to its multiplicity of uses, typical of its long history of domestication [89]. Many other *Opuntia* species produce sweet fruits (tunas) which are sold in markets throughout Mexico and worldwide [90].

3.2.4. Forage

Given that cattle raising and farming are common occupations in Iturbide, ranchers cultivate or collect forage to feed domestic livestock instead of purchasing it. Forage almost always consists of native plants when livestock is grazed in open areas, compared with a mixed diet of native and exotic species when livestock are kept within town limits.

We registered at least 30 forage taxa where the consumed material consists mainly of leaves and fruits. Several Cucurbitaceae including *Cucurbita mochata*, *C. pepo*, *C. ficifolia*, *Citrullus lanatus*, *Cucumis melo* and *C. anguria* are utilized for food; also, the dry leaves and fruit peels of them are given to the cattle as fodder, and the same practices are carried out in Yucatán, Mexico (*Cucumis anguria*, common name: meloncillo [91]). Another example is the use of two cultivated species of *Cucurbita* (*C. pepo* and *C. mochata*), which are an important part of traditional farming polyculture systems called milpas (the milpa is a farming system made up of the so-called triad: corn, beans and squash). These species help control erosion and maintain moisture by limiting solar penetration through the canopy and reducing the growth of weeds. The most common way to feed livestock is after harvesting the fruit when it is common to introduce directly (cows, pigs, sheep or goats) to feed on plant debris.

Several Poaceae, such as *Sorghum bicolor*, *S. halepense* and *Bouteloua curtipendula*, are among the most common forage species used to feed cattle. *Sorghum halepense* has become a pest species in both natural and agricultural areas and due to its abundance, it is often used as forage in Iturbide. It is considered the sixth weed with the highest rate of invasion to different crops in more than 50 countries, affecting millions of hectares [92]. In Iturbide, this species is not a pest since the climate is not suitable for its development. Other forage species are *Carya illinoensis* and *Juglans major*, which are collected after falling from trees and given to cattle. On the other hand, taxa frequently found in abandoned farmlands and used as grazing areas are *Chenopodium ambrosioides* and *Amaranthus palmeri* (both Amaranthaceae), *Helianthus annuus* and *Taraxacum officinale* (both Asteraceae), *Turnera diffusa* (Turneraceae), *Acalypha hederacea* (Euphorbiaceae) and *Arachis hypogaea* (Fabaceae).

Other multipurpose shrubs are widely used also as forage. The leaves of *Rhus virens*, *Calliandra conferta*, *Prosopis glandulosa* and *Vachellia farnesiana* constitute an important part of the diet of domestic animals in the region. The dry or fleshy fruits of several native shrubs and trees such as *Cordia boissieri*, *Diospyros palmeri*, *Quercus virginiana*, *Quercus canbyi*, *Quercus polymorpha*, *Prosopis glandulosa* and *Vachellia farnesiana* (Appendix A) are used as seasonal forage. The fruits of other taxa such as *Diospyros* spp. are used in similar ways in Ethiopia [93]. The acorns from *Quercus* spp. are used as food in Slovakia [94], and at least seven other species of *Cordia* have edible fruits and are utilized in the same way in Mexico [95]. Two species of Cactaceae, that are important in the diet of cattle, are the native *Opuntia ficus-indica* and *O. lindheimeri*. Both are cut with a machete and their thorns are scorched to provide easy, efficient, cheap and nutritious livestock feed. *Opuntia* spp.

are extremely useful livestock forage, providing digestible energy, vitamins and water; although they are mainly used for cattle, this species is also used as forage for pigs.

3.2.5. Construction and Fuel

Of the 30 taxa ethnobotany harnessed for construction, 80% are trees. A total of 27 of these species are native, with the exception of *Cupressus lousitanica*, *C. sempervirens* and *Thuja occidentalis*. Only four shrub species, *Rhus virens*, *R. trilobata*, *Agave americana* and *A. aff. scabra*, are used for construction. The wood of the first two species is mainly used to make tools for use in the home or for agricultural activities such as handles for brooms, machetes, rakes and hoes. The huge, dried peduncles (called quiote) of *Agave* inflorescences are used as gates on rural properties, livestock guards and clothesline supports. Since the houses and buildings in Iturbide are entirely made of concrete, and the gas is utilized as a heat source, wood is used mainly to build storage rooms, columns and ceilings for rest rooms, corrals and chairs. In northern Mexico, wood is stored to be used as fuel for barbecuing and to heat water for bathing. Wood from conifers (e.g., *Pinus*, *Cupressus*, *Juniperus* and *Thuja*), Fabaceae (*Prosopis* and *Vachellia*) and oak (*Quercus*) is the most frequently used as a heat source due to their hardness and durability. In Turkey, the wood of conifers and oaks such as *Cupressus*, *Juniperus*, *Pinus* and *Quercus* are used also as firewood and to make fences [96]. The wood of *Helietta parvifolia* is very hard, durable and resistant to pests, which makes it excellent for use as fence posts that last up to 20 years [25,27]. *Prosopis laevigata* and *Vachellia farnesiana* are among the 33 multipurpose species; their branches are used for fuelwood and fodder. The stems of *Fouquieria splendens* are cut, allowed to dry for several weeks and used to make pens for chickens or pigs; some species of this genus also have ornamental uses because of the beauty of their flowers. DNA sequencing of coprolites has shown that our prehistoric ancestors also consumed *Fouquieria* plants [97]. The wood of *Carya* is used to make chairs, tables and benches. Its wood is excellent for use in tool handles because of its strength and shock resistance. This species is considered the most important nut tree native to North America. Its nuts are also a high-quality food source due to their high protein and fat contents.

3.2.6. Fibers

The exploitation of natural fibers has decreased dramatically in northeastern Mexico. Interviewees in Iturbide noted that it is not economically lucrative to sell goods made from natural fibers. Very few people work with plant fibers as a permanent job, but those who do use *Agave lechuguilla*, *A. americana*, *Yucca carnerosana* and less commonly, *Hechtia podantha*. The fiber collection and handling process remain the same as it was 50 years ago: (1) travel to locate and collect the plant, (2) bundle it, (3) use a mule or donkey to transport it, (4) extract the fiber with relatively artisanal instruments and (5) dry it to sell the fiber.

3.2.7. Live Fences

The construction of living fences in rural areas of northern [25,27] and southern [98] Mexico is common and has several objectives. Live fences serve as a barrier to natural elements and prevent entry to private property. The utilization of live fences is less expensive than the construction of block and cement fences, and it contributes to the beautification of the property. Due to their large size, uniform structure and durable leaves and thorns, the succulent species of the Asparagaceae, Cactaceae and Fouquieriaceae families are the most frequently used as live fences. The most used taxa in Iturbide are *Myrtillocactus geometrizans*, *Agave americana*, *Yucca filifera*, *Y. treculeana* and *Fouquieria splendens*. The rich diversity of columnar cacti used as living fences is manifested in the south-central region of southern Mexico, where at least 14 taxa of cacti are exploited as components of living fences: *Escontria chiotilla*, *Myrtillocactus geometrizans*, *M. schenkii*, *Pachycereus hollianus*, *Polaskia chende*, *P. chichiipe*, *Stenocereus griseus*, *S. stellatus*, *S. treleasei*, *S. fricii*, *S. queretaroensis*, *S. quevedonis*, *S. beneckeianus* and *S. satnaleyii* [99]. The light green and yellow-bordered leaves of *A. americana* var. *americana* can reach up to 2.5 m in length and their scape (peduncle) can measure

up to 4.5 m in height with extremely showy inflorescences in yellow panicles that attract multiple pollinators. *Agave americana* is also cultivated in Ecuador as a live fence to delimit land for grazing and farming [97]. The flowers of this and other species of *Agave* are eaten cooked, including *A. salmiana* and *A. mapisaga* (called “gualumbos”); both species are two of the most commercialized flowers with the largest number of ways of cooking in popular cuisine of Otomí origin in the center of Mexico (Pachuca, Hidalgo [100]).

When live fences are constructed by planting *Yucca* plants directly adjacent to one another, they form a practically insurmountable barrier. Their resistant stems and thorny, leathery leaves cannot be easily broken by domestic cattle, and they reach up to 4 m in height. In addition, their flowers are edible and provide delicious seasonal food, which is also consumed in the center of the country in the state of Hidalgo [100]. In drier areas of Iturbide, dried stems from *Fouquieria splendens* are widely used as barriers, for instance, to fence goats and chickens.

3.2.8. Dye

Natural dyes obtained from plants have been widely used in Mexico since the pre-Hispanic era. Indigenous cultures in the western United States have used various plant species as dyes [98], several of which are also found in Iturbide, including *Arundo donax*, *Cucumis melo*, *Gutierrezia sarothrae*, *Juglans major*, *Junieprus deppeana*, *Larrea tridentata*, *Opuntia engelmannii*, *Phaselus vulgaris*, *Prunus persica*, *Taraxacum officinale* and *Zea mays*. In Iturbide, we have registered the use of five species with dyeing properties (Appendix A). The leaves, branches and fruits of species of Juglandaceae (*Carya* and *Juglans*) are boiled in water to create black or dark brown dye used to color hair. In eastern North America, *Juglans cinerea* is used as a dye, but also in construction as veneer, wood carvings, furniture and cabinetry [101]. The ripe and raw fruits of *Hylocereus undatus* (Cactaceae) and *Morus celtidifolia* (Moraceae) provide intense bright red and dark purple colors of great beauty which are used directly or boiled in water to create dye for clothes, tablecloths and fibers. Currently, in Iturbide, the use of these techniques is sporadic and practiced by very few people, especially older adults from neighboring towns who continue practicing artisan staining methods. The betacyanins extracted from the fruit of *Hylocereus polyrhizus* are used as a natural colorant in the manufacture of traditional ice cream; its application causes color changes in the raw material, similar to the artificial colorant (E-162), having greater acceptability than the artificial colorant [102].

3.2.9. Roof

Dry leaves of Arecaceae species, such as *Washingtonia* and *Brahea*, and stems of Poaceae, such as *Bambusa* and *Arundo*, are excellent elements for making roofs. The leaves are intertwined or spliced one on top of the other and tied; the large interwoven surface that the leaves provide creates an effective barrier against sun, wind and rain. The stems of the grasses *Bambusa* and *Arundo* are cut to a homogeneous size and tied with twine to create roof panels. Although these are more fragile and less resistant to inclement weather, they are common in many of Iturbide's houses. This custom extends in the northwestern region of Mexico (Sonora), where, in addition to roofing houses, brooms are made. Their trunks (*Bambusa*) are also used for construction, and the fruit, the palm heart for food [103].

3.3. Quantitative Ethnobotanical Indices (IFC, UVI, FL)

Nowadays, the harnessed botanical taxa and the importance that people give to the medicinal properties are relevant factors to determine the ethnobotanical value of the regional flora [1,4–6,13,20,24,55]. According to the number of uses recorded for the different ailments, the highest IFC values were obtained for the respiratory (0.92), genitourinary (0.91), ophthalmic (0.90), digestive (0.89) and nervous (0.88) systems (Table 3). These systems represent the main health problems recognized by the World Health Organization (WHO [60]), as well as in research on the documentation of traditional medicine [1,2,7]. Among the taxa that had the most mentions to heal respiratory illnesses were those from the

families Lamiaceae, (*Ocimum basilicum*, *Mentha piperita* and *Monarda citriodora*), Asteraceae (*Tagetes lucida*), Liliaceae (*Allium sativa*) and Rutaceae (*Citrus limon*). These taxonomic families are reported for other traditional peoples in different parts of the world, e.g., in the Himalayas, Amazon and Australia. This is because plant families share common biochemistry (chemosystematics), which helps us understand traditional ethnobotanical knowledge around the world [104].

Few species were cited for the treatment of genitourinary and circulatory diseases, but those seemed to be particularly effective, especially *Turnera diffusa*, *Eryngium heterophyllum* and *Equisetum laevigatum*. The most commonly mentioned species included *Eryngium heterophyllum*, which has proven to be an excellent remedy for high cholesterol levels [105], and the multipurpose medicinal species *Petroselinum crispum*, which is used as a diuretic, carminative, gastronomic agent and anti-inflammatory; these properties of the plant have been corroborated in formal studies [106]. Moreover, this species is used to treat amenorrhea, cardiac disease, gastrointestinal disorder, hypertension, urinary disease, otitis, nasal congestion, diabetes and several dermal diseases. It is worth noting that, although there are only three species used for the cure of ophthalmic ailments, *Matricaria recutita*, *Echeveria simulans* and *Sedum palmeri*, they are invariably used for that particular purpose. Although the IFC value for the gastrointestinal system ranked fourth, it is almost quantitatively equal to the respiratory, genitourinary and ophthalmic systems.

The Use Value Index (UVI) is interpreted as the potential use of a particular species that is used to cure or counteract a specific ailment. Therefore, higher values determine the frequency of medicinal species [13]. In our study, it is interesting to note that the highest UVI values were obtained for exotic species, which reflects the importance of their inclusion in the traditional medicine of Iturbide residents. The species in order of descending importance are *Lepidium peruvianum* (3), *Ocimum basilicum* (2.4), *Rosmarinus officinale* (2.29), *Mentha piperita* (2.25), *Cinnamomum verum* (2.06) and *Plectranthus coleoides* (2, Table 4). The native species with the greatest UVI values were *Conyza filaginoides* (2), *Psidium guajava* (1.86) and *Zea mays* (1.72). All interviewees mentioned that *Lepidium peruvianum* relieves gastrointestinal, endocrine (prostate) and urinary (kidney) ailments.

Table 4. Plant species with medicinal uses that obtained the highest UVI values in Iturbide, Nuevo León, Mexico. The letters ‘E’ and ‘N’ refer to the Exotic and Native origin of each species, respectively.

Scientific Name	UVI	Origin
<i>Lepidium peruvianum</i> G.Chacón	3	E
<i>Ocimum basilicum</i> L.	2.4	E
<i>Rosmarinus officinalis</i> L.	2.29	E
<i>Mentha piperita</i> L.	2.25	E
<i>Cinnamomum verum</i> J.Presl.	2.06	E
<i>Plectranthus coleoides</i> Benth.	2	E
<i>Thymus vulgaris</i> L.	2	E
<i>Citrus sinensis</i> (L.) Osbeck	2	E
<i>Amphipterygium adstringens</i> (Schltdl.) Standl.	2	N
<i>Conyza filaginoides</i> (DC.) Hieron	2	N
<i>Taraxacum officinale</i> (L.) Weber ex F. H.Wigg.	1.86	E
<i>Psidium guajava</i> L.	1.86	N
<i>Syzygium aromaticum</i> (L.) Merr. & L. M. Perry	1.75	E
<i>Eucalyptus camaldulensis</i> Dehnh.	1.73	E
<i>Zea mays</i> L.	1.72	N

The other mentioned species, especially those belonging to the Lamiaceae family, are frequently cited in the literature as having medicinal properties, especially to treat ailments of the respiratory system [107]. A total of seventeen medicinal taxa obtained 100% of Fidelity Level. These plants were the most commonly mentioned to heal a specific type of disease. A total of thirteen medicinal taxa with the highest Fidelity Level are native and four are exotic, with the families Asteraceae [108] and Lamiaceae [107] being the

most well-represented (Table 5). Moreover, at least eleven families are used for medicinal purposes (Appendix A), and the fact that almost all species used have a fidelity level of 100% indicates that these species are quite well-known for their healing properties. The taxa with the highest number of mentions were *Equisetum laevigatum*, *Turnera diffusa*, *Artemisia ludoviciana*, *Flourensia cernua*, *Ficus carica* and *Verbena canescens*.

Table 5. The highest values obtained in the Fidelity Label (FL%) index determine the ethnobotanical species with greater relevance in the medicinal categories. Its weighting is given from the number of informants who mention the species *i* to cure a specific disease (Ip), with respect to the frequency of mention of the mentioned species (Iu).

Plant Species	Ailment	Ip	Iu	FL(%)
<i>Chenopodium ambrosioides</i> L.	Gastrointestinal system	16	16	100
<i>Eryngium heterophyllum</i> Hemsl. & Rose	Circulatory system	15	16	94
<i>Artemisia ludoviciana</i> Nutt.	Gastrointestinal system	17	17	100
<i>Calea oliveri</i> B.L.Rob. & Greenm.	Gastrointestinal system	14	14	100
<i>Chrysactinia mexicana</i> A. Gray	Gastrointestinal system	18	18	100
<i>Flourensia cernua</i> DC.	Gastrointestinal system	17	17	100
<i>Gnaphalium viscosum</i> Kunth	Respiratory system	14	14	100
<i>Equisetum laevigatum</i> A. Braun	Genitourinary system	28	28	100
<i>Hedeoma drummondii</i> Benth.	Nervous system	16	16	100
<i>Monarda citriodora</i> var. <i>austromontana</i> (Epling) B.L.Turner	Respiratory system	24	26	92
<i>Punica granatum</i> L.	Gastrointestinal system	14	14	100
<i>Ficus carica</i> L.	Endocrine system	17	17	100
<i>Moringa oleifera</i> Lam.	Endocrine system	9	9	100
<i>Purshia plicata</i> (D.Don) Henr.	Gastrointestinal system	10	10	100
<i>Citrus x limon</i> (L.) Osbeck	Respiratory system	16	16	100
<i>Turnera diffusa</i> Willd. ex Schult.	Genitourinary system	19	19	100
<i>Verbena canescens</i> Kunth	Nervous system	17	17	100

4. Conclusions

Iturbide presents a high biocultural diversity of ethnobotanical taxa. This diversity is made up of native and exotic species; in general, it is very similar to that of other nearby areas with similar climate, relief and vegetation in the state of Nuevo León [13,24–27], for the northeast zone [59], the northern macro-region [48,86] and in general, for arid and semiarid zones in Mexico [50]. In addition, this diversity at the local level has a relationship with the variation in altitude within Iturbide, being possible to find several types of vegetation, including scrub vegetation at lower altitudes and coniferous forests at higher altitudes, forming an ecotone between these vegetations. This heterogeneity means that there are no differences in its diversity, even concerning pine-oak forest sites [49].

Comparing the level of knowledge and use of ethnobotany in Iturbide and the significance with respect to other sites shown in the investigation, we can conclude that there is a strong cultural attachment to native and exotic flora; it is complete with a multifunctional roll. The traditional ethnobotanical knowledge of the local inhabitants of the Iturbide mestizo region is highly important. Our results contribute to the ethnobotanical biocultural diversity in northeast Mexico and in general in the north of the country. We maintain that the knowledge and practices of plants used in rural mestizo regions, arid and semiarid zones as well as transition zones are as relevant as those rooted in localities of indigenous tradition and high biological diversity.

In the study site, the inclusion of exotic species concerning the native ones is important and this has also been reported in other localities of the region [13]. This pattern demonstrates the learning capacity of local communities in the face of the entry of new plant species, creating new knowledge and taking advantage of them and even promoting a phenomenon of co-evolution.

Both native and exotic plants play a multifunctional role, taking advantage of various anthropocentric categories and highlighting the ornamental use. Regarding the ornamental flora, it shows the abundance of species for this purpose, which are cultivated in public parks and private gardens. This phenomenon has been documented in other localities [13], and its relevance is associated with the population's interest in mitigating solar radiation, enhancing the landscape beauty of arid and semiarid areas, contributing significantly to the reduction in stress caused by climate change and improving physical and emotional human health and well-being [18].

Despite showing cultural changes, where medicinal and food plants go into the background, after being more relevant for their role in primary human functions, they continue to be important and are used to cure a series of diseases. Interestingly, species with higher use values (UVI) are introduced, further promoting these cultural changes and meeting new health needs of local residents. However, the level of fidelity (FL) maintains certain native species to address problems with the digestive and respiratory systems. Regarding edible plants, these are seasonal and continue to be included in the local gastronomy. All this shows that traditional knowledge, despite undergoing adaptations, continues to prevail and is transmitted from generation to generation. However, they are at risk from the increasing loss of the younger population.

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Appendix A

Table 1. Families, genera, species and their uses in Iturbide, Nuevo León, Mexico. The letter after author name indicates: N = native and E = exotic. The collection number belongs to Eduardo Estrada (EE).

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
ACANTHACEAE				
<i>Hypoestes phyllostachya</i> Baker, E, EE25323	Paleta de pintor	Ornamental	Whole plant	Planted in private gardens
<i>Beloperone gutatta</i> Bredengee, N, EE25325	Camarón	Ornamental	Whole plant	Planted in private gardens
ACERACEAE				
<i>Acer negundo</i> L., EE25383	Maple	Ornamental	Whole plant	Planted in public parks and private gardens
ACTINIDIACEAE				
<i>Actinidia deliciosa</i> (A.Chev.) C.F.Liang & A.R.Ferguson, E, EE25447	Kiwi	Food	Fruit (pulp)	Raw
ADOXACEAE				
<i>Sambucus canadensis</i> L., N, EE25384	Sauco	Ornamental Medicinal (respiratory system)	Whole plant Inflorescences and flowers	Planted in public parks and private gardens Boiled, drink the infusion
AMARANTHACEAE				
<i>Amaranthus palmeri</i> S.Watson, N, EE25326	Quelite	Food Forage	Leaves and inflorescences (young) Whole plant	Cook with oil or raw (previously disinfected with chlorine in water) Raw
<i>Beta vulgaris</i> subsp. <i>adanensis</i> (Pamukç.) Ford-Lloyd & J.T. Williams, E, EE25448	Betabel	Food medicinal (gastrointestinal system), detoxify the gut	Leaves Leaves	Boiled, liquate Raw, boiled or cooked
<i>Beta vulgaris</i> L. var. <i>cicla</i> L., E, EE25371	Acelga	Dye Food	Roots Leaves	Raw, squeezed Raw, boiled or fried.
<i>Chenopodium ambrosioides</i> L., N, EE25324	Epazote	Food Medicinal (gastrointestinal system), eliminate intestinal worms Condiment Forage	Leaves, inflorescences and flowers Leaves, stems, inflorescences and flowers Leaves and stems Whole plant	Boil or cook with beans (to add flavor) Boiled, drink the solution Dried, crushed, added to flavor the food Raw
<i>Spinacia oleracea</i> (L.) E.H.L.Krause, E, EE25449	Espinaca	Food Medicinal (gastrointestinal system)	Leaves Leaves	Raw (previously disinfected with chlorine in water) Liquate, raw, to eliminate amoeba
AMARYLLIDACEAE				
<i>Crinum asiaticum</i> L., E, 25450	Lirio listado	Ornamental	Whole plant	Planted in private gardens
<i>Clivia miniata</i> (Lindl.) Bosse, E, EE25451	Clivia	Ornamental	Whole plant	Planted in private gardens
ANACARDIACEAE				
<i>Amphipterygium adstringens</i> (Schltdl.) Standl., N, EE25452	Cuacharalate	Medicinal (dermic system), antiseptic, antibiotic	Bark	Boiled, used as cataplasm, wound washing

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
<i>Mangifera indica</i> L., E, EE25454	Mango	Food	Fruit	Raw, mixed with green salads
<i>Rhus trilobata</i> Nutt., N, EE25455	Lantrisco, jobo	Ornamental	Whole plant	Planted in private gardens
<i>Rhus virens</i> Lindh. ex A. Gray, N, EE25456	Lantrisco	Ornamental	Whole plant	Planted in private gardens
		Construction	Trunks and branches	Dried, to make columns of houses, tools and fuel
		Construction of tools and fuel	Trunks and branches	Dried, to make columns of houses, tools and fuel
		Forage	Leaves	Raw
<i>Schinus molle</i> L., E, EE25457	Pirul	Rites (soul cleansing) and religion	Small branches and leaves	Leaves are rubbed all over the individual's body while praying
		Ornamental	Whole plant	Planted in private gardens
ANNONACEAE				
<i>Annona muricata</i> L., N, EE25453	Guanábana	Food	Fruit	Raw or liquid to make fruit drinks
APIACEAE				
<i>Apium graveolens</i> L., E, EE25327	Apio	Food	Leaves	Raw, in salads
		Medicinal (blood system), low cholesterol	Leaves and stems	Raw
<i>Coriandrum sativum</i> L., EE25328	Cilantro	Food (condiment)	Leaves	Raw or cooked in broth
<i>Cuminum cyminum</i> L., E, EE25329	Comino	Food (condiment)	Seeds	Cooked with rice and meat
<i>Daucus carota</i> L., E	Zanahoria	Food	Root	Raw or cooked with different vegetables
<i>Daucus carota</i> L., E, EE25330	Hierba del sapo	Medicinal (urinary system), dissolve kidney stones	Leaves and stems	Boiled, drink the solution
<i>Eryngium heterophyllum</i> Hemsl. & Rose, N, EE25504	Perejil	Medicinal (blood system), low cholesterol and triglycerides	Root	Boiled, drink the solution
<i>Petroselinum crispum</i> (Mill.) Fuss, E, EE25331		Food	Leaves and stems	Raw or cooked with different vegetables
		Medicinal (urinary system)	Leaves	Prevents bladder infections
		Medicinal (blood system)	Leaves	Purifies the blood
APOCYNACEAE				
<i>Cascabela thevetia</i> (L.) Lippold, E, EE25503	Cascabel	Ornamental	Whole plant	Planted in private gardens
<i>Plumeria rubra</i> L., N	Ramo de novia	Ornamental	Whole plant	Planted in private gardens
<i>Vinca minor</i> L., E, EE25220	Teresita	Ornamental	Whole plant	Planted in private and public gardens
ARACEAE				
<i>Spathiphyllum wallisii</i> Regel, N, EE25502	Cuna de Moisés	Ornamental	Whole plant	Planted in private gardens
<i>Anthurium magnificum</i> Linden, N, EE25501	Anturio, lampazo	Ornamental	Whole plant	Planted in private gardens
<i>Zantedeschia aethiopica</i> (L.) Spreng., E, 25500	Alcatraz	Ornamental	Whole plant	Planted in private gardens
ARECAECACEAE				
<i>Brahea berlandieri</i> (Kunth) Mart., N, EE25499	Palmito	Ornamental	Whole plant	Planted in private gardens
		Rites	Leaves	Ornaments in floral bouquets
		Construction	Leafs	Roofs of houses and cabins

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
<i>Cocos nucifera</i> L., E, EE25385	Coco	Food	Fruit	Raw pulp and its water, to make candies
<i>Washingtonia filifera</i> (Linden ex André) H.Wendl. ex de Bary, N, EE25386	Palma	Ornamental	Whole plant	Planted in private gardens
		Construction, roofs	Leaves	Dried
ASPARAGACEAE				
<i>Agave lechuguilla</i> Torr., N, EE25251	Lechugilla	Healthy hair	Root	Milled, raw, used as shampoo
<i>Agave americana</i> L. var. <i>americana</i> , N, EE25251b	Magüey	Fibers	Leaves	Leaves divided into multiple fibers used to make woven products
		Food	Root	Boiled and fermented (to prepare alcoholic beverages)
		Living fences	Whole plant	Planted in private gardens
		Food	Root	Agua miel (sap), raw or cooked to make syrup
		Food (quiote)	Peduncle	Cooked in a well with hot stones and firewood, covered for 24 h
		Food	Flowers	Cooked
		Food	Root	Boiled and fermented (to prepare alcoholic beverages)
		Ornamental	Whole plant	Planted in public and private gardens
		Construction	Peduncle (dry)	Livestock keeper
		Living fences	Whole plant	Planted in private gardens
<i>Agave aff. scabra</i> Ortega, N, EE25251c	Magüey, bronco	Food (quiote)	Peduncle	Cooked in a well with hot stones and firewood, covered for 24 h
<i>Asparagus setaceus</i> Kunth, E, EE25332 <i>Dasylirion berlandieri</i> S. Watson, N, EE25253	Hoja elegante Sotol	Fibers	Leaves	Used to make ties
		Living fences	Whole plant	Planted in private gardens
		Living fences	Whole plant	Planted in private gardens
		Ornamental	Whole plant	Planted in private gardens
		Food	Root	Boiled and fermented (to prepare alcoholic beverages)
		Religious rites	Leaves (base)	With the base of the leaves, structures similar to flowers are made that adorn the main square and streets in celebration of the patronal feast of San Pedro
<i>Polianthes tuberosa</i> L., N, EE25254	Nardo	Ornamental	Whole plant	Planted in private gardens
<i>Sansevieria trifasciata</i> Prin., E, EE25498	Lengua de suegra	Ornamental	Whole plant	Planted in private and public gardens
<i>Yucca filifera</i> Chabaud, N, EE25155	Palma china	Food	Flowers (called chochas)	Raw, collected before opening and the reproductive structures are removed so that when cooking they do not make the food bitter
<i>Yucca filifera</i> Chabaud, N, EE25155	Palma china	Food	Fruit (called dátiles)	Raw
		Food	Fruit	Raw
		Ornamental	Whole plant	Raw

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
<i>Yucca treculeana</i> Carrière, N, EE25155b	Palma samandoca	Food	Flowers (called chochas)	Raw, collected before opening and the reproductive structures are removed so that when cooking they do not make the food bitter
ASPHODELACEAE		Live fences	Whole plant	Planted in private gardens
<i>Kalanchoe blosfeldiana</i> Poelln., E, EE25152	Brujita	Ornamental, for its beautiful fleshy leaves	Whole plant	Planted in private gardens
<i>Kalanchoe digremontiana</i> Raym.-Hamet & H. Perrier, E, EE25333	Urania	Medicinal (endocrine system), anti-inflammatory	Sap	Raw, drink the sap
		Medicinal (gastric system), heal gastrointestinal problems	Leaves (pulp)	Raw, milled, drink the sap
ASTERACEAE		Ornamental	Whole plant	Planted in private gardens
<i>Artemisia ludoviciana</i> Nutt., N, EE25256, EE25334	Estafiate	Medicinal (gastrointestinal system), diarrhea, flatulences	Leaves and stems	Boiled, drink infusion
<i>Baccharis salicifolia</i> Nutt, N, EE25258	Jara, jarilla	Medicinal (gastrointestinal system), diarrhea, flatulences	Leaves and stems	Cut into pieces, boiled in water, drink the solution
<i>Calea oliveri</i> B.L.Rob. & Greenm., N, EE25368	Ámbula	Medicinal (nervous system), insomnia	Leaves	Boiled in water, drink the solution
<i>Chrysactinia mexicana</i> A. Gray, N, EE25370	Hierba de San Nicolás	Medicinal (reproductive system), aphrodisiac	Leaves	Boiled in water, drink the solution
<i>Chrysanthemum morifolium</i> Ramat., EE25222	Crisantemo	Ornamental	Whole plant	Planted in private gardens
<i>Conyza filaginoides</i> (DC.) Hieron, N, EE25497	Simonillo	Ornamental	Whole plant	Planted in private gardens
		Medicinal (gastrointestinal system), diarrhea, colic	Leaves and stems	Boiled in water, drink the solution
		Medicinal (endocrine system), diabetes and cancer	Leaves and stems	Boiled in water, drink the solution
<i>Dahlia coccinea</i> Cav., N, EE25388	Dalia (the representative plant of Mexico)	Ornamental, by its showy and big inflorescences with red external flowers	Whole plant	Planted in private gardens
<i>Flourensia cernua</i> DC., N, EE25387	Hojasé	Medicinal (gastrointestinal system), constipation	Leaves	Boil only 3–4 leaves, very astringent effect and very bitter taste
<i>Gnaphalium viscosum</i> Kunth, N, EE25389	Gordolobo	Medicinal (respiratory system), cough, throat pain	Stems, leaves, inflorescences and flowers	Boiled in water, drink the solution
<i>Grindelia inuloides</i> Willd. var. <i>inuloides</i> , N, EE25390	Árnica	Medicinal (skeletal-muscular system), external wounds	Leaves and inflorescences	Boiled in hot water, drink the solution
<i>Gutierrezia sarothrae</i> (Pursh) Britton & Rusby, N, EE25496	Amargosa	Medicinal (broken bones),	Leaves	Used as plaster (glutinous stems, sticky)

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
<i>Gymnopserma glutinosum</i> Less., N, EE25369	Marica	Fibers	Branches	Dried, they
		Household items	Leaves and stems	Dried, intertwined, tied and attached to a stick to make homemade brooms
<i>Helianthus annuus</i> L., N, EE24495	Girasol	Forage	Whole plant	Raw
<i>Lactuca sativa</i> L., E, EE25391	Lechuga	Food	Leaves	Raw, previously disinfected with chlorine
<i>Machaeranthera tanacetifolia</i> (Kunth) Nees, N, EE25494	Árnica	Medicinal	Leaves and inflorescences	Boiled, solution used as cataplasm
<i>Matricaria recutita</i> L., E, EE25493	Manzanilla	Medicinal (gastrointestinal system), colic, stomach ache	Leaves	Boiled, drink the solution
<i>Parthenium hysterophorus</i> L., N, EE25492	Amargoso	Mosquito repellent	Whole plant (dry)	Burning in the yard, smoke produced repels insects and other pests
		Household items	Leaves and stems	Dried, intertwined, tied and attached to a stick to make homemade brooms
<i>Tagetes lucida</i> (Sweet) Voss, N, EE25491	Yerbanís	Beverage	Leaves, stems, inflorescences and flowers	Boiled, drink as tea
		Medicinal (gastrointestinal system), stomach ache, colic, ulcer	Leaves, stems, inflorescences and flowers	Boiled, drink as tea
<i>Tanacetum parthenium</i> (L.) Sch.Bip., E, EE25490	Altamisa	Mosquito repellent	Whole plant	Alive, inside the house
		Medicinal (gastric system), stomach ache	Leaves and stems	Boiled, drink the solution
<i>Taraxacum officinale</i> (L.) Weber ex F. H.Wigg., E, EE25489	Diente de león	Food	Leaves	Raw (previously disinfected with chlorine)
		Forage	Whole plant	Raw
<i>Trixis californica</i> Kellogg, N, EE25488	Árnica	Medicinal	Leaves and stems	Boiled, drink the solution
<i>Zinnia elegans</i> L., N, EE25335	Cartulina	Ornamental	Whole plant	Planted in private and public gardens
BALSAMINACEAE				
<i>Impatiens hawkeri</i> W. Bull, E, EE25219	Belén	Ornamental	Whole plant	Planted in private gardens
BEGONIACEAE				
<i>Begonia gracilis</i> Kunth, N, EE25236	Begonia	Ornamental	Whole plant	Planted in private gardens
BIGNONIACEAE				
<i>Chilopsis linearis</i> (Cav.) Sweet, N, EE25487		Ornamental, by its beautiful flowers	Whole plant	Planted in private and public gardens
<i>Tecoma stans</i> (L.) Juss. ex Kunth, N, EE25218	Tronadora, San Pedro	Ornamental	Whole plant	Planted in public and private gardens
BORAGINACEAE				
<i>Cordia boissieri</i> A. DC., N, EE25157	Anacahuita	Medicinal (respiratory system), pneumonia	Flowers and fruit (pulp)	Boiled, drink the infusion
		Ornamental	Whole plant	Planted in public and private gardens
		Forage	Fruit	Raw
<i>Ehretia anacua</i> (Terán & Berland.) I. M. Johnst., N, EE25163	Anacua	Ornamental	Whole plant	Planted in public and private gardens

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
BRASSICACEAE				
<i>Brassica oleracea</i> L., E, EE25486	Repollo	Food	Leaves	Raw or cooked with other vegetables.
<i>Lepidium peruvianum</i> G. Chacón, E, EE25336	Raíz peruana	Medicinal (gastrointestinal, endocrine and urinary systems)	Root	Boiled, drink the infusion
<i>Rorippa officinale</i> R. Br., E, EE25485	Berro	Medicinal (endocrine system), prostate problems	Leaves and stems	Boiled, eat and drink infusion
		Food	Leaves	Raw (previously disinfected with chlorine in water) or cooked with other vegetables
<i>Raphanus sativus</i> L., E, EE25484	Rábano	Food	Root	Raw, in salads
		Medicinal (respiratory system), asthma problems	Root	Raw, pulp
		Medicinal (blood system), lower blood pressure	Root	Raw, pulp
BROMELIACEAE				
<i>Ananas comosus</i> (L.) Merr., E, EE25483	Piña	Food	Fruit	Raw
		Food	Fruit juice	Meat tenderizer
<i>Hechtia podantha</i> Mez, N, EE25392	Guapilla	Fibers	Leaves	Leaves divided into multiple fibers used to make woven products (ties)
<i>Tillandsia usneoides</i> (L.) L., N, EE25231	Paixtle	Religious rites	Leaves	Dried, decorate the christmas tree
		Manufacture of articles	Leaves	To make pillows
BUDDLEJACEAE				
<i>Buddleja cordata</i> ssp. <i>tomentella</i> (Standl.) E.M.Norman, N, EE25393	Tepozán	Medicinal (skeletal-muscular system), general pain	Leaves	Boiled in water, solution used as cataplasm
CACTACEAE				
<i>Cylindropuntia imbricata</i> (Haw.) F.M.Knuth, N, EE25246	Coyonoxtle	Medicinal (skeletal-muscular system), breaks and fissures of bones	Stems and pulp	Raw, use as cataplasm, smear the pulp on the injured area and bandage
<i>Cylindropuntia leptocaulis</i> (DC.) F.M.Knuth, N, EE25246b	Tasajillo	Medicinal (endocrine system) cancer	Stems and pulp	Boiled, drink the infusion
<i>Echinocactus platyacanthus</i> Link & Otto, N, EE25482	Biznaga burra	Food	Stems and pulp	Cooked with piloncillo (brown sugar) to make candies
<i>Hylocereus undatus</i> (Haw.) Britton & Rose, N, EE25377	Pithaya	Food	Fruit	Raw, blended with water to make drinks
		Ornamental	Whole plant	Planted in private gardens
		Dye	Fruit	Raw, squeezed
<i>Lophophora williamsii</i> (Lem. ex Salm-Dyck) J.M. Coult., N, EE25394	Peyote	Spiritual, religious	Whole plant	Raw, eaten in pieces or blended in water and drink the potion
		Medicinal (skeletal-muscular system)	Whole plant or cut into pieces inside alcohol and mixed with marijuana (Cannabis sativa)	Raw, cataplasm, rubbed on sore joints
		Medicinal (nervous system), insomnia	Pieces of plant	Raw, eaten in pieces or blended in water and drink the potion

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
<i>Mammillaria heyderi</i> Muehlenpf., N, EE25395	Chilitos	Ornamental	Whole plant	Planted in private gardens
<i>Myrtillocactus geometrizans</i> (Mart. ex Pfeiff.) Console, N, EE25396	Garambuyo	Living fences	Whole plant	Planted in private gardens
<i>Opuntia ficus-indica</i> (L.) Mill., N, EE25397	Nopal sin espina	Ornamental	Whole plant	Planted in private gardens
		Ornamental	Whole plant	Planted in private gardens
		Forage	Stems (cladodes)	Raw, cut into pieces and scorched (to remove thorns)
		Food	Stems (cladodes) and fruit	Peeled and cut into pieces, raw or cooked, fruit eaten raw
		Medicinal (endocrine system), low cholesterol	Stems	Raw, cut into pieces and eat
<i>Opuntia lindheimeri</i> Engelm., N, EE25249	Nopal	Forage	Stems (cladodes) and fruit	Raw, cut into pieces and scorched (to remove thorns), fruits eaten raw
		Food	Stems	Raw
		Medicinal (endocrine system), low cholesterol	Stems	Raw, stem pulp
		Medicinal (gastrointestinal system), improve digestion	Stems	Raw, stem pulp, liquefied
CANNABACEAE				
<i>Celtis leavigata</i> Willd., N, EE25233b	Palo blanco	Ornamental	Whole plant	Planted in private gardens
<i>Celtis pallida</i> Torr., N, EE25233	Granjeno	Food	Fruit	Raw or boiled to make syrup
		Ornamental	Whole plant	Planted in private gardens
CANNABINACEAE				
<i>Cannabis sativa</i> L., E, EE25481	Mariguana	Medicinal (skeletal-muscular system)	Female inflorescences and leaves into alcohol and mixed with peyote	Cataplasm, rubbing on sore joints
		Recreational, playful use	Female inflorescences	Smoked
CANNACEAE				
<i>Canna indica</i> L., E, EE25240	Coyol	Ornamental, for its beautiful flowers	Whole plant	Planted in private gardens
CAPRIFOLIACEAE				
<i>Lonicera japonica</i> Thunb., E, EE26167	Madreselva	Ornamental, for the delicious aroma of its flowers	Whole plant	Planted in private gardens
CARICACEAE				
<i>Carica papaya</i> L., N, EE25480	Papaya	Food	Fruit	Raw or in fruit salads
CARYOPHYLLACEAE				
<i>Dianthus caryophyllus</i> L., E, EE25224	Clavel	Ornamental, for its beautiful flowers	Whole plant	Planted in private gardens
<i>Dianthus deltoides</i> L., E, EE25440	Clavelina	Ornamental, for its beautiful flowers	Whole plant	Planted in private gardens
<i>Gypsophila paniculata</i> L., E, EE25441	Ilusión	Ornamental, for its beautiful flowers	Whole plant	Planted in private gardens
COMMELINACEAE				
<i>Commelina coelestis</i> Willd., N, EE25442	Hierba del pollo	Ornamental, for its beautiful flowers	Whole plant	Planted in private gardens

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
COSTACEAE				
<i>Costus igneus</i> N. E. Br., E, EE25443	Insulina	Medicinal (endocrine system), diabetes	Leaves	Boiled, drink the infusion
CONVOLVULACEAE				
<i>Ipomoea batatas</i> (L.) Lam., N, EE25444	Camote	Food	Root	Rosted or boiled
<i>Ipomoea purpurea</i> (L.) Roth, N, EE25445	Manto de la virgen	Ornamental, for its beautiful purple flowers	Whole plant	Planted in private gardens
CRASSULACEAE				
<i>Echeveria simulans</i> Rose, N, EE25446	Siempreviva	Ornamental, for its beautiful fleshy leaves	Whole plant	Planted in private gardens
		Medicinal (ophthalmic system), red eyes, irritated eyes	Sap	Eye drops
<i>Sedum diffusum</i> S. Watson, N, EE25437	Chismes	Ornamental, for its beautiful fleshy leaves	Whole plant	Planted in private gardens
		Medicinal (ophtlmic system), red eyes, irritated eyes	Sap	Eye drops
<i>Sedum palmeri</i> S. Watson, N, EE25438	Deditos	Ornamental, for its beautiful fleshy leaves	Whole plant	Planted in private gardens
CUCURBITACEAE				
<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai, E, EE25151	Sandía	Food	Fruit	Raw, cut into pieces
<i>Cucumis anguria</i> L., E, EE25364	Pepinillo	Forage (pigs) Food	Fruit peel Fruit	Raw Boiled into brine
<i>Cucumis melo</i> L., E, EE25365	Melón	Forage Food	Fruit Fruit	Raw Raw, cut into pieces
<i>Cucurbita ficifolia</i> Bouché, E, EE25366	Chilacayote	Forage (pigs) Food Forage Food	Fruit peel Fruit Fruit Fruit	Raw Boiled in water with sugar to make candies Raw Cooked with other vegetables
<i>Cucurbita moschata</i> Duchesne, N, EE25367	Calabaza	Food	Fruit	Cooked or boiled in water with sugar to make candies
<i>Cucurbita pepo</i> L., N, EE25439	Calabaza	Forage Food Food Forage	Leaves Fruit Seeds Leaves and fruit	Raw Cooked Raw, dried, toasted and salty Raw
<i>Luffa aegyptiaca</i> Mill., E, EE25435	Estropajo	Fibers	Inner part of dried fruit	To wash dishes or to carve skin for bathing
<i>Sechium edule</i> (Jacq.) Sw., N, EE25479	Chayote	Food	Fruit	Raw, cut into pieces or boiled
CUPRESSACEAE				
<i>Cupressus arizonica</i> Greene, N, EE25153	Cedro	Ornamental Fuel Furniture Religious rites Construction	Whole plant Wood Wood Sap (resin) Wood	Planted in public and private gardens Dried Dried Used as incense during religious prayers Dried to make columns and beams of houses

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
<i>Cupressus lousitanica</i> Mill., E, EE25153a	Ciprés	Ornamental Furniture Fuel	Whole plant Wood Wood	Planted in public and private gardens Dried Dried
<i>Cupressus sempervirens</i> L., E, EE25378	Pincel	Construction Ornamental Fuel	Wood Whole plant Wood	Dried to make columns and beams of houses Planted in public and private gardens Dried
<i>Juniperus flaccida</i> Schltld., N, EE25436	Táscate	Construction Ornamental	Wood Whole plant	Dried to make columns and beams of houses Planted in public and private gardens
<i>Thuja occidentalis</i> L., E, EE25172	Tuya	Fuel Construction Ornamental	Wood Wood Whole plant	Dried Dried to make columns and beams of houses Planted in public and private gardens
CYCADACEAE				
<i>Cycas revoluta</i> Thunb., N, EE25434	Chamal, cica	Ornamental	Whole plant	Planted in public and private gardens
<i>Dioon edule</i> Lindl., N, EE25375	Chamal	Ornamental Food	Whole plant Seeds	Planted in public and private gardens To make flour and tortillas
EBENACEAE				
<i>Diospyros palmeri</i> Eastw., N, EE25432	Chapote	Ornamental Forage Fuel Construction	Whole plant Fruit Trunks and branches Wood	Planted in public and private gardens Raw, for cattle, sheeps, goats and pigs Dried Dried to make columns and beams of houses
EQUISETACEAE				
<i>Equisetum laevigatum</i> A. Braun, N, EE25433	Cola de caballo	Medicinal (urinary system), kidney pain	Stems	Boiled, drink the infusion
EUPHORBIACEAE				
<i>Acalypha hederacea</i> Torr., N, EE25173	Hierba del cáncer	Medicinal (endocrine system), cancer Forage	Leaves and stems Whole plant	Boiled, drink the solution Raw
<i>Croton suaveolens</i> Torr., N, EE25478	Salvia	Medicinal (blood system), anemia	Leaves and stems	Boiled in water, drink the infusion
<i>Euphorbia pulcherrima</i> Willd. ex Klotzsch, N, EE25156	Noche buena	Ornamental	Whole plant	Planted in public and private gardens
<i>Euphorbia dentata</i> Michx., N, EE25261	Golondrina	Medicinal (respiratory system), sinusitis	Leaves and stems	Boiled in water, infusion used as nasal drops
<i>Euphorbia milii</i> Des Moul., E, EE25261b	Corona de Cristo	Ornamental	Whole plant	Planted in public and private gardens
<i>Jatropha dioica</i> Sessé, N, EE25431	Sangre de Drago	Medicinal (dermatologic system), hair growth, fungi Medicinal (gastric system), harden the gums		Milled, the pulp used as shampoo
<i>Ricinus communis</i> L., E, EE25159	Higuerilla	Ornamental	Leaves and stems Whole plant	Milled, chew and spit out the pulp Planted in public and private gardens
<i>Sapium sebiferum</i> (L.) Roxb., E, EE25164	Sapium	Ornamental	Whole plant	Planted in public and private gardens
<i>Tragia ramosa</i> Torr., N, EE25363	Mala mujer	Medicinal (urinary system), kidney diseases	Leaves	Boiled, drink the infusion
FABACEAE				
<i>Arachis hypogaea</i> L., E, EE25429	Cacahuate	Food Forage	Seeds Leaves	Raw Raw

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
<i>Bauhinia purpurea</i> L., N, EE25225	Pata de vaca	Ornamental	Whole plant	Planted in public and private gardens
<i>Calliandra conferta</i> A.Gray, N, EE25430	Charrasquillo	Medicinal (gastrointestinal system)	Leaves	Boiled, drink the infusion
<i>Cercis canadensis</i> L., N, EE25165	Duraznillo	Forage	Leaves and fruit	Raw
<i>Cicer arietinum</i> L., E, EE25379	Garbanzo	Ornamental	Whole plant	Planted in public and private gardens
<i>Erythrostemon mexicanus</i> (A. Gray)	Potro	Food	Seeds	Cooked
Gagnon & G. P. Lewis, N, EE25229		Ornamental	Whole plant	Planted in public and private gardens
<i>Eysenhardtia texana</i> Scheele, N, 25477	Palo azul	Ornamental	Whole plant	Planted in public and private gardens
<i>Lens culinaris</i> Medik, E, EE25428	Lenteja	Food	Seeds	Cooked
<i>Pachyrhizus erosus</i> (L.) Urb., N, EE25476	Jicama			
<i>Phaseolus vulgaris</i> L., N, EE25475	Frijol	Food	Seeds	Cooked
<i>Pisum sativum</i> L., E, EE25474	Chícharo	Food	Seeds	Cooked
<i>Prosopis glandulosa</i> var. <i>torreyana</i> (L.D.Benson) M.C.Johnst., N, EE25473	Mezquite	Construction	Trunks and branches	Dried to make columns and beams of houses
		Fuel	Trunks and branches	Charcoal
		Forage	Leaves and fruit	Raw
<i>Vachellia farnesiana</i> (L.) Wight & Arn., N, EE25234	Huizache	Construction	Trunks and branches	Dried
		Fuel	Trunks and branches	Charcoal
		Forage	Leaves and fruit	Raw
<i>Vicia faba</i> L., E, EE25238	Haba	Food	Seeds	Cooked
FAGACEAE				
<i>Quercus virginiana</i> Mill., N, EE25166	Encino	Construction	Wood	Dried to manufacture furniture and household goods
		Forage	Seeds (called bellotas)	Raw
		Fuel	Wood	Dried, cut into pieces
		Ornamental	Whole plant	Planted in public and private gardens
<i>Quercus canbyi</i> Trel., N, EE25427	Encino	Ornamental	Whole plant	Planted in public and private gardens
		Construction	Wood	Dried to manufacture furniture, household goods and columns and beams of houses
		Forage	Seeds (called bellotas)	Raw
		Fuel	Wood	Dried, cut into pieces
		Construction	Wood	Dried to manufacture furniture, household goods and columns and beams of houses
<i>Quercus polymorpha</i> Schldl. & Cham., N, EE25426	Encino	Ornamental	Whole plant	Planted in public and private gardens
		Ornamental	Whole plant	Planted in public and private gardens
		Forage	Seeds (called bellotas)	Raw
		Fuel	Wood	Dried, cut into pieces
		Construction	Wood	To manufacture furniture and household goods

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
FOUQUERACEAE <i>Fouquieria splendens</i> Engelm., N, EE25380	Ocotillo, albarda	Living fences Ornamental	Stems Whole plant	Stems are cut and planted in rows, eventually producing root and leaves (living fences) Planted in private gardens
GERANIACEAE <i>Pelargonium hortorum</i> L.H. Bailey, E, EE25227	Geranio	Ornamental	Whole plant	Planted in private gardens
GESNERIACEAE <i>Tulipa gesneriana</i> L., E, EE25472	Tulipán	Ornamental	Whole plant	Planted in private gardens
HYDRANGEACEAE <i>Hydrangea macrophylla</i> (Thunb.) Ser., E, EE25471	Hortensia	Ornamental	Whole plant	Planted in private gardens
JUGLANDACEAE <i>Carya illinoinensis</i> (Wangenh.) K. Koch, N, EE25168	Nogal	Forage Food	Leaves Fruit	Raw Raw
<i>Carya myristiciformis</i> (F. Michx.) Nutt. ex Elliott, N, EE25470	Nogal	Construction	Wood	Dried
		Fuel	Wood	Dried
		Ornamental	Whole plant	Planted in public and private gardens
		Medicinal (endocrine system), diabetes	Fruit	Raw
		Medicinal (dermic system), hair dye	Bark	Boiled in water, wash hair with solution
		Ornamental	Whole plant	Planted in public and private gardens
		Medicinal (dermic system), hair dye	Bark	Boiled in water, wash hair with solution
		Forage	Leaves	Raw
		Food	Fruit	Raw
		Construction	Wood	Dried
<i>Juglans major</i> (Torr.) A. Heller, N, EE25469	Nogal de nuez encarcelada	Fuel	Wood	Dried
		Ornamental	Whole plant	Planted in public and private gardens
		Medicinal (dermic system), hair dye	Bark	Boiled in water, wash hair with solution
		Medicinal (gastrointestinal system), colics	Leaves	Boiled in water
		Medicinal (nervous system), to fall asleep	Whole plant	Boiled, drink the infusion
		Ornamental	Whole plant	Planted in public and private gardens
		Medicinal (gastrointestinal system)	Leaves	Boiled, drink the solution
		Medicinal (respiratory system), cough	Leaves and stems	Boiled, drink the infusion, chew and swallow leaves and stems
LAMIACEAE <i>Hedeoma drummondii</i> Benth., N, EE25468	Poleo	Medicinal (nervous system), to fall asleep	Whole plant	Boiled, drink the infusion
<i>Lavandula angustifolia</i> Mill., E	Lavanda	Ornamental	Whole plant	Planted in public and private gardens
<i>Marrubium vulgare</i> L., E, EE25424	Marrubio	Medicinal (gastrointestinal system)	Leaves	Boiled, drink the solution
		Medicinal (respiratory system), cough	Leaves and stems	Boiled, drink the infusion, chew and swallow leaves and stems

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
<i>Melissa officinalis</i> L., E, EE25425	Toronjil	Ornamental, for its delicious aroma and to repel mosquitoes	Whole plant	Planted in private gardens
		Medicinal (gastrointestinal system), colics	Leaves and stems	Boiled, drink the infusion
		Medicinal (respiratory system), cough	Leaves and stems	Boiled, drink the infusion
<i>Mentha piperita</i> L., E, EE25241	Yerbabuena	Medicinal (respiratory system), cough	Leaves and stems	Boiled, drink the infusion, chew and swallow leaves and stems
		Medicinal (respiratory system), fever and cold	Leaves and stems	Boiled, drink the infusion
<i>Mentha spicata</i> L., E, EE25241b	Yerbabuena	Medicinal (gastrointestinal system), spasms	Leaves and stems	Boiled, drink the infusion
		Medicinal (respiratory system), flu and asthma	Leaves	Boiled, drink the infusion
<i>Monarda citriodora</i> var. <i>austromontana</i> (Epling) B.L.Turner, N, EE25381	Poleo cabezón, betónica	Medicinal (respiratory system), cough	Leaves and stems	Boiled, drink the infusion, chew and swallow leaves and stems
		Medicinal (nervous system), to fall asleep	Leaves	Dried, put a piece of branch under the pillow at night
		Ornamental, for its delicious aroma and beautiful flowers	Whole plant	Planted in private gardens
<i>Ocimum basilicum</i> L., E, EE25242	Albahaca	Medicinal (nervous system), used against insomnia, to fall asleep	Leaves and stems	Boiled, drink the infusion
<i>Origanum majorana</i> L., E, EE25257	Orégano	Religious rites	Whole plant	Part of the flower bouquets used in pilgrimages
		Food (condiment)	Leaves	Dried, added to broths and soups
<i>Plectranthus coleoides</i> Benth., E, EE25362	Vaporú	Medicinal (respiratory system), cough and cold	Leaves and stems	Boiled, drink the infusion
		Religious rites	Whole plant	Milled, mixed with glycerine and spread on the chest and nostrils
		Ornamental, by its delicious aroma and beautiful flowers	Whole plant	Dried, milled, used as incense
<i>Poliomintha longiflora</i> A.Gray, N, EE25259	Orégano de montaña	Food (condiment)	Leaves and stems	Planted in private gardens
		Medicinal (respiratory system), cough, throat pain	Leaves and stems	Dried, added to broths and soups
		Ornamental, by its beautiful flowers and aroma	Whole plant	Boiled, drink the infusion
<i>Rosmarinus officinalis</i> L., E, EE25382	Romero	Medicinal (gastrointestinal system) colics	Leaves	Planted in private gardens
		Medicinal (respiratory system), nasal congestion	Stems, leaves and flowers	Boiled, drink the infusion
		Ornamental, by its beautiful flowers and aroma	Whole plant	Cut into pieces, boiled, drink the infusion
		Condiment	Leaves	Planted in private gardens
				Dried, added to flavor the food

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
<i>Scutellaria</i> sp., N, EE25422	Mirto	Ornamental, by its beautiful flowers and aroma	Whole plant	Planted in private gardens
<i>Teucrium cubense</i> L., N, EE25423	Verneba	Medicinal (fever)	Leaves and stems	Boiled, drink the solution
<i>Thymus vulgaris</i> L., E, EE25360	Tomillo	Medicinal (respiratory system), cough and expectorant	Leaves and stems	Boiled, drink the infusion
		Medicinal (dermic system), dermic infections	Leaves	Boiled, use as cataplasm
		Food (condiment)	Leaves and stems	Dried, add to stews, soups and broths
LAURACEAE				
<i>Cinnamomum verum</i> J.Presl., E, EE25361	Canela	Medicinal (gastrointestinal system), stomach pain, vomit	Bark	Boiled, drink the infusion
		Medicinal (respiratory system), cough and throat pain	Bark	Boiled, drink the infusion
		Medicinal (endocrine system), diabetes	Bark	Boiled, drink the infusion
		Medicinal (blood system), improve blood circulation	Bark	Boiled, drink the infusion
<i>Litsea glauscecens</i> Kunth, N, EE25359	Laurel	Food (condiment)	Leaves	Dried, add to stews, soups and broths
<i>Persea americana</i> Mill., N, EE25170	Aguacate	Ornamental, by its showy green stems	Whole plant	Planted in private gardens
		Food	Fruit	Raw, used in multiple ways
		Medicinal (respiratory system), asthma	Leaves	Boiled, drink the infusion
		Medicinal (circulatory system), arterial hypertension	Leaves	Boiled, drink the infusion
<i>Persea podadenia</i> S. F. Blake, N	Salsafrás	Medicinal (circulatory system), anemia	Bark	Cut into pieces, boiled, drink the infusion
LILIACEAE				
<i>Allium cepa</i> L., E, EE25358	Cebolla	Food	Stem	Raw or boiled
		Medicinal (respiratory system), cough, asthma, flu	Stem	Boiled, drink the infusion along with honey bee
		Medicinal (circulatory system), improve blood circulation	Stems	Boiled, drink the infusion
<i>Allium sativum</i> L., E, EE25421	Ajo	Medicinal (circulatory system), low cholesterol, improve circulation	Stems	Boiled, drink the infusion, raw, cut into pieces, milled
		Medicinal (dermic system), dermic wounds	Cloves	Ground garlic cloves, the pulp is smeared on the wound
		Medicinal (auditive system), earache	Cloves	Milled, pulp is smeared inside the ears
		Food (condiment)	Bulb (clove)	Raw or boiled, added to multiple foods
<i>Allium</i> sp., N, EE25467	Cebollín	Religious rites	Complete bulb	Dried, several bulbs braided and hung at the entrance of houses to ward off bad vibes
<i>Lilium candidum</i> L., E, EE25466	Lirio	Medicinal (auditive system)	Bulb	Raw, milled, pulp smeared inside the ears
LOMARIOPSIDACEAE				
<i>Nephrolepis exaltata</i> (L.) Schott, N, EE25465	Helecho	Ornamental, by its beautiful perennial foliage	Whole plant	Planted in pots in private gardens

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
LHYTRACEAE				
<i>Heimia salicifolia</i> (Kunth) Link, N, EE25169	Jarilla	Medicinal (dermic system), dermatitis	Leaves	Milled, boiled in water, use as cataplam
<i>Lagerstroemia indica</i> L., E, EE25244	Crespón	Ornamental, by its beautiful perennial foliage and showy flowers	Whole plant	Planted in pots in public and private gardens
<i>Punica granatum</i> L., E, EE25154	Granada	Ornamental Medicinal (gastrointestinal system), diarrhea Food	Whole plant Peels Fruit	Planted in private gardens Boiled in water, drink the solution Raw
MAGNOLIACEAE				
<i>Magnolia grandiflora</i> L., N, EE25171	Magnolia	Ornamental, by its perennial foliage and beautiful white flowers	Whole plant	Planted in public and private gardens
MALVACEAE				
<i>Alcea rosea</i> L., E, EE25357	Malva rosa	Ornamental, by its big and beautiful flowers	Whole plant	Planted in private gardens
<i>Hibiscus denudatus</i> Benth., N, EE25174	Hibisco	Ornamental, by its beautiful flowers	Whole plant	Planted in private gardens
<i>Hibiscus syriacus</i> L., E, EE25417	Malva	Ornamental, by its beautiful flowers	Whole plant	Planted in private gardens
<i>Malva parviflora</i> L., N, EE25418	Malva de patio	Medicinal (circulatory system), varicose veins	Fruit and leaves	Boiled, drink the solution and chew and swallow the ground fruits and leaves
<i>Tilia mexicana</i> Schltdl., N, EE25419	Tila	Medicinal (nervous system), insomnia Ornamental	Dried flowers Whole plant	Boiled in water, drink the solution Planted in private gardens by its majestic bearing
<i>Sida rhombifolia</i> L., N, EE25420	Hierba del cochino	Medicinal (gastrointestinal system) diarrhea	Immature fruit	Boiled in water, drink the infusion
MELIACEAE				
<i>Azadirachta indica</i> A.Juss., E, EEEE25265	Neem (Nim)	Medicinal (gastrointestinal system), stomach pain, cramps, constipation Ornamental	Bark Whole plant	Boiled in water, drink solution Planted in private gardens
<i>Melia azedarach</i> L., E, EE25266	Canelo	Medicinal (dermic system), wound, skin irritation Ornamental	Bark and leaves Whole plant	Boiled, infusion used as cataplasm in the wounded area Planted in public and private gardens
MORACEAE				
<i>Ficus carica</i> L., E, EE25268	Higo	Food Ornamental	Fruit Whole plant	Raw or boiled and canned fruit Planted in private gardens
<i>Morus celtidifolia</i> Kunth, N, EE25349	Mora	Medicinal (endocrine system), diabetes Medicinal (endocrine system), diabetes Ornamental Food Dye	Fruit and leaves Fruit Whole plant Fruit Fruit	Raw, leaves boiled, drink the infusion Boiled, drink the solution Planted in public and private gardens Raw Raw, squeezed
MORINGACEAE				
<i>Moringa oleifera</i> Lam., E, EE25351	Moringa	Medicinal (endocrine system), diabetes	Leaves	Boiled, drink the infusion
MUSSACEAE				
<i>Mussa x oleifera</i> Lam., E, EE25415	Plátano	Food	Fruit	Raw

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
MYRTACEAE				
<i>Eucalyptus camaldulensis</i> Dehnh., E, EE25416	Eucalipto	Ornamental	Whole plant	Planted in private gardens
		Medicinal (respiratory system), nasal congestion	Leaves	Boiled, drink the infusion
		Medicinal (nervous system), stress	Leaves	Boiled, drink the infusion
<i>Psidium guajava</i> L., N, EE25228	Guayaba	Medicinal (gastrointestinal system), fever	Leaves	Boiled, drink the infusion
		Medicinal (gastrointestinal system), diarrhea	Fruit	Raw, eat several fruits
		Food	Fruit	Raw and canned fruits
<i>Syzygium aromaticum</i> (L.) Merr. & L. M. Perry, E, EE25350	Clavo	Medicinal (endocrine system), diabetes	Leaves	Boiled, drink the infusion
		Food (condiment)	Floral buds (immature and dry)	Raw or boiled, used in multiple ways
		Medicinal (gastrointestinal system), constipation	Fruit	Boiled, drink the infusion or chewed
NYCTAGINACEAE				
<i>Bougainvillea spectabilis</i> Willd., N, EE25223	Bugambilia	Ornamental, by its showy flowers	Whole plant	Planted in public and private gardens
		Medicinal (respiratory system)	Bracts and flowers	Boiled in water, drink the solution
<i>Mirabilis jalapa</i> L., N, EE25252	Maravilla	Ornamental, by its showy and beautiful flowers	Whole plant	Planted in private gardens
OLEACEAE				
<i>Fraxinus americana</i> L., N, EE25255b	Fresno	Ornamental	Whole plant	Planted in public and private gardens
		Construction	Wood	Dried to make columns and beams of houses
<i>Fraxinus cuspidata</i> Torr., N, EE25255	Fresno	Ornamental, by its beautiful flowers	Whole plant	Planted in public and private gardens
<i>Fraxinus greggi</i> A. Gray, N, EE25255c	Barretilla	Ornamental	Whole plant	Planted in public and private gardens
		Construction	Wood	Piles and columns for houses
		Fuel	Wood	Dried
<i>Jasminum floridum</i> Bunge, E, EE25372	Jazmín	Ornamental	Whole plant	Planted in private gardens
<i>Jasminum officinale</i> L., E, EE25372b	Jazmin			
<i>Ligustrum japonicum</i> Thunb., E, EE25162	Trueno	Ornamental	Whole plant	Planted in public and private gardens
ONAGRACEAE				
<i>Oenothera rosea</i> L'Hér. ex Aiton, N, EE25413	Hierba del golpe	Medicinal (dermic system), external wounds	Whole plant	Raw, milled, smeared in the wounded area
PAPAVERACEAE				
<i>Hunnemannia fumariifolia</i> Sweet, N, EE25348	Amapola de campo	Ornamental, by its showy yellow flowers	Whole plant	Planted in private gardens
PINACEAE				
<i>Pinus cembroides</i> Zucc., N, EE25353	Piñonero	Food	Seeds	Raw
		Fuel	Wood	Dried
		Ornamental	Whole plant	Planted in private gardens

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
<i>Pinus greggii</i> Engelm. ex Parl., N, EE25354	Pino	Fuel	Wood	Dried
<i>Pinus pseudostrubus</i> Lindl., N, EE25414	Pino blanco	Ornamental Fuel Ornamental Religious rites	Whole plant Wood Whole plant Resin	Planted in private gardens Dried Planted in private gardens In prayer altars
PIPERACEAE				
<i>Piper nigrum</i> L., E, EE25356	Pimienta	Food (condiment)	Seeds	Mixed with different meals
PLANTAGINACEAE				
<i>Antirrhinum majus</i> L., E, EE25459	Perritos	Ornamental, by its beautiful flowers	Whole plant	Planted in private gardens
<i>Plantago lanceolata</i> L., N, EE25458	Llantés	Medicinal (endocrine system), cancer	Leaves	Boiled in water, drink the infusion
PLUMBAGINACEAE				
<i>Plumbago pulchella</i> Boiss., E, EE25158	Júdica	Ornamental	Whole plant	Planted in private gardens
POLYGONACEAE				
<i>Polygonum punctatum</i> Elliot, N, EE25407	Chilillo	Medicinal (dermic system) Ornamental	Stems and leaves Whole plant	Boiled, use the solution as catapalsm Planted in private gardens
POACEAE				
<i>Arundo donax</i> L., E, EE25408	Carrizo	Religious rites Construction	Stems Stems	Religious ornaments Roofs
<i>Avena sativa</i> L., E, EE25373	Avena	Food	Seeds	Raw or boiled
<i>Bambusa</i> sp., E, EE25374		Religious rites Construction	Stems Stems	Religious ornaments Roofs
<i>Bouteloua curtipendula</i> (Michx.) Torr., N, EE25409	Banderita	Forage	Whole plants	Raw
<i>Cymbopogon citratus</i> (DC.) Stapf, E, EE25410	Zacate limón	Ornamental	Whole plant	Planted in private gardens
<i>Sorghum bicolor</i> (L.) Moench, E, EE25411	Sorgo	Medicinal (gastro-intestinal system) Forage	Stems and leaves Whole plants	Boiled, drink the infusion Raw
<i>Sorghum halepense</i> (L.) Pers., E, EE25412	Zacate Johnson	Forage	Whole plants	Raw
<i>Zea mays</i> L., N, EE25347	Maíz	Food Medicinal (gastrointestinal system), parasites Medicinal (urinary system), kidney problems	Fruit (seeds) Styles (female flowers) Seeds	Boiled or cooked with mutiple foods Boiled in water, drink the solution Milled, boiled, drink the solution
PORTULACACEAE				
<i>Portulaca mundula</i> I. M. Johnston, E, 25216	Verdolaga	Food Ornamental	Leaves and stems Whole plant	Raw (previously disinfected with chlorine) or cooked with different foods Planted in private gardens (pots)
RANUNCULACEAE				
<i>Clematis drummondii</i> Torr. & A.Gray, N, EE25405	Barba de chivo	Ornamental	Whole plant	Planted in private gardens

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
RHAMNACEAE				
<i>Colubrina greggii</i> S.Watson, N	Colubrina	Ornamental	Whole plant	Planted in private gardens
ROSACEAE				
<i>Crataegus mexicana</i> Moc. & Sessé ex DC., N, 25355	Tejocote	Medicinal (endocrine system), diabetes	Fruit	Raw or boiled, drink the fruit pulp
		Medicinal (blood system)	Fruit	Raw or boiled, drink the fruit pulp
<i>Cydonia oblonga</i> Mill., E, EE25346	Membrillo	Food	Fruit	Raw or boiled to make canned fruits
<i>Eriobotrya japonica</i> (Thunb.) Lindl., E, EE25406	Níspero	Food	Fruit	Raw
		Medicinal (endocrine and blood systems), diabetes and arterial hypertension	Fruit	Raw, liquefied in water
<i>Malus domestica</i> Borkh., E, EE25343	Manzana	Food	Fruit	Raw
		Food	Canned fruits	Boiled
		Alcoholic beverages	Fruit	Fermented
<i>Prunus armeniaca</i> L., E, EE25344	Chabacano	Food	Fruit	Raw
		Ornamental	Whole plant	Planted in private gardens
<i>Prunus domestica</i> L., E, EE25345	Ciruelo	Food	Fruit	Raw
<i>Prunus persica</i> (L.) Batsch, E, EE25150	Durazno	Food	Fruit	Raw
		Ornamental	Whole plant	Planted in private gardens
<i>Purshia plicata</i> (D.Don) Henr., N, EE25460	Rosa de castilla	Medicinal (gastrointestinal system), diarrhea	Leaves	Boiled, drink the solution
<i>Rosa montezumae</i> Humb. & Bonpl. ex Redout & Thory, N, EE25461	Rosa	Ornamental	Whole plant	Planted in private gardens
RUTACEAE				
<i>Casimiroa pringlei</i> (S. Wats.) Engl., N, EE25342	Manguito	Ornamental	Whole plant	Planted in public and private gardens
		Food	Fruit	Raw
<i>Citrus limon</i> (L.) Osbeck, E, EE25404	Limón	Food	Fruit	Raw
		Medicinal (respiratory system), cough, chest pain, throat pain	Leaves and fruit juice	Boiled, drink the solution
		Ornamental	Whole plant	Planted in private gardens
<i>Citrus sinensis</i> (L.) Osbeck, E, EE25341	Naranja	Food	Fruit	Raw
		Medicinal (respiratory system), cough, chest pain, throat pain	Leaves and fruit peel and fruit juice	Boiled, drink the solution
		Ornamental	Whole plant	Planted in public and private gardens
<i>Helietta parvifolia</i> (A. Gray) Benth., N, EE25215	Barreta	Ornamental	Whole plant	Planted in public and private gardens
		Construction	Wood	Dried, piles and columns for houses, fences (very durable wood)
		Ornamental	Whole plant	Planted in public and private gardens

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
<i>Ruta graveolens</i> L., E, EE25221	Ruda	Medicinal (respiratory system), cold	Leaves and stems	Boiled
<i>Zanthoxylum fagara</i> (L.) Sarg., N, EE25247	Colima	Construction	Wood	Dried, piles and columns for houses
		Forage	Leaves	Raw
		Medicinal (respiratory system), asthma	Leaves	Boiled, drink the solution
		Medicinal (skeletal-muscular system), arthritis	Leaves	Boiled, drink the solution
SALICACEAE				
<i>Populus mexicana</i> Wesm. Ex DC., N, EE25248	Álamo, chopo	Ornamental	Whole plant	Planted in public and private gardens
<i>Salix nigra</i> Marshall, N, EE25462	Sauce	Ornamental	Whole plant	Planted in public and private gardens
		Fuel	Wood	Dried
SAPINDACEAE				
<i>Koelreuteria paniculata</i> Laxm., E, EE25238	Alfombrilla	Ornamental	Whole plant	Planted in private gardens
SCROPHULARIACEAE				
<i>Leucophyllum frutescens</i> (Berland.) I. M. Johnst., N, EE25161	Cenizo	Medicinal (endocrine system), hepatitis	Whole plant	Cut into pieces, boiled, drink and take a bath with the solution
		Ornamental	Whole plant	Planted in public and private gardens
		Religious rites	Branches and leaves	Part of the floral bouquets used in prayers and pilgrimages
SOLANACEAE				
<i>Capsicum annum</i> var. <i>glabriusculum</i> (Dunal) Heiser & Pickersgill, N, EE25217	Chile piquín, chile quipín	Food (condiment)	Fruit	Raw
		Ornamental	Whole plant	Planted in public and private gardens
<i>Capsicum annum</i> var. <i>glabriusculum</i> (Dunal) Heiser & Pickersgill, N, EE25217b	Chile japonés	Medicinal (respiratory system), cough, phlegm	Fruit (milled)	Liquefied in water, drink (very spicy drink)
		Food (condiment)	Fruit	Raw
		Ornamental	Whole plant	Planted in public and private gardens
<i>Capsicum annum</i> var. <i>glabriusculum</i> (Dunal) Heiser & Pickersgill, N, EE25217c	Chile morrón	Food (condiment)	Fruit	Raw
<i>Capsicum annum</i> var. <i>glabriusculum</i> (Dunal) Heiser & Pickersgill, N, EE25217d	Chile jalapeño	Food (condiment)	Fruit	Raw
<i>Capsicum annum</i> var. <i>glabriusculum</i> (Dunal) Heiser & Pickersgill, N, EE25217e	Chile serrano	Food (condiment)	Fruit	Raw
		Medicinal (respiratory system), cough, phlegm	Fruit (milled)	Liquefied in water, drink (very spicy drink)
<i>Datura stramonium</i> L., N, EE25339	Toloache	Falling in love	Leaves and seeds	Leaves (boiled in water, drink the solution), seeds (raw, chew and swallow)

Table 1. Cont.

Scientific Name	Common Name	Uses (System)	Part Used	Method of Use
<i>Lycopersicon esculentum</i> Mill., E, EE25403	Tomate	Food Medicinal (skeletal-muscular system), muscular pain	Fruit Fruit	Raw or cooked with other foods Raw, pulp, use as cataplasm
<i>Physalis philadelphica</i> Lam., N, EE25260	Tomate de fresadilla	Food	Fruit	Mixed with other foods, broths, sauces and stews
<i>Solanum ovigerum</i> Dunal, E, EE25463	Huevitos	Ornamental, by its fruits (egg-like)	Whole plant	Planted in private gardens
<i>Solanum tuberosum</i> L., E, EE25464	Papa	Food	Root	Mixed with other foods, broths, sauces and stews
TURNERACEAE				
<i>Turnera diffusa</i> Willd. ex Schult., N, EE25340	Damiana, hierba del venado	Medicinal (genitourinary system)	Leaves, stems and inflorescences	Boiled in water, drink the solution
URTICACEAE				
		Forage	Whole plant	Raw
<i>Urtica dioica</i> L., N, EE25402	Hiedra	Medicinal (blood system), purify the blood	Whole plant	Boiled in water, drink the solution
VERBENCEAE				
<i>Lippia graveolens</i> Kunth, N, EE25400	Orégano	Food (condiment)	Leaves	Dried, added to different foods, broths and stews
<i>Verbena canescens</i> Kunth, N, EE25401	Verbena	Medicinal (nervous system), insomnia	Leaves and stems	Boiled in water, drink solution and bathe with the solution
VITACEAE				
<i>Parthenocissus quinquefolia</i> (L.) Planch., N, EE25160	Viña virgen	Ornamental	Whole plant	Planted in private gardens
<i>Vitis berlandieri</i> Planch., N, EE25338	Parra, vid	Ornamental Food	Whole plant Fruit	Planted in private gardens Raw
XANTHORRHOEACEAE				
<i>Aloe vera</i> (L.) Burm.f., E, EE25250	Sábila	Medicinal (gastrointestinal system), gastritis Medicinal (dermic system), hair restauration; dermical wounds Ornamental	Leaves Leaves Whole plant	Pulp, milled, liquefied, drink the solution Pulp, smeared pulp all over hair; raw, smeared milled pulp in wounded area Planted in private gardens
ZYGOPHYLLACEAE				
<i>Larrea tridentata</i> (Sessé & Moc. ex DC.) Coville, N, EE25399	Gobernadora	Medicinal (gastrointestinal system), spasms	Leaves	Boiled in water, drink the solution
ZINGIBERACEAE				
		Medicinal (dermic system), bad smell Smelly feet Cleaning the interior of car radiators	Leaves Leaves Leaves	Boiled in water, wash bad smelling parts of body Dried, put leaves inside shoes Boiled in water, drained hot solution into radiator
<i>Zingiber officinale</i> Roscoe, E, EE25398	Jengibre	Food (condiment) Medicinal (gastrointestinal system), intestinal inflammation, fever Medicinal (dermic system), external wounds	Root Root Root	Raw, cut into the pieces Raw, liquefied, drink the solution Raw, milled, smeared in wounded areas

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