



Wixaritari or Huichol Ethnobotany of the Southern Sierra Madre Occidental in Mexico

Martha Cedano-Maldonado, Luis Villaseñor-Ibarra, and Mara Ximena Haro-Luna

Abstract

The Wixaritari, Wixarika, or Huichol is a contemporary group of Indigenous people, one of the most traditionally preserved of Mexico and probably the Americas. It is a society whose people have lived geographically isolated since the Spanish conquest and have maintained their ethnic identity and ancestral social, political, educational, and religious structure, for over hundreds of years, through oral communication and the practice of its traditions and customs. Its language derived from the Uto-Aztec-Sonorense linguistic family, and there is archaeological evidence proving their permanence in the territory during the last 1800 years. This study documents the traditional knowledge and worldview that the Wixaritari have on useful plants they interact with. An analysis is included integrating botanical, geographical, ethnological, anthropological, linguistic, sociological, and historical works on the subject. We identified 596 plant species used by the Wixaritari, 190 of them medicinal, 131 edible, 114 ceremonial, 63 timber, and 72 with other use like fibers, fodder, soap, firewood, glue, and poison. From each category, mythological and cosmogonic aspects of the most outstanding species are described, as well as their use and plant parts used. The results suggest the need to record the Wixaritari plant traditional heritage, before it gets lost by acculturation, death, migration, and ecological deterioration of their territories. In addition, we systematized an inventory of the useful species reported, mainly addressing the edible plants and emphasize the need of conducting ethnobotanical investigations in areas with scarce or null information, for instance, the communities of San Sebastián Teponahuatlán, Tuxpan de Bolaños, and Guadalupe Ocotán. We also emphasize the need of generating

M. Cedano-Maldonado (✉) · L. Villaseñor-Ibarra · M. X. Haro-Luna
Instituto de Botánica, Departamento Botánica y Zoología, Centro Universitario de Ciencias Biológicas y Agropecuarias (CUCBA), Universidad de Guadalajara, Zapopan, Jalisco, Mexico
e-mail: mcedano@cucba.udg.mx; luis.villasenor@academicos.udg.mx;
mara.hluna@alumnos.udg.mx

more applied and holistic ethnobiological research, including a greater feedback from and cooperation with the Wixaritari communities.

Introduction: The Wixaritari or Huichol Culture

The Wixaritari, Wixarika, or Huichol are contemporary Indigenous people, among the most traditional of Mexico and the Americas (Bauml 1994). It is a relatively close group, which still lives geographically isolated and that jealously defends its culture and territory, from the times of the Spanish conquest to the present, promoting resistance to acculturation and independent and unusual development, especially from other cultures of the Sierra Madre Occidental of Mexico (Neurath 2003). This people have maintained their ethnic identity and their ancestral social, political, educational, and religious structure, for over hundreds of years, which they have successfully replicated, through oral communication practicing their traditions and customs (Iturrioz-Leza et al. 1995) (Fig. 1). Archaeological studies evidence their



Fig. 1 *Wixaritari* wearing the party outfit, which is distinguished by its striking and captivating cross-stitched blanket outfit, in which they capture through symbols the mythological stories of their ancestors and their gods. Accessories such as necklaces, bracelets, and earrings are made with beads. Generally, men wear more ornate clothing than women. The allegories vary in each of the regions. (a) *Nuiyama* (Julia González) and (b) *Eisiekame* (Juan López). (Photo by: Luis Villaseñor Ibarra)

permanence in the territory during the last 1800 years (Bauml 1994). Its language is grouped into the Uto-Aztec-Sonorense linguistic family, from which it derived approximately 3,000 years ago, along with that of the Pima and Pápago from Arizona, the Tarahumara, Tepehuan, and Cora people. The Wixaritari people feel united in their traditions with the Tepehuan and the Cora, calling them older brothers and younger brothers, respectively. However, the Wixaritari preserve their customs more completely and purely because they were not submitted by the Spaniards, nor concentrated in towns (Bauml 1994; Neurath 2003).

Currently, the Wixaritari society is organized political and economically into five communities (Villaseñor-Ibarra et al. 2017a), which derived from four pre-Hispanic tribal groups, the Cureatsarixi, Tatei quitari, Tuapuritari, and Huautuari people (Negrín 1997). They were distributed in dispersed settlements but recognized territories. In 1723, during the colonial times, their territories were recognized as the community of San Sebastián Teponahuaxtlán (*Waitia*) and its annex Tuxpan de Bolaños (*Tutsipa*), Santa Catarina Cuexcomatlán (*Tuapurie*), and San Andrés Cohamiata (*Tateikie*) and its annex Guadalupe de Ocotán (*Xatsitsarie*), all of them settled in mountainous areas and canyons of the southern portion of the Sierra Madre Occidental (Barrera-Rodríguez 2004). Current population is formed by more than 52,000 people (INEGI 2010; INALI 2008), and their traditional territory covers portions of the states of Jalisco, Nayarit, and small areas of Durango and Zacatecas (Fig. 2). These communities maintain their autonomy, with its own civil and

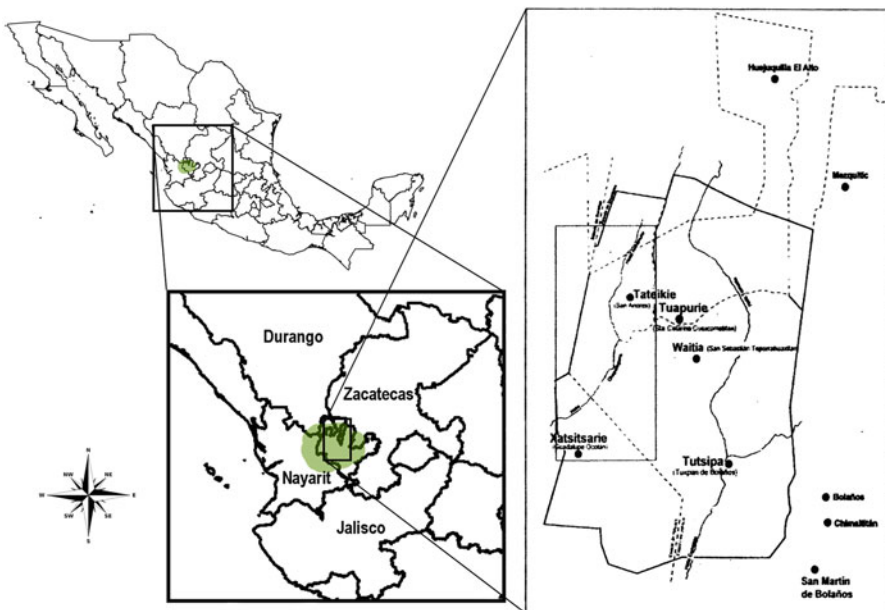


Fig. 2 Distribution map of the Huichol territory; in green appears the *Wixarika* territory in Mexico; on the right, the five most important traditional Huichol communities. (Taken from Villaseñor-Ibarra 1999)

religious authorities and their own social structure. All of them are intimately linked retaining stable key cultural traits (Villaseñor-Ibarra et al. 2017b).

The Wixaritari have particular perceptions about the world, which are described through myths and stories about their people (Kindl 2013). The myths associated with useful or significant plants in their culture may be associated with good or bad mythical characters. Their main cultural symbols are the corn-peyote-deer trilogy (Guzmán-Mejía and Anaya-Corona 2007). Their idiosyncrasy is based on three aspects: 1) religious festivities, which allow to fulfill “*el costumbre*” (the custom), 2) the tradition, which governs the behaviors and encloses a particular worldview constituted by a magical-religious knowledge, and 3) “*el costumbre*,” which are all the basic norms of behavior, ceremonies, and justice (Barrera-Rodríguez 2004; Torres 2000).

The Wixaritari Territory

The Wixaritari or Huichol region covers an area of approximately 3921 km², included in 16 municipalities and four states of Mexico. In the state of Jalisco, the Wixaritari territory overlaps with the jurisdictions of Bolaños, Colotlán, Chimaltitán, Huejucar, Huejuquilla El Alto, Mezquitic, San Martín de Bolaños, Santa María de los Angeles, Totatiche, and Villa Guerrero. In Nayarit, the territory is part of Del Nayar, Santa María del Oro, and La Yesca. In Zacatecas, it belongs to Monte Escobedo and Valparaíso, and in Durango it is part of El Mezquital (Vázquez-García et al. 2004).

The Sierra Madre del Sur, the Sierra Madre Occidental, and the Trans-Mexican Volcanic Belt converge in the Wixaritari territory, which makes up a geomorphology with high mountains, deep canyons, steep plateaus, extensive mountains, semiarid areas, and a great diversity of ecosystems, with elevations ranging from 400 to 2800 m (Fig. 3). Its relief is formed by two macrobasins, one of them the Atengo river basin and two tributaries confluent with the Huaynamota river, the Camotlán, and Huajimic that become the Chapalagana river, and the other is the Bolaños river basin (Barrera-Rodríguez 2004). Temperatures are greater than 30 °C in summer and less than 5 °C in winter, with maximum rainfall of 600 to 1000 mm and in some zones up to 1200 mm. The natural wealth of the area presents a mosaic of landscapes mainly consisting of pine and oak forest communities in mountainous areas. There are also tropical deciduous forest on the slopes of the mountains and deep valleys, another forest type along the canyons, wetlands at the elevations of the sierra, crassicaule scrubland in arid and semiarid areas, and zacatal (natural or induced grasslands) in flat areas of the plateaus and highlands. In addition, in some small areas there are aquatic vegetation, chaparral, tall xerophytic vegetation of the Chihuahuan desert, thicket of *Dodonaea viscosa*, and spiny forest (Luquín et al. 2004).

This chapter aims to make a compendium on the knowledge, beliefs, traditions, utilities, and assessments that the Wixaritari ethnic group has on plants, to recognize the relationships, the position they occupy in their culture, and the cultural identity



Fig. 3 View of the Sierra Madre Occidental from the *Tateikie* community (San Andrés Coamiata, Mezquitic, and Jalisco). (Photo by: Luis Villaseñor Ibarra)

granted to them. We in addition aimed to establish the current state of knowledge and research needed in relation to the Wixaritari or Huichol ethnobotany.

Methodology

We reviewed and contrasted botanical, geographical, ecological, ethnological, anthropological, ethnographic, linguistic, sociological, and historical studies on the Wixaritari ethnobotanical knowledge. Methodologies include qualitative analysis of the data collected through ethnographic observations, field notebooks, database consultations, interviews, and botanical explorations. The quantitative analyses are related to the diversity and floristic richness of the region. However, it is necessary to emphasize that some floristic and ethnobotanical works report incomplete and inaccurate information on the useful flora of the Wixaritari region. Generally, botanical investigations record the scientific names of the species, but lack basic ethnobiological information like common names and uses. Contrastingly, ethnobotanical studies provide more information on cultural aspects but suffer from inexact taxonomic identification, and only the medicinal plants have been detailed. This situation makes it difficult for this work to generate a general list of the species and precise data on the useful plants hitherto recognized. The documents analyzed are presented in the literature section. The section “[Edible Plants](#)” shows original information obtained through interviews, the corroboration of plants in the field and collection of samples as supporting material for their identification. The identity of species not collected but whose Wixaritari names were recorded were corroborated with local people, using field guides. Subsequently, the information was contrasted with the floristic listings generated for the region.

Relations Between the Wixaritari and the Plants

In the Wixaritari worldview, the myth about the origin of plants is included in the legend of the origin of the universe, in which *Watakame*, or “the first sower,” when arriving on land, dropped the *jicara* (Fig. 4), which contained all beings living that would populate the world (Neurath 2005). Plants, fungi, animals, and the elements of nature continue due to the disembodiment of their ancestors, and as the members of their bodies were watered, they created the fruits of the earth that, since then, keep the Wixaritari or Huichol people. To preserve the spirits of nature, people have to perform celebrations, offerings, physical deprivations, and various rites in order to restore strength to the gods and prevent them from getting angry because of the lack of thanks and devotional attention. When people die, their lives will be judged for the fulfillment of customs and their behavior. If the person who died showed an exemplary existence, they will become divine spirits, living together with the gods in *Huiricuta* (*Wirikuta*), forming part of the sun’s rays. But if the person failed, their descendants would appear in the form of insects, coyotes, or owls (Negrín 1997). One of its deities is the goddess of vegetation *Takutsi Nakawé*, a female monster that reigns in the rainy season; she is the maker of the world, governing the forces of darkness of the world, before the igneous and solar powers (Villegas 2016).

From the western view, it can be confirmed that the existence of the Wixaritari has always depended on nature. They have a traditional pattern of life that adapts to the rugged landscape of the mountains, which consists in the organization of “ranchos,” or groups of houses with a small population, which are freely dispersed throughout their territory (Fig. 5). This settlement pattern has prevented the depletion of water and existing resources, as well as the simultaneous use of different ecological floors (Neurath 2003). In addition, they exhibit a great knowledge about the environment and the biological wealth present in their territory. They know which, how, and when natural resources are available and how to take advantage of different species. Likewise, their forms of production depend on the natural conditions of the

Fig. 4 Jicara is a bowl made with a half of the dried fruit of *Lagenaria siceraria* or *Cucurbita argyrosperma*. (Photo by: Mara Ximena Haro-Luna)





Fig. 5 Huichol ranch in the municipality of Mezquitic, Jalisco. (Photo by: Luis Villaseñor Ibarra)

environment, their beliefs, customs, and cultural traditions and only cover the subsistence needs of the population. For this reason, the harvest is destined for self-consumption, to carry out traditional festivals and as fodder for livestock or raising domestic animals (Barrera-Rodríguez 2004).

However, each community safeguards its own knowledge about native flora and fauna of the region. Generally, elders of the family are the ones who have most information about elements of their environment, including an extensive classification of use types of natural resources, and they also have more techniques for environmental management and preservation. The traditional environmental knowledge is transmitted among family members and the community member (particularly important is that to the new generations), through talks, songs, and ceremonies that can last for a whole night and even more. During the broadcast, events from their origin as Wixaritari people are narrated. In the mythology, they consider that the gods themselves taught the Wixaritari or Huichol to live. Gods were the first to do everything: cultivating, hunting, and building, among other activities; therefore, now they replicate those Gods' teachings. They also consider the natural phenomena and elements like rain, wind, plants, animals, and others as governed by deities (Barrera-Rodríguez 2004).

The floristic studies carried out in the Wixaritari region register a biological wealth of about 2081 plant species and 139 infraspecific taxa (Vázquez-García et al. 2004). The ethnobotanical studies have reported the use of nearly 600 species, the Wixaritari useful flora, which includes the use of wild plants, archaic

domesticates, and some introduced plants (Bauml 1994). These species come from wild habitats, mainly pine and oak forests, oak, tropical deciduous forest, grassland, crop fields, family gardens, orchards, and other agricultural fields (Nieves et al. 2004a). The valuation of the species by categories is variable; Bauml (1994) organized a checklist of useful species of the region in 12 use categories, while Nieves et al. (2004b) identified 18 categories. For practical reasons, in this chapter we regrouped plants into six use categories, as shown in Table 1. This instrument was built with the information from different works. The medicinal use with 190 species being the most numerous and valuable category, followed by the edible with 131 species, the ceremonial plants including 114 species, those used as timber that are 63 species, and those that we include in the category of “others” comprising 72 plant species with little known uses with low-use value. However, the information is still uncertain and generates a bias in the final results, due to several inconsistencies perceived in most publications, which do not include lists of species and lack species identification; in some studies, many plants were registered only with Huichol names. In some studies, there is no direct report of uses of each species, which may have more than one use and be counted as different species. These are some of the most common problems found in the studies reviewed. The following text describes the categories established in Table 1 based on information on the most relevant species.

Table 1 Categorization of the plants used by the *Wixarika* ethnic group. Reference: (Bauml 1994; Bauml 2004; Bye et al. 2005; Casillas 1990; Cedano-Maldonado et al. 1998; Cedano-Maldonado et al. 2017; Higareda-Rangel et al. 2004; Nieves-Hernández 2002; Nieves et al. 2004b; and Villaseñor-Ibarra et al. 2017a) 1, 4, 18, 19, 23, 32, 34, 35, 37, 38

Categories included	Subcategories included	No. of plants	Total
Artisanal	Utensils, household items, and toys	22	
	Bow and arrows	4	26
Ceremonials	Arrows	2	
	Ornamentals	40	
	Pigments or paints	17	
	Sacred/religious	55	114
Edibles	Meals and condiments	112	
	Drinks	19	131
Timber	Siege	21	
	Construction/sacred	21	
	Tools	21	63
Medicinals		190	190
Others	Ropes or fibers	11	
	Fodder	21	
	Soap	2	
	Firewood	21	
	Glue	6	
	Poison	11	72
Total		596	596

Craft Plants

For the manufacture of handicrafts, people use 26 plants species (Nieves-Hernández 2002). *Cucurbita moschata* is used to make bowls or *jícaras* and is the only taxon that is cultivated; the rest of the species are collected from wild environments. Such is the case of *Bothriochloa laguroides* and *Muhlenbergia* aff. *grandis* used for making brooms (Bauml 1994; Nieves-Hernández 2002). With the stems of *Otatea acuminata* (*hacu ucáari*), local people weave baskets, flasks, or rod beds, with the leaves of the *sotol* (*Dasyllirion* spp.); they weave petates, rugs, or the traditional benches called *u'pali*, which have a reed support and a strong wooden hoop crafted with mesquite or pine wood, bonded with rubber obtained from *Bletia* sp. (*kwe'ísaka*) (Lumholtz 1900) or *Bletia macrithmochila* (*cuesucua ucáari*) (Bauml 1994). Also, the Wixaritari use cotton-like fibers of *Ceiba pentandra* (*kapo'ri*) and ixtle (*mai'ra sikulíaiya*) to make textiles for common or ritual use (Lumholtz 1900). However, most of these manufacturing practices are obsolete, and it is rare to observe them today.



Fig. 6 Mask made from *Quercus* sp. (a) and stamen, in which some elements of the drum dance are represented: corn plants, a three-legged drum, a bule (fruit of *Lagenaria siceraria*), and eagles. (Photo by: Luis Villaseñor Ibarra)

At present, the crafts frequently of most elaboration are masks, pictures, or figures of yarn or chaquira, which are made with wood of *Quercus* spp., *Pinus* spp., *Arctostaphylos pungens*, or *Prosopis juliflora*, and these can be of ritual or commercial use (Fig. 6). Generally, those that are sold lack meaning or symbolism and are only repetitions of figures that they like best, to be bought by tourists (Neurath 2005).

In the Wixaritari mythology, the *sotol* stands out and is associated with a mythical evil being, and they report that in ancient times there was an evil giant woman who devoured people. One night, a brave man tired of mistreatment by the lady took a honeycomb and, in the company of other men, went to where that woman slept, they opened her head and put the honeycomb in it. The next morning, the giant woman could not torment people anymore, because her head hurt her too much, and bees came out of her ears. Because of her despair, she lost her mind and people of the town took the opportunity to throw her through a ravine. When she fell, her head detached from the body, and in all those places where her head bounced, *sotol* plants sprouted because they are equal to her hair [according to the story of Mrs. Josefina T.].

Ceremonial, Sacred, or Religious Use Plants

This group of plants consists of 114 species representing the third most important cultural use for the Wixaritari ethnic group, but qualitatively it may be the most relevant (Table 1). It calls to attention that the ceremonial use stands out from other aspects being more useful for survival, and it can be an attribute that distinguishes the Wixaritari from other cultural groups in Mexico. However, by analyzing the mystical and ritual context of the Wixaritari, one can understand the reason of its significance.

In the Wixaritari cosmogony, a great number of Gods are venerated. Those who gave them their origin, those who govern all natural elements, and those who taught them to live and do things as they do, to mention a few. To all of them, they should be adored and honored in a special way, so they have a ceremonial and mythical calendar that is divided into two periods: that of the dry season (winter and spring), with parties held at the head of the community. The Wixaritari have established dates that are governed by the Catholic calendar, such as the New Year or Change of Wands, Carnival or *Pachitas*, and Easter, which are celebrations offered to male deities, such as the sun, fire, deer, and closing with the peyote party. They start in the rainy season (summer and autumn) with parties of the type *neixa* or *mitote* (includes one or several nights of shamanic singing and circular dance), which are held in ceremonial centers or in the shrines. These celebrations have movable dates and are dedicated to the Mother Earth honoring to female divinities, such as the goddess of fertility, fruits, plants, and water, to mention a few (Neurath 2003) (Fig. 7).

All parties are run by the “*mara’akate*” or shamans; they sing-dialogue with the gods to convince them to do favors to the people present, but they are also responsible for preserving and keeping alive the traditions, rites, and religious



Fig. 7 Community meeting in the central plaza of the *callihuey* or ceremonial center of *Tateikie*, to start celebration of the “Fiesta del Tambor.” (Photo by: Luis Villaseñor Ibarra)

holidays (Neurath 2003; Villaseñor-Ibarra et al. 2017a). Each celebration is aimed at giving back, thanking, and pleasing the gods for the effort they made to generate all the good that happened in their lives during that time, such as abundant harvest or hunting, health, or well-being (Barrera-Rodríguez 2004; Guzmán-Mejía and Anaya-Corona 2007).

Only the *neixa* or *mitote* type parties are held in the “*tukipa*” or “*callihuey*,” communal ceremonial centers of pre-Hispanic tradition dedicated to the worship of the ancestors of the community that have deified (Fig. 8). These sites are composed of several buildings grouped around a circular dance square. The main temple called “*tuki*” is distinguished by presenting larger dimensions and a circular or oval shape; the other shrines, or “*xirikite*,” are parental, smaller, and have a rectangular structure. The *Tupika* are also social centers and initiation schools, since during the holidays they are staged and rites are performed about the cosmic truths of what happens in nature. The experience that the original settlers of the ceremonial center had during their mythical journey is repeated near the Pacific Ocean toward the *Wirikuta* desert, in San Luis Potosí (Neurath 2003).

Throughout the Wixaritari territory, there are 20 ceremonial centers, where several gods of the community live and where the concept they have of space and time is represented. The interior represents the dark place of origin, the underworld and the sea. The square where the dance takes place corresponds to the *Wirikuta* desert and the *Tamatsi Parietsika* shrine “Our Big Brother, the one who walks at dawn”: the deer-*peyote* god. Each oratory or *xirikite* is the abode of a Wixaritari god, and there, the sacred *jicaras* are protected with objects that represent it, which are protected by the “*xukuri ' ikame*” or “*jicareros*,” who adopt the deity as their own corresponding *jicara*, for 5 years (the duration of the position); at that time, they live



Fig. 8 *Wixarika* ceremonial center of Rancho de En Medio, Villa Guerrero, Jalisco, where “*xirikite*” or small temples can be seen. (Photo by: Mara Ximena Haro-Luna)

there and become the ancestor or god who has to personify during the holidays (Neurath 2003).

Each celebration or rite includes the participation of a group of plants that provide magical and protective powers. Some represent the gods themselves, others serve to purify the spaces and the spirit, and with others, people make the offerings. In addition, there are special rituals to build the temples or *niericas* and others to prepare the dyes that allow them to decorate their faces for some festivities. Among the most important plant species, which is considered divine, *Lophophora williamsii*, also called “*hikuri*” “*hikuli*” or “*peyote*,” is one of the central elements of culture and religion (Anderson 1980; La Barre 1975) (Fig. 9). It has psychoactive alkaloids; the best known is mescaline, which induces and alters the state of consciousness accompanied by colorful visions (Anderson 1980). In the *Wixaritari* cosmogony, three great mythological cycles are described, the deer included in the first one, which deals with the events that occurred to their ancestors from the sea to the place of the dawn, from the creation of the sun and the first deer hunting, in which the peyote is given voluntarily to the hunters and becomes the deer (Neurath 2003) (Fig. 10). This episode is venerated at the *Hikuli Neixa* festivity “the dance of peyote,” which is celebrated at the end of the dry season. During this celebration, the *jicareros* perform a complex dance that expresses how the deer-peyote is hunted, collected, blessed, and ritually shared. But first, they must obtain and collect it.

Fig. 9 *Lophophora williamsii*, “*Hikuri*” or “peyote,” considered a sacred plant and one of the most important gods of the Huichol culture and religion. (Photo by: Mara Ximena Haro-Luna)



For this ritual, the *jicareros* of several temples undertake and direct a pilgrimage toward the east, to the *Wirikuta* or *Hiricuta* desert in San Luis Potosí, following the routes drawn from immemorial time. During that trip, the *jicareros* are known as *peyoteros* (*hikuritamate*); they wear a special dress, which includes a hat adorned with white turkey feathers, which resemble the flowers of the peyote, and to purify themselves, they practice fasting, confession, and abstention of dream. When the *hikuri* is ingested, *nierika* is obtained “the gift of seeing.” According to their mythology, the ancestors were the first to try *hikuli* and have a visionary experience, after which they became gods. By reliving all this experience, the *hikuritamate* can become *mara’akate* or “shamans,” initiates, traditional doctors, or singers. In the middle of the desert, the *hikuritamate* also dream of the *Nia’ariwame*, the snake goddess of the eastern rain, whom they take back to their communities when they return from the pilgrimage, along with a large number of peyote plants to be used in various ceremonies, as medicine or to perform several types of cooperative labor that require their strength (Bauml 2004). The Huichol consider peyote to be the heart of the gods, because they first tasted it to find out its taste, to determine the amount to eat and the duration of its effects. So, when they consume it, they reveal some of their attributes and also reveal their hearts and thoughts. The celebration of the *hikuri* also corresponds to the first of the three main festivals that are related to the three critical moments of the corn crop cycle, which concerns the preparation of the *coamil* (Neurath 2003).

Fig. 10 Wooden *hikuri* in which chaquira and stamen represent symbols of the first mythological cycle of the Huichola cosmogony, of which the creation of the sun and the first deer hunt stand out, which is voluntarily given to hunters and becomes in peyote. (Crafts made by: Fidel de la Cruz †. Photo by: Luis Villaseñor Ibarra)



The corn (*Zea mays*) has the same cultural value as *hikuri* and is considered “*Tatei Niwetsika*,” the goddess, described in the second mythological cycle of the Huichol cosmogony (Fig. 11), which talks about the flood, the creation of corn, and the origin of human beings. During the narration, it is described how the first cultivator “*Watakame*” looks for the corn goddess “*Tatei Niwetsika*,” the way he is saved from the flood and how his dog becomes the first woman (Neurath 2003). *Tatei Niwetsika* is symbolized by bundle ears selected for their perfection and stored as seeds. There are two main parties in his honor and mark two of the three critical moments of the corn crop cycle: That of *Namawita Neixa* marks the beginning of the season and is done with the time of planting. *Tatei Neixa*’s “Our Mother’s dance” marks the end of the season, the ritual presentation of the first fruits (corn and tender gourds), and children under 5 years of age are celebrated. These parties are accompanied by *tepu*, the drum, and the champaign of the shaman is more complex and long than at the Peyote Festival, since it guides them through an imaginary trip to the *Wirikuta* desert and, at a certain moment, the children recognize themselves with the first fruits and are presented as such to the gods. Then, a symbolic separation is established between human beings and their food. Thus, it is also an initiatory rite to the life of pilgrims (Neurath 2003).

Maize is a species originated and domesticated by Indigenous peoples of Mexico for more than 5,000 years (Benz 2001). Among the *Wixarika* culture, its cultivation is the most important and ancient religious practice, and most of its harvest is

Fig. 11 *Nierika* or stamen box representing the “multicolour” or “pinto” *Tsayule* corn and representing the center of the cosmos, made by *Xikitakame* (Mariano López de la Cruz). (Photo by: Luis Villaseñor Ibarra)



considered sacred (Bauml 1994). Mainly, it is intended for the self-consumption of those who cultivate it and to prepare food for traditional communal festivals. Only a small portion is used for the breeding of domesticated species that they own (Barrera-Rodríguez 2004). The cultivation of up to eight agricultural varieties has been recorded, but five of them are considered sacred, because they are related to the five directions of the cosmos. Maize varieties are named according to their color: *Yuawime* “blue,” which corresponds to the south; *Tusame* “white,” to the north; *Tatlawime* “purple,” the west; *Taxicaawime* “yellow” (Fig. 12), to the east; and *Tsayule* “multicolored” or “pinto,” to the center. In the *Xirikite* shrines, these ceremonies are headed, but only in those that have descendants of any of the *irikate* or “people-arrow” and that are protected in the *jicaras*. At present, the cultivation is carried out by the traditional and ancient method known as rubbing, graving, and burning (Neurath 2003).

The third plant most mentioned by the Wixaritari is the “*Kiéri*” “*Quieri*” or “Planta del Dios,” and that may correspond to *Solandra brevicalyx*, *S. grandiflora*, or *S. guttata*. These species exhibit phytochemical, ethnobotanical, and ornamental interest (Bernardello and Hunziker 1987). In Mexico, their use is reported in several Indigenous cultures, among them, the Wixaritari. However, there are discrepancies about the species managed. Although the majority of the authors who speak on the subject point out that the species used is *Solandra brevicalyx* (Bauml 2004), the taxonomists of the group mention *S. grandiflora* (Bernardello and Hunziker 1987),



Fig. 12 Wixarika girl helping to shed yellow corn, one of the five sacred varieties and which represents the west of the cosmos. (Photo by: Mara Ximena Haro-Luna)

but the herbarium specimens collected in the Huichol region were identified as *S. guttata* (Nieves et al. 2004b), while other studies suggested that these could be *Datura* or *Brugmansia* species because they have similar hallucinogenic effects (Bauml 2004). According to Bernardello and Hunziker (1987), there is archaeological evidence that supports the theory that its use as hallucinogenic plant is prior to peyote. They also point out that all species contain psychoactive compounds to a variable degree. Although *S. grandiflora* is the one that produces the most, having psychoactive alkaloid compounds such as atropine, noratropin, hiosciamine, and tropin, present throughout structures plant in different proportions. In the Wixaritari mythology, *Kieri* was an evil sorcerer, deceiving since he was a baby, because he danced before the people and told them that it was good, and they ate their hallucinogenic leaves, sap, and fruits. But he was bad; he drove them crazy and made them believe they could fly, but it was not true. This happened until *Kauyumarie*, the hero of the divine culture and *Venado* Person, the ally of the *hikuri*, who kills him with the fifth arrow, arrived. When he was dying, he vomited and transformed into a plant that flew to live among the boulders of the Sierra Madre like the Wind Tree (Furst 2007). Therefore, *Kiéri*, in fact, did not die but is the incarnation of the God of the wind, and witchcraft “*kiéri tewiari*” is attributed with benign and, at the same time, perverse powers (Neurath 2003; Negrín 1997) (Fig. 13). It causes narcotic and hallucinogenic effects; however, special powers that cannot be

Fig. 13 Flowers of *Solandra* sp.; the plant is called *Kieri*, “Plant of the God,” or “God of the wind and witchcraft”; it causes narcotic and hallucinogenic effects and is used to treat matters of witchcraft. (a) *Nierika* showing the shape of the *Kieri*, made by *Muwieri* (Alejandro García). (Photo by: Luis Villaseñor Ibarra)



obtained through peyote are required to deal with matters of witchcraft and counterterming. Wixaritari shamans consider it one of the most powerful and dangerous plants they know. Sorcerers use it to make spells, using substances or pollen to introduce it into the victim's body, causing them dizziness and disorientation. They mention that there are very few who come to the *kieri*, because there are many dangers and sacrifices demanded by this powerful deity and that while the whims are fulfilled, wealth can be expected, the gift of music and art (Alcocer and Neurath

2004), triumph in love, or help to deer hunting. Even a piece of the plant can be wrapped as an amulet for luck; it can also reveal the cause and cure a disease. Their favors are invoked by placing offerings at the base of the plants or tying them to the branches. Appropriate songs are sung, food and drink are left, and candles are lit before pilgrims can leave freely (Bauml 2004).

Within the group of plants that serve to purify, *Nicotiana rustica* (*wiainuri* or *ya*) or sacred tobacco is particularly relevant. It has hallucinogenic properties and is associated with the God of Fire, and it is said that the Elder Brother *Tamatsi Kauyumari* created it in a seedbed, its seeds spread in the ground, because he wanted to create something to smoke. The first plants that appeared were not good, because the smoke generated by its leaves was too light. Over time, *Kauyumari* managed to create a good tobacco, which was tested by *Tatewari* “El Abuelo Fuego” and *Taweviekame* “Creator of the Sun”; they called it “*ya*” and considered it sacred. The Wixaritari mention that there are female and male plants, the latter being stronger. This sacred tobacco is only cultivated, transported in sacred recipients called *bules* (fruits of *Lagenaria siceraria*), and smoked by shamans in purification rituals in which they must sing the whole night (Negrín 2006). Its leaves are smoked in dried corn leaves, although some authors point out combinations with *Tagetes lucida* (*tímutsari*) or *Santa Maria* or *pericón*, similar to the Aztec narcotic called “*yahutli*” (Bauml 2004) or with peyote, as a curative used to reduce their tension (Moreno-Coutiño and Coutiño-Bello 2012) or as a formula to achieve more lucid visions; they smoke the first, and they chew the second drinking alcohol. The sorcerers use it smearing their arrows in the juice of tobacco so that they take diseases to their enemies. But the shamans carry the tobacco leaves on their sacred journey to purify the places where they will chew the peyote (Barba-Ahuatzin 2004). Other species of the genus *Bursera* spp. or glasses are used for this purpose. The drops of resin (*ukua*) they produce are placed in a three-legged smoker (*putsi*); the smell generated by the smoke when burned is considered food for the god *Cauyumarie* (Negrín 1997).

For the elaboration of sacred objects, the species of *Lagenaria siceraria* or the *bule* (Fig. 14) is used. An entire fruit is split into two; *jícaras* are obtained, each conceived as a matrix where life is born; the one below corresponds to Mother *Yurianaca*, the fertile land. The other corresponds to Mother *Huerica Huimari*, the celestial vault, and the Huichols live in the middle of the reconstituted *bule*. But if the *bules* are split at the base, then they become *jícaras* that receive blood and water, essential objects of Huichol symbolism. Also, with *Cucurbita argyrosperma* (*xucuri*) or pumpkin, *jícaras* or *rucuri* are made, the interior is lined with wasp wax, and the exterior is decorated with elements that represent all mother goddesses. They include seeds, shells, paper flowers, glass beads, stamen or wild cotton pom poms, and prayers. Also, in these *jícaras* the offered foods are added. With them, the family union and the fruits of the earth are represented. Also, common objects such as food dishes and water vessels can be manufactured (Negrín 1997).

The species *Phragmites australis* (*haka*), or reed, is considered one of the oldest plants on earth and created by the Grandmother of the World (Santos-García and Carrillo 2012). When the world was dark and full of water, the *Cauyumarie* bandage

Fig. 14 Dried fruit of *Lagenaria*; it is used to make utensils or sacred objects, such as jicaras naming *Bule*. (Photo by: Luis Villaseñor Ibarra)



was born inside a reed, which forms the shaft of each sacred arrow. With it, the bodies of the votive arrows are manufactured. When a woman asks the gods to grant them a male child, they deposit a votive arrow in a sacred place, usually in a water eye. But if a female is desired, then she must offer a *jicara*. The species of the genus *Otatea* spp. are plants related to the Goddess of Growth because she carries her cane of *otate*. It is used to make different *nierikas* or objects that allow seeing the invisible. Some are in the form of a ring, in which a net is woven, and votive arrows are hung. Others, called *niericate* or flat discs with the center uncovered made with reed and wet *otate*, were colored yarn interwoven. With these same materials, the religious figure of the *namma* was also constructed; it has yarn frets interwoven with the *otate* and the reed; they are rectangular or square in shape, and feathers were fitted on both sides, which serve as a protective shield. These are the most elaborated and colorful votive offerings and represent a front shield that shows the face of a god; usually symbolic and mythological figures are represented (Negrín 1997).

Generally, the plants chosen as offerings have notorious qualities in their flowers. They represent the gifts of life-giving gods, their words, thoughts, blessings, and prayers (Negrín 1997) (Fig. 15). Some of them stand out for their fragrance such as *Polianthes platypylla* (*teaxuuri uquis*) or wild tuberose and *Macrosiphonia hypoleuca*, and some for the beauty of its flowers to put in the *jicaras* of the peyoteros, flowers of *Yucca* spp. (*xunuuri*) and *Tillandsia caput-medusae*. So that lightning does not fall in the house, in the cornfield, or in a sacred place, *Bessera elegans*



Fig. 15 The Huichols give flowers to their gods, because they represent their words, thoughts, blessings, and prayers. *Nierika* made by *Xikitakame* (Mariano López de la Cruz). (Photo by: Luis Villaseñor Ibarra)

(*xauricáa ucáari*) is offered to honor the goddess *Nüarivame* and *Milla biflora* (*siicütame ucáari*) for *El fuego de Tatei Nüarivame*. Nieves et al. (2004b) suggest that many of these species are perhaps selected for their striking colors and the large sizes of their flowers, since 32 of the species they report meet these particularities; some of them belong to the Asteraceae (7), Fabaceae (6), Liliaceae (6), Scrophulariaceae (5), Lamiaceae (4), and Orchidaceae (4). Among the latter, *Laelia speciosa* (*cuaiyuri*) is mentioned to decorate temples at the feast of corn, altars, and hats; of *Spiranthes aurantiaca* (*sisicalaque tataa*), the flowers are stirred with sacred tobacco and loaded into the sacred *bules* to go to *Wirikuta*, and then they are burned. Another species that attracts attention is *Tagetes erecta*, (*püvaari*) or *cempoalxochitl*, which asserts that its cultivation is archaic and that it was domesticated in the Huichol region, with magical-religious purposes, for some rituals and ceremonies. The interest of their domestication had to do with their inflorescences, as they are one of the offerings to decorate the temples in the ceremony of the end of the harvest, exclusively, in the celebration called “*Tatei Neixa*” or “*Yuima cuari*.” In addition to ceremonial use, its leaves are prepared into a medicinal infusion to cure headache (Bauml 2004).

Finally, in some religious ceremonies people make use of sacred yellow paintings, to decorate their faces with symbolic designs or simply paint it. In the pilgrimage to *Wirikuta* to search for peyote, people use the species *Berberis trifoliata* var. *glauca* (*úxa*) with which an intense yellow dye is made (Bauml 1994; Bauml 2004; Negrín 1997). In the festivity of the Pachita or of the Flags, celebrated on Friday of the Holy Week, the dried flower of *Cochlospermum vitifolium* (*ramoakari*) is used, which is ground with a small amount of orange peel, to give it a pleasant fragrance. Subsequently, the resulting powder is sprinkled on the face of men,



Fig. 16 Flower of the *Cochlospermum vitifolium* tree called “Ramoakari,” the main or only ingredient of the yellow dye used in the ceremony called “Fiesta de las Banderas” or “Fiesta de la Pachita”: (a) Grinding of the dried petals, (b) dye obtained, (c) dye bath, and (d) appearance of the dye on the face. (Photo by: Luis Villaseñor Ibarra)

women, and children who fasted the night before the celebration, as well as the flags used there (Cedano-Maldonado et al. 1998) (Fig. 16).

Edible Plants

Although information on edible plants is scarce, the *Wixaritari* consume more than 131 plant species as food (Bauml 1994; Nieves-Hernández 2002). Most of the taxa are wild, very few of them are introduced species, and only a few, such as corn (*hico*), beans (*mume*) (Fig. 17), squash (*jutzi*), chili (*haacuucuri*), and chayote and avocado (*yeuca-te*), are cultivated, coming from an ancient domestication. Before using cultivated chili varieties, they consumed a wild species they call *puruhi* (Diguet 2005).

Due to the diversity of ecosystems that exist in the region and the rugged orography in which the different *Wixaritari* communities are distributed, there is no homogeneous knowledge in this regard. As for the species considered edible, they make use of the plants that they obtain more easily growing in areas close to their community (Barrera-Rodríguez 2004). What all the communities share is the classification of edible plants as food, including vegetables associated with salty flavors and that can be consumed mostly raw, fruits associated with sweet flavors, condiments used in different foods and drinks, roots or sweet potatoes prepared in a salty or sweet way, nuts consumed as snacks and as an ingredient to prepare mole or *pipian*, and finally, nutraceutical foods, that is, those that have nutritional and therapeutic action (Bauml 2004, field data by the authors).



Fig. 17 Wixarika girl helping to clean the *mume* or bean (*Phaseolus* sp.) They grow on their land. (Photo by: Mara Ximena Haro-Luna)

As part of the Wixaritari mythology, there is a legend that mentions the participation of edible plants to save the earth from a new flood. The story begins with *Tacutsi Nacahué* “the Great Grandmother,” the mother of all ancestor deities and the matrix of all female spirits on earth and in the water, and which triggered the great flood. To calm her anger and not flood the world again, she demanded from *Cauyumarie* “Elder Brother Venadito del Sol” that she will be offered a blind and crippled boy, a peccary, an iguana, a black puppy, and a colored wooden canoe (*kwaixruari*) loaded with offerings, such as pumpkin nipples and plants, seeds, and corn. When the requested gifts were delivered, she consented to disappear into the ocean, and at that time the Spirit of the Waters of the South was transformed into rock (Negrín 1997).

People from the different Wixaritari communities consider the plants from which they consume raw leaves and stems (e.g., *Convolvulus* sp., *Medicago sativa*, *Oxalis hernandezii*, *Zornia reticulata*, and *Manihot rhomboidea*), as well as other greens, which they call quelites, such as *Amaranthus hybridus* and *Portulaca oleracea*.

These are used to accompany savory dishes such as pumpkin (Fig. 18), meat, beans, or mushrooms. Also, within the vegetables they include the tender shoots of trees like *Enterolobium cyclocarpum* and *Leucaena macrophylla* that are consumed in broths (Bauml 2004; field data by the authors).

The traditional diet is complemented with young pods or immature seeds of *Asclepias* spp., *Amoreuxia palmatifida* (*taraki y zurati*) (Fig. 19), *Bauhinia pringlei* and *Ceiba* sp., and with different fruits of wild trees like *Leucaena leucocephala*, *Pithecellobium dulce*, *Arctostaphylos pungens*, *Prosopis laevigata*, *Psidium guajava*, *Casimiroa* sp. *Spondias purpurea*, *Persea americana*, and cactus as *Steneocereus queretanoensis* (*Maára*), *Heliocereus speciosus* (*hapani*), and *Opuntia* spp. From the group of introduced plants of the old world, the Wixaritari consume *Mangifera indica*, *Musa paradisiaca*, *Prunus persica*, and *Cucumis sativus*, to mention a few (Bauml 2004). Most of the species are present at different seasons of the year, and there is no processing to eat them. In addition, it is common the consumption of seeds of *Amaranthus* spp. (*quiaoja*), pine nuts of different species of *Pinus*, and nuts of *Juglans regia* and *Juglans major* var. *glabrata* as a snack, throughout the day or during long walks (Bauml 2004) [field data by the authors].

It is common to consume different species of *Opuntia* spp. (*nakari*) either the *pencas* (*cladodes*) or the cactus hearts, which are the inner part of the most mature



Fig. 18 Mrs. Robertina eating cooked pumpkin, fruit of the *Cucurbita argyrosperma* species. The plants are cultivated by the Huichols and are one of the most appetizing foods tasted by them. (Photo by: Mara Ximena Haro-Luna)



Fig. 19 *Amoreuxia palmatifida* in its natural habitat, called by the Huichols “*Tarakí*”; the plant is consumed raw (its immature fruits), and a sauce with chili is made with the seeds. Also, they eat the raw root, flavored, or cooked in broth as a vegetable. When corn flour is scarce, it is mixed with the root to make it yield. (a) Wixarika boy collecting the plant in the surroundings of the *Tateiki* community. (Photo by: Luis Villaseñor Ibarra)

parts of the plant (Fig. 20). These are considered a strong dish, and the Wixaritari prepare them in various ways ranging from roasted, cooked, in broths, in *moles*, or in sauces, or combined with other elements such as beans or other vegetables. As for the agaves, they give a different name to each part of the agave they eat as sweets: the leaves (*xaapa*) and the inflorescence named *quiote* (*hari*) that cook on the coals or in clay ovens, the flowers (*siiberi*) from which the stamens and pistil are consumed (Bauml 2004) [field data by the authors].

In the category of sweet potatoes or roots, the plants are of traditional Mexican consumption such as *Pachyrhizus erosus* (*xata-tea*) or *jicama*, *Solanum cardiophyllum* (*teho*) or wild potato, *Ipomoea murucoides* (*tikarixa*), *Dioscorea remotiflora* or sweet potato, and some species of *Dalembertia* and *Tigridia*, to mention a few. Of all, only *xata-tea* is consumed raw; the rest are cooked, and because of its neutral flavor is used as an accompaniment with meat, nopales, and *quelites*, as well as for the preparation of candies, adding maguery or bee honey (Bauml 2004) [field data by the authors].

Plants in the category of condiments include the most used *Dysphania ambrosioides* (*hapaxuki*) or epazote, as well as *Capsicum annuum* (*kukuri*) or chili pepper and two introduced species, *Menta piperita* locally called toronjil, and *Origanum vulgare* or oregano. All these species are used in a wide range of salty and sweet recipes. Gathering of condiments, such as wild peppers, nuts, and some fruits such as *Solanum* spp. (*tásiu híxi*), is carried out at different times of the year; they are dehydrated in the sun and then stored to have available in the kitchen (Bauml 2004, field data by the authors; Fig. 21).

Some of the species of edible plants are considered as nutraceutical foods, so in addition to being appreciated for their nutritional value as food, they are used as remedies for different conditions such as *xeuroruwame* for fertility and *kukiya huaye* to relieve cough. Also, it is common mainly for children to eat the nectar and stamens

Fig. 20 *Opuntia ficus-indica* called “*Nakari*” or “*prickly pear*”; its modified stems are consumed as food; they are also used to cure constipation, dysentery, diabetes, or to deflate. (Photo by: Mara Ximena Haro-Luna)



of a large variety of flowers such as *Pseudobombax palmeri* (*rabe*) or *Magnolia pugana* (*awkwe*) (Bauml 2004; field data by the authors).

Timber Plants

According to the data collected, 63 species are reported; some of them are used for constructing fences, others to make tools or to build houses and temples. Many of these plants have dual purposes, one utilitarian and the other sacred, as it is the case of the objects that are made to be offered. As part of the mythology, it is said that the trees, especially pines, symbolize the measure that the ancestors took to determine the appropriate elevation to place the clouds, so that they did not fall too strong or too faint and their *jakiérite* or their children do not drown in the rain (Negrín 1997).

One of the most exploited species is *Haematoxylum brasiletto* (*uca ucáari*, – *itsa*) or stick of Brazil, which because of its red color is selected to build the “command rods” or objects from which *Tayau*’s power “Father Sun” emanates. These objects are carried for a year by the *Tatuwani*, the “traditional governor,” and the members of the



a



b



Fig. 21 Fruits of a species of tomatillo (*Solanum* sp.) put to dry in the sun: (a) when dehydrated, strings or necklaces are made that are hung on the beams of the house to be used in the kitchen. Author of the photograph: Mara Ximena Haro-Luna; (b) *Solanum lycopersicum* is one of the species they grow in their orchards. (Photo by: Luis Villaseñor Ibarra)

traditional government: first, second governor, judge, sheriff, captain, commissioner and *Topiles*, or messengers who are known as “*Ttstkate* or *Ttsikate*?” or “wand bearers.” During the New Year celebrations, there is a change of rulers, and the “change of wands” ceremony is held (Neurath 2003). In the construction of



Fig. 22 “*Tuki*” or main temple of the *Tateikie* ceremonial center (San Andres Cohamiata, Mezquitic, Jalisco). (a) *Pinus durangensis* one of the species that grows in the Sierra Huichola; due to the height of its stems, it is used in the construction of the *Tuki*. (Photo by: Luis Villaseñor Ibarra).

traditional and sacred instruments such as the three-legged drum (*tepo*) and the violin, the creator must locate among his dreams the tree whose wood will have the magical power to vibrate the spirits of the ancestors (Negrín 1997). The wood of *Juniperus durangensis* and *Pinus teocote* is used to build the main temples or “*Tuki*,” which is located at the west of the courtyard of each ceremonial center (Bauml 1994). They have a circular or oval structure, semisunk, with a high roof of grass (*Muhlenbergia* sp.), supported by two wooden posts of the trees referred to above, representing “the cosmic trees (*haurite*),” that support the sky. The size varies in each ceremonial center; generally, the average is 10 m in height and diameter (Neurath 2003) (Fig. 22). Stems of *Arundo donax*, *Heteropogon contortus* (*hamürixá ucáari*), and *Otatea acuminata* (*hacu ucáari*) are used as beams to build the roofs of houses and temples (Bauml 1994) (Fig. 23). A use that has already disappeared is the manufacture of *nierikas* with pieces of walnut, which are left uncovered in the center; stamen of colors was also interwoven and beaded with beeswax threads of beads of chaqira. Currently, it is replaced by fiberboard boards, which are decorated with Campeche wax and stamen; these are no longer sacred objects and are sold as handicrafts (Neurath 2005) (Fig. 24).

Medicinal Plants

The medicinal or herbalist *Wixarika* is the area most approached by scholars, and it includes the use of about 190 species for the cure of about 95 different diseases. Huichols classify plants into two groups: those of cold nature and those of hot nature. The latter are the most used (Casillas 1990). They also usually grouped these plants based on the places where they grow or are collected, those of the *kieta* or “ranch,” those of *huyetetsita* or “on the side of the path,” and those of the *ritsie* or “forest or



Fig. 23 Trolley where they guard the harvested corn, the walls are built with otate (*Otate* sp.). (Photo by: Mara Ximena Haro-Luna)

mountain” (Bye et al. 2005). Several of these species are conferred various therapeutic uses (Nieves et al. 2004b). Currently, the *Wixarrika* health system has traditional and modern medicine. For them, the first is the most successful and efficient, because it is available to everyone, resolves problems immediately, and addresses the diseases sent by the gods. The system of modern medicine is an alternative to address the natural ills that come from the mestizos, and their medicines are incompetent to heal them (Casillas 1990).

The legend of how diseases arose with the Wixaritari narrates that when the world originated, the Wixaritari gods *Cacaiyari* were gathered, the first ear was born to be able to eat it, they put it to the fire, and from the embers a smoke came out, which was actually *iricayari* whooping cough and infected them. When he first appeared in the sacred place *Teupa*, other diseases arose in the center and the four cardinal points. First, the *cuitayari* dysentery came out in the west, then, in the east, the *Tápacuñiya* pneumonia, then, in the south, the *Tawaiya* plague, then, in the north, the rubella *isipúriquiya*, and finally, in the center, smallpox, *etsá*, and the measles. Then *Seriecame-Marracuarrí* was responsible for spreading all other diseases (Casillas

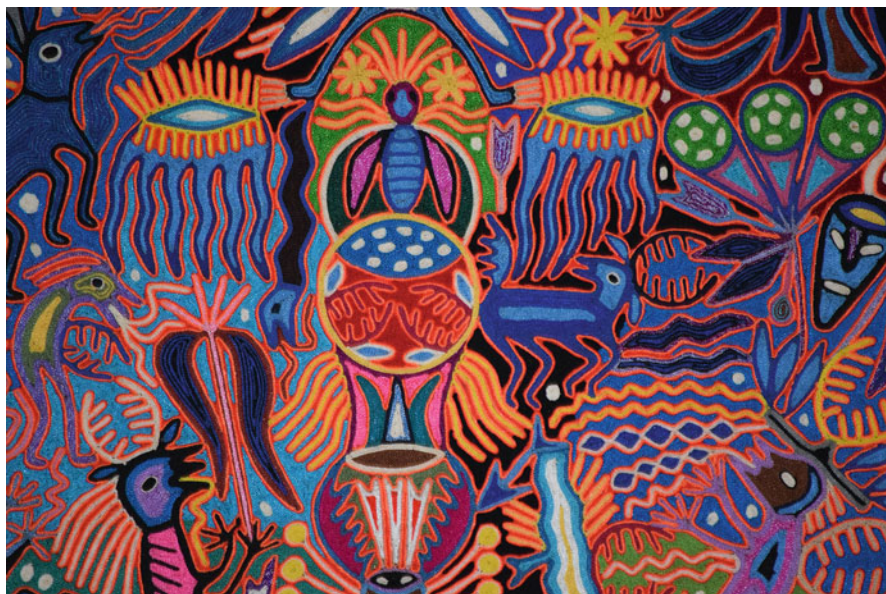


Fig. 24 Current *Nierika* built with material made of plywood, Campeche wax, and yarn, which are sold as handicrafts. Formerly, they were made of walnut wood and had a hole in the center, because through it they communicated with the gods and the universe was seen. When the *nierika* is a sacred object, it is not for sale. (Photo by: Luis Villaseñor Ibarra)

1990). Like any Indigenous group, the Wixaritari or Huichols have an appreciation about the health-disease process. Most of his discomforts are attributed to the participation of supernatural forces and consider that the source of health and long life is related to following the *rayerreiya* or “*el costumbre*,” which includes participating in ceremonies and parties, doing offerings, traveling to sacred places, cultivating their corn, and being a good hunter and excellent pilgrim, to name a few (Casillas 1990; Guzmán-Mejía and Anaya-Corona 2007). They think their gods will punish those who do not comply, throwing arrows that carry diseases. Other illnesses may be caused by black magic and sent through a sorcerer, because only they can capture and steal the *Kiúri* or “the soul,” which is the one that maintains health (Casillas 1990).

To achieve the recovery of any disease, even when treated with modern medicine, a *mara'akame* or shaman is used. For only they can enter the natural world and the supernatural and implore the gods for forgiveness and restoring health to the sick. The treatment begins with some questions to find the cause of the condition. Healing begins by using the *muviere*, a feathered and sacred arrow; with it, on the abdomen, the shaman makes a movement to the four cardinal points and the center of the patient, also sucks to remove the disease, and spits it out to pass it to an object or thing. Subsequently, to complete the recovery, medicinal, magical, or power plants are used (Kindl 2013), and actions must be taken by the patient and his family to please the offended deities (Camberos 2004; Casillas 1990).

For the treatment of supernatural or nonexplainable diseases by science, such as the loss of the soul, to gather couples, against the lack of inspiration in the realization of crafts, to protect against spells and accidents, magical protection against children's diseases, and to do the rituals of "clean," the use of fourteen plant species is mentioned. Among the most important: *Solandra guttata* (*kieri*, *quieri nanáari*) for healing in rituals and to obtain abundance, *Prosopis laevigata* (*meequí ucáari*) to cure the evil eye, and *Casimiroa* sp. (*sapú ucáari*) so that the souls of the dead do not pass inside the house can be mentioned (Bauml 1994).

For the cure of natural diseases, the most used species are the following: *Prosopis laevigata* (*meequí ucáari*) which helps eliminate stomachache, *Enterolobium cyclocarpum* (*uvee tatuata ucáari*), *Crocantemum glomeratum* (*acuitsi-huayeya*), and *Guazuma ulmifolia* (*Aaye ucáari*) to stop diarrhea (Fig. 25), *Brosimum alicastrum* (*hauri ucáari*, *hairite*, *jairi*) to deflate, *Psidium guajava* (*guayavuaxi ucáari*) for stomachache, *empacho* for cough, flu, and fever, and *Bejaria aestuans* (*piriíqui ucáari*) to attack cough, whooping cough, asthma, and flu. *Euphorbia furcillata* and *E. biformi* (*veriya uayeeya nunuveme*) are used when menstruation is not abundant, while *E. strigosa* (*veria uayeeyari*) is used to fatten undernourished women, boys, or girls. *E. hyssopifolia* (*taueaca uquisi ucáari*) and *E. succedanea* (*taueaca ucáari*) are used when blood does not come out, to treat infections, and to



Fig. 25 *Guazuma ulmifolia* tree, "Aaye ucáari" or "guazima"; its fruits (a) are boiled in water, and the preparation obtained is taken to stop diarrhea; they are also sucked raw to quench thirst. (Photo by: Gregorio Nieves Hernández)



Fig. 26 Natural habitat of *Tagetes lucida*, “*Tímutsari*” or “*Santa María*”; its flowers (a) are prepared in infusion, which is ingested to calm the pain of stomach, heart or chest, and head or lower fever. (Photo by: Luis Villaseñor Ibarra)

close cuts, and *E. sphaeronzi* (*icuxia uayey*) to whet appetite. *Lophophora williamsii* (*hikuri, hikuli*) is used to avoid tiredness, counteract scorpion bite, soothe rheumatism, and fight against mumps; *Haemataxylum brasiletto* (*uca ucáari, - itsa*) helps against dysentery, diarrhea, cough, bloody urine, chest or heart pain, tiredness, and headache. *Tagetes lucida* (*tímutsari*) (Fig. 26) and *T. erecta* (*púuvaari, púvaari siníuxi*) are used for stomachache, heart or chest pain, headache, and fever; *T. micrantha* (*tuumíusári uquisi*) for stomachache, diarrhea, and cramps; and *Pithecellobium dulce* (*míxúuri ucáari, mutíri-te*) for stomachache, diarrhea, parasitosis, and burns (Fig. 27). *Opuntia ficus-indica* (*nakari*) cladodes are used for constipation, dysentery, and diabetes, and it is anti-inflammatory. *Arctostaphylos pungens* (*upapaari*) is used for cough, bad urine, and *torzones* (*twist and contractions*), *Pinus oocarpa* (*hucuu*) to cut nosebleed, cough, and muscle pain, and *Salvia* spp. (*neuturica uayeyári uquisi*) is a cold grass, used for diarrhea, *empacho*, corn disease, acidity, parasitosis, headache, and stomachache. *Prunus serotina* var. *capuli* (*tuvii uricasanaca uquisi*) is used for cough, flu, and chest or heart pain, to name a few. Most of the medicinal plants used are wild, which indicates the importance of forests as sources of these resources, and the importance of protection and biodiversity conservation linked to culture in the region (Bauml 1994; Casillas 1990; Higareda-Rangel et al. 2004; Nieves-Hernández 2002; Bye et al. 2005).

Other Uses

In this category, 72 species are included, 21 are used as fodder, 21 as firewood (Fig. 28), 11 as fibers (*Agave* spp. and *Dasyliirium* sp.), 11 as poison (among them *Agave vilmoriana*), 6 as glue (outstandingly *Bletia macristhmochila*), and 2 as soap (*Agave vilmoriniana*, *Manfreda rubescens*).

The root of *Manfreda rubescens* (*haariuqui uquisi*) is boiled and macerated in a metate or with a wooden hammer; it is used in laundry. The leaves of *Agave vilmariniana* (*vaave ucáari*) are cut and macerated raw and used as body soap and

Fig. 27 Fruits of *Pithecellobium dulce* “míxiúuri ucáari uquisi” or “guamúchil,” which are consumed to cure stomach pain, stop diarrhea, and expel parasites. (Photo by: Luis Villaseñor Ibarra)



for washing hair (Bauml 1994). There are other plants for personal care, which have not been reported so far, by personal comments to one of the authors, noted the use of various lianas, as a hair treatment to stimulate hair growth. In the case of *Bletia macristhmochila* (*cuesucuaucáari*), the bulbs are torn with a knife and scrambled with black *zacate* ash so that it sticks hard, such as equipment wood (*uveri*), guitar and violin, or various offerings (Bauml 1994).

Perspectives

In recent times, roads and new accesses are opened in the Wixaritari territory, and some mestizo people have penetrated their spaces and influenced their customs and thoughts of children and young people. Several of these teenagers have migrated to study or work in other regions of Mexico, causing local uprooting and tremendous cultural erosion. Although, it is not the case of the elders and adults, some go out to sell their handicrafts, but they continually return to their lands and continue transmitting their knowledge, customs, practices, and myths to those who remain in the community. However, these changes make the registration of their knowledge a priority, before they are lost due to acculturation, death, migration, and the ecological deterioration of their territories.

Based on the work reviewed for the study area, it is necessary to integrate an inventory of the useful flora of the Wixaritari, with the information generated on the subject. Among the obstacles to be overcome, there is a lack of herbarium materials, the taxonomical identification of many of the species, the linguistic record of Wixaritari, or Huichol language names and the detail of their uses. Of the most

Fig. 28 Firewood collection is a task carried out by the *Wixaritari* children; they take advantage of around 21 species. (Photo by: Luis Villaseñor Ibarra)



important utilitarian plant groups, it is necessary to address “edible plants,” since reports on them are insipient. Also, exploration and work on the communities of San Sebastián Teponahuatlán, Tuxpan de Bolaños, and Guadalupe Ocotán are needed. In general, it is necessary to generate more applied and holistic ethnobiological research, addressing aspects such as values of importance for the cultural group, its worldview, its conceptions, emotions, and behaviors. As well as delving into traditional knowledge and practice to recognize how culture has been integrated, such as the use and sustainable management of resources, the conservation of their areas, the successes and mistakes of their practices, and the ecological consequences of them, to name a few. There should be greater feedback and cooperation from scholars to the communities, participatory action research should be generated, taking into account their problems and needs, to identify and solve these problems, revaluation should be involved of sociocultural and territorial identities, and work

should be done on the revaluation of sociocultural and territorial identity, as well as on the recognition of biocultural heritage, among others.

References

- Alcocer P, Neurath J. La eficacia de la magia en los ritos coras y huicholes. *Arqueol Mex.* 2004;69: 48–53.
- Anderson EF. *Peyote the divine Cactus*. Arizona: The University of Arizona Press; 1980.
- Barba-Ahuatzin B. Antropología del tabaco. *Ciencia.* 2004;55(4):6–16. https://www.revistaciencia.amc.edu.mx/images/revista/55_4/antropologia.tabaco.pdf
- Barrera-Rodríguez RO. Medios natural y ambiental del territorio huichol (norte de Jalisco, México). Guadalajara: CUCSH, Universidad de Guadalajara; 2004.
- Bauml JA. Ethnobotany of the huichola people of Mexico. Doctoral Thesis. Claremont: Faculty of the Claremont Graduate School; 1994.
- Bauml JA. Overview of huichol ethnobotany. In: Vazquez-García JA, coordinator. *Flora del norte de Jalisco y etnobotánica huichola*. Guadalajara, México: CUCBA-CUCSH, Universidad de Guadalajara; 2004. p. 86–92.
- Benz BF. Archaeological evidence of teosinte domestication from Guilá Naquitz, Oaxaca. *PNAS.* 2001;98(4):2104–6.
- Bernardello LM, Hunziker AT. A synoptical revisión of *Solandra* (Solanaceae). *Nord J Bot.* 1987;7(6):639–52. <https://doi.org/10.1111/j.1756-1051.1987.tb02032.x>. ISSN 1756-105.
- Bye R, Aedo-Gajardo A, Faba-Zuleta P. Listado florístico y etnobotánico de las plantas medicinales de los huicholes del río Chapalagana, Jalisco y del Nayar, Nayarit. México, Distrito Federal: Instituto de Biología. Informe final SNIB-CONABIO proyecto No. AE001. Universidad Nacional Autónoma de México; 2005.
- Camberos S. El chamanismo y las raíces de la terapéutica en la medicina tradicional de los Huicholes. In: Vazquez-García JA, coordinator. *Flora del norte de Jalisco y etnobotánica huichola*. Guadalajara, México: CUCBA-CUCSH, Universidad de Guadalajara; 2004. p. 109–110.
- Casillas RA. Nosología mítica de un pueblo. *Medicina tradicional huichola*. Guadalajara: Universidad de Guadalajara; 1990. 160 p.
- Cedano-Maldonado M, Villaseñor-Ibarra L, Gamboa-Ruiz A. Usos tradicionales de la familia Cochlospermaceae por los wixárikas (huicholes) de San Andrés Cohamiata, Mezquitic, Jalisco, México. *Boletín IBUG.* 1998;5(1–3):343–51.
- Cedano-Maldonado M, Villaseñor-Ibarra L, Vargas-Ponce O. Plantas útiles. En: *La biodiversidad en Jalisco. Estudio de Estado, vol. I*. Guadalajara: CONABIO; 2017. p. 177–87.
- Diguet L. El idioma huichol. Contribución al estudio de las lenguas mexicanas (1911). In: Diguet L, editor. *Por tierras occidentales; entre sierras y barrancas*. Ciudad de México: Centro de estudios mexicanos y Centroamericanos; 2005. p. 161–93.
- Furst PT. Visiones de un chamán huichol. Museo de Arqueología y Antropología de la Universidad de Pennsylvania; 2007.
- Guzmán-Mejía R, Anaya-Corona M. *Cultura de maíz-peyote-venado: sustentabilidad del pueblo wixárika*. Guadalajara, México: CUCSH, Universidad de Guadalajara; 2007.
- Higareda-Rangel Y, Nieves-Hernández G, Luquín-Sánchez H. Plantas medicinales de Santa Catarina Cuexcomatlán (Tuapurie) Sierra *Wixárika*, Jalisco. In: Vazquez-García JA, coordinador. *Flora del norte de Jalisco y etnobotánica huichola*. Guadalajara: CUCBA-CUCSH, Universidad de Guadalajara; 2004. p. 102–108.
- INALI Instituto Nacional de Lenguas Indígenas. 2015. con base en los datos de la Encuesta Intercensal, INEGI 2015 y el Catálogo de las Lenguas Indígenas Nacionales, INALI, 2008. https://site.inali.gob.mx/Micrositios/estadistica_basica/estadisticas2015/pdf/agrupaciones/huichol.pdf.

- INEGI. Instituto Nacional de Estadística, Geografía e Informática. II Censo de Población y Vivienda. 2010. In: <https://www.inegi.org.mx/app/areasgeograficas/?ag=14>. Last consultation: Access 3 Oct 2019.
- Iturriz-Leza JL, Carrillo de la Cruz J, López de la Cruz J, Ortiz-Medina J, Leal-Carretero S, Aguilar-López N, Pacheco-Salvador G, Gómez-López P, Mikiri F, Ortiz-López A, García-Muñoz P, Caudillo-Félix GA. Reflexiones sobre la identidad étnica. Guadalajara: Universidad de Guadalajara; 1995.
- Kindl O. Eficacia ritual y efectos sensibles. *Revista de El Colegio de San Luis*. 2013;5:206–27.
- La Barre W. *The Peyote Cult*. Hamden: Archon Books; 1975.
- Lumholtz C. Symbolism of the Huichol Indians. *Memoirs of the American Museum of Natural History*. Vol III, Anthropology II. 1900.
- Luquín SH, Nieves HG, Ayala RJM. Vegetación del norte de Jalisco. In: Vázquez-García JA, coordinator. *Flora del norte de Jalisco y etnobotánica huichola*. Guadalajara: CUCBA-CUCSH, Universidad de Guadalajara; 2004. p. 86–92.
- Moreno-Coutiño A, Coutiño-Bello B. *Nicotiana tabacum* L., usos y percepciones. *Etnobiología*. 2012;10(2):29–39.
- Negrín JE. arte contemporáneo de los huicholes. Guadalajara: Universidad de Guadalajara, INAH-SEP; 1997.
- Negrín J. ¿Qué atrae a los indígenas huicholes hacia el Océano Pacífico? El océano es el principio de la vida: Relatos huicholes sobre *Tatéi Haramara*, Nuestra Madre el Mar. 2006. http://www.huicholesyplagicidas.org/documentos/que_atrae_a_los_huicholes_al_mar.pdf
- Neurath J. Huichole. Comisión Nacional para el Desarrollo de los Pueblos Indígenas, PNUD. 2003. Access to pdf 14 Jan 2019.
- Neurath J. Máscaras enmascaradas. Indígenas, mestizos y dioses indígenas mestizos. *Relaciones*. 2005;101:23–50.
- Nieves HG, Vázquez-G M, Saldívar ESM. Rasgos físicos de la región norte de Jalisco. In: Vázquez-García JA, coordinador. *Flora del norte de Jalisco y etnobotánica huichola*. Guadalajara: CUCBA-CUCSH, Universidad de Guadalajara; 2004a. p. 22–23.
- Nieves HG, Vázquez-García JA, Cházaro MJ, Vázquez-G. M. Uso tradicional de la flora de la región huichola. In: Vázquez-García JA, coordinador. *Flora del norte de Jalisco y etnobotánica huichola*. Guadalajara: CUCBA-CUCSH, Universidad de Guadalajara; 2004b. p. 93–101.
- Nieves-Hernández G. Flora vascular del norte de Jalisco y su uso tradicional por la etnia huichola, Jalisco, México. Master's Thesis. Zapopan, Jalisco México: Universidad de Guadalajara; 2002.
- Santos-García S, Carrillo CT. *Teukarita*: designación de nombres de personas entre los *wixaritari* y sus significados. In: Conti C, Guerrero L, Santos S, editors. *Aproximaciones a la documentación lingüística del huichol*. Jaén: Gráficas la Paz; 2012.
- Torres JJ. El hostigamiento a “El costumbre” huichol. Los procesos de hibridación social. México: El colegio de Michoacán, A.C. Universidad de Guadalajara; 2000.
- Vázquez-García JA, Nieves HG, Cházaro MJ, Vargas-Rodríguez YL, Flores-Macías A, Luquín SH. Listado preliminar de plantas vasculares del norte de Jalisco y zonas adyacentes. In: Vázquez-García JA, coordinador. *Flora del norte de Jalisco y etnobotánica huichola*. Guadalajara: CUCBA-CUCSH, Universidad de Guadalajara; 2004. p. 116–168.
- Villaseñor-Ibarra L. Etnomicología de la etnia *Wixarika* (Huichol), Jalisco, México. Master's Thesis. Zapopan, Jalisco México: Universidad de Guadalajara; 1999.
- Villaseñor-Ibarra L, Cedano Maldonado M, Guzmán-Dávalos L, Pacheco Salvador G (‘*Hritemai*). *Yekwaate metá wixaritari Tateikietari*. Hongos y Wixaritari de Tateikie. Guadalajara: Universidad de Guadalajara; 2017a.
- Villaseñor-Ibarra L, Cedano-Maldonado M, Vargas-Ponce O. Aprovechamiento y manejo de las plantas, hongos y animales silvestres por los huicholes y nahuas. In: *La biodiversidad en Jalisco. Estudio de Estado Vol. I*. Guadalajara: CONABIO; 2017b. p. 189–196.
- Villegas L. Dioses, mitos, templos, símbolos: El universo religioso de los huicholes. *Americanía Revista de Estudios Latinoamericanos Nueva Época* (Sevilla). 2016;3:4–48.