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Pulque and pulquerías of Mexico City: a traditional fermented beverage and spaces of biocultural conservation

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Abstract

Pulque is a fermented beverage prepared with the sap of agave species, consumed since pre-Hispanic times in Mexico. In the sixteenth century, spaces called *pulquerías* were established for the sale and consumption of pulque. The demand for pulque became so high that there were more than 1500 *pulquerías* in Mexico City early twentieth century, but due to socio-cultural factors, the popularity of pulque plummeted. Currently, there are few *pulquerías* in Mexico City, and these are the main spaces for the consumption of this beverage in the metropolis. The pulque sold in *pulquerías* comes from eight localities, largely from Nanacamilpa, Tlaxcala. People working in *pulquerías* have deep knowledge and specific practices to keep pulque in good conditions and to prepare it in a wide spectrum of flavors by mixing the fermented beverage with fruits, vegetables or seeds. We recorded 69 types of pulque mixtures. *Pulquerías* allow the economic maintenance of working families in urban and rural contexts, are spaces of socialization, and identity and help the conservation of an ancient traditional beverage.

Keywords: Mesoamerican food, Agave, Traditional knowledge, Identity, Urban foodways

Background

Numerous traditional fermented foods and beverages have been recorded in Mexico, based on a variety of substrates, among them: (1) seeds: *tesgüino* (*Zea mays*), *pozol* (*Z. mays* and *Theobroma cacao*), (2) fruits: *tepache* (*Ananas comosus*), *colonche* (*Opuntia* spp.), (3) barks: *balché* (*Lonchocarpus longistylus*), and (4) sap: *pulque* (*Agave* spp.) [1–4]. These ferments represent a strategy for preserving resources, obtaining emerging products with higher nutritional values and have important ritual and festive connotations [4–6].

Historically, pulque is one of the most important fermented beverages in Mexico, its consumption dates back

at least 2300 years ago, and is currently produced in 20 of 32 states of Mexico [7–9]. It can be prepared with the sap of 46 different species of *Agave* (mainly *Agave salmiana*, *A. mapisaga*, *A. hookeri*, and *A. americana*) [8, 9]. Pulque is a white cloudy beverage, lightly acidic (pH 4–5), and alcoholic (2–7%), with a high content of probiotic microorganisms [3, 10]. For its preparation, the sap is extracted from the stem of agaves right before the inflorescence production, when individuals are approximately 10 years old [8].

The sap is then fermented by microorganisms such as lactic acid bacteria (*Lactobacillus*, *Leuconostoc* spp.) and yeasts (*Saccharomyces cerevisiae*) [10].

Before the European contact, Mesoamerican cultures incorporated pulque into their daily diet and was an important source of nutrients [7]. In cultures, such as the Nahuatl, pulque had symbolic and sacred connotation, therefore its consumption was strongly regulated

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and was available for the general population only in community celebrations [11]. Pulque was consumed alone or accompanied with other plants. For instance, roots of *Acacia angustissima* were added to pulque to speed up its fermentation [12]. The herb *memeyaxihuatl* (*Euphorbia nutans*) was boiled and macerated with pulque for medicinal purposes [13]. Flowers and fruits were added to confer it new flavors, aromas and colors; for instance, with fruits of several species of Cactaceae, people prepared the *nochoctli* (from Nahuatl *nochtli*: prickly pear, *octli*: pulque), and with flowers of *Commelina tuberosa*, pulque called *matlaloctli* (from Nahuatl *matlalli*: blue) was stained [12].

Pulque is named by different cultures in their languages (Table 1) [7, 12, 14–16]. The term pulque derives from a Castilian barbarism from the Nahuatl language *poli-uhqui*: decomposed; the Nahua people used *octli poli-uhqui* or *poliuhhticaoctli* when the decomposition of the beverage occurred [17].

With the American-European encounter and its profound transformations, the consumption of pulque was desecrated and became a beverage for general consumption, especially by indigenous and mestizo people [18, 19]. Once the Viceroyalty of New Spain and the political-social power of the Catholic Church became established, they exerted pressure to regulate and prevent the consumption of pulque, because its consumption violated Christian values and prevented the indigenous from joining the European rituals and customs [18–21]. In 1580, authorities implemented the regulation and taxing of the sale of pulque, and they issued licenses to sell pulque in mobile stands, which operated on streets, squares, and markets. Those mobile stands were set up on roads that supplied pulque to passersby, which were very successful [21]. In 1672, the authorities of the New Spain banned mobile pulque stands and instead allowed the installation of 36 fixed stations for the distribution and legal consumption of pulque, establishing the first formal

pulquerías [18]. These spaces were consolidated as areas for the coexistence and recreation of the popular classes. *Pulquerías* progressively increased, and by 1854, there were nearly 500 in Mexico City [22].

Initial regulations for the commercialization of pulque strictly stated that only “white pulque” could be sold, that is, without the addition of any root, fruit, or seed [18, 19]. Despite such prohibitions, combining white pulque with other ingredients—known as *curados*—was a common practice, these combinations also included ingredients that arrived with the colony. By the nineteenth century, these combinations were already allowed by the authorities for sale, were an attraction of the *pulquerías*, and had great acceptance among the customers. Recipe books compiled a great diversity of *curados* from that time, including almond, pineapple, egg, maize, or orange blossom [23].

In its initial commercialization, pulque was transported from the producing localities to the cities by animal traction. By the second half of the nineteenth century the railroad was consolidated, greatly favoring the pulque industry, since it allowed transporting more pulque in less time [24]. From the producing states, mainly Tlaxcala and Hidalgo, large amounts of pulque arrived daily to the most important cities, among them Mexico City, where in 1896 about 365,000 L entered per day [24]. By 1909, the increased in the supply of pulque to the cities favored the opening of new *pulquerías*, reaching 1691 in Mexico City [25].

In 1910, the Mexican Revolution stopped the apogee of pulque, and the revolutionary war was fighting to dismantle the large extension farms, where most of the pulque production was produced. The agave cultivation areas were fragmented and distributed to peasant families; this produced a decrease in the cultivation of agaves and the productivity of pulque [25, 26].

Also, after the Mexican Revolution a strong smear campaign against pulque and its consumers emerged, calling it a “dirty, immoral, backward drink, for the poor and indigenous people,” which was associated with an idea of backwardness incompatible with “modern progress” [24, 27]. A lie was spread which consisted that in the elaboration of pulque pieces of excrement, called “doll,” were added to the sap. This was to discourage the consumption of pulque, presenting its consumption as something unhealthy and dangerous. The *pulquerías* were considered as insalubrious, crime and poverty centers, and administrative and fiscal regulations were assigned, such as the reduction in the service hours and an increase in taxes on the production, transport, and sale of pulque [24, 27]. Meanwhile, other bottled alcoholic beverages, like beer, were promoted, and its consumption was encouraged through advertising, providing facilities to

Table 1 Vocables referring to the fermented agave sap (pulque) among some Indigenous Mesoamerican languages

Indigenous language	Name given to the fermented agave sap
Hñähñu	<i>sei, ñogui</i>
Ixcatec	<i>xè</i>
Maya	<i>chih</i>
Mixtec	<i>nducha kuijin, ndute kuijin, ndixi kuijin</i>
Nahuatl	<i>octli, iztacoctli, neutli, meoctli</i>
Ngiwa	<i>sa thuá</i>
Purhépecha	<i>urape</i>
Zapotec	<i>ñüpi yòcho, ni-zòo yòcho, zu</i>

establish factories and promoting their distribution; positioning it as “the hygienic and modern” beverage [24].

In 1953, 1201 *pulquerías* were registered in Mexico City. In this year, another campaign against pulque started to regulate and close establishments that “violated morals and good customs” [22]. Many *pulquerías* were closed for having “immoral” names, austere furniture, displaying “inappropriate” murals, or operating in “unsanitary” conditions. In 1954, licenses to establish new *pulquerías* in Mexico City were suspended [22].

A series of policies and social stigmas caused the production and consumption of pulque to drop precipitously. At the beginning of the twentieth century in Mexico City, there were more than 1500 *pulquerías*, but by 2012, there were only 72, and they continue declining [22, 25]. Despite all these adversities, some *pulquerías* resist and survive nowadays. The *pulquerías* that have survived are ancient establishments and testimonies of the history of pulque in Mexico, being the urban consumption space for this traditional beverage. This study aims at documenting the current state of *pulquerías* in

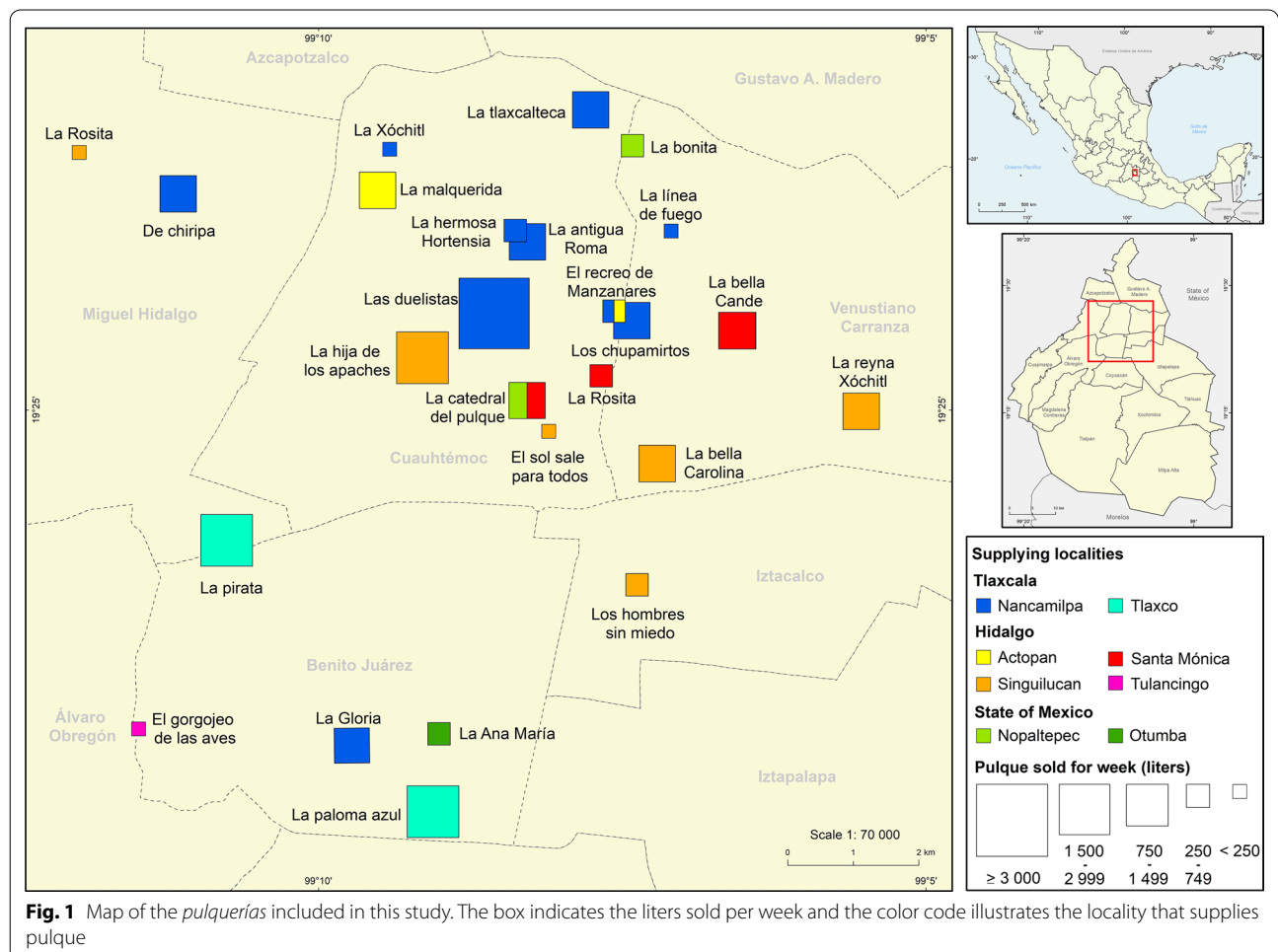
Mexico City, and its future perspectives. We emphasize the supplying localities, the traditional knowledge for managing pulque, the high variety of ingredients and preparation forms and their cultural importance.

Methods

We studied 25 *pulquerías* in the central area of Mexico City during 2015 (Fig. 1), where direct observation was made under an immersion line, arrive and record the: (1) supply of beverages, (2) physical structure of the *pulquería*, (3) clientele and their forms of interaction, and (4) worker activities.

Afterward, 25 semistructured interviews were carried out with workers from the *pulquerías*, under the topics: (1) operation of the *pulquería*, (2) supply of pulque and (3) pulque handling practices and preparation of *curados*.

Open in-depth interviews were conducted with clients about the activities they carry out in the *pulquería* and their opinions about them. The information was analyzed under a qualitative approach using thematic codes [28] and spatial analysis through QGISv.3.10.12.



Results and discussion

The pulque route. Pulque arrives at the *pulquerías* from the producing localities, once a week for those that sell a few liters of pulque, while those that sell a greater quantity receive pulque three or four times per week. Per week, a *pulquería* sells an average of 836 l (707.3 SD); however, this is an amount of pulque impossible to market for many *pulquerías*. Seven *pulquerías* do not exceed 300 L per week, while only five exceed 1000 l per week (Table 2, Fig. 1).

The *pulquerías* offered pulque from eight localities, four from Hidalgo, two from Tlaxcala and two from the State of Mexico. The localities that supply the most pulque to the *pulquerías* studied are Nanacamilpa (7875 l per week) and Tlaxco (4200 l) in the state of Tlaxcala and Singuilucan (4130 l) in Hidalgo. The state that provides the most pulque to the *pulquerías* studied is Tlaxcala (12,075 l) (Table 3, Fig. 2).

The localities that mainly supply pulque in Mexico City are in the southern region of Hidalgo and the northeast of Tlaxcala, the most productive area since the pulque splendor [24]. Although pulque production declined, this

area produces approximately 50% of the national pulque production [29].

The *pulquerías* that sell larger volumes of pulque are supplied from localities with greater productive capacity that enable them to satisfy their high demand. This is the case of Nanacamilpa, which has large areas cultivated with agave and where the production is up to 3000 l per day [9]. The *pulquerías* that sell less pulque are supplied from localities with lower production. This allows the creation of exclusive relationships among certain localities and *pulquerías*, for instance Tulancingo with *El gorjeo de las aves* (70 l).

The distance between localities and *pulquerías* is not a limiting factor for the supply of pulque, but rather its productive capacity, the relationships of trust between people, and the taste of the product. The closest locality to Mexico City is Otumba, 49 km away, which supplies only 300 l per week, while the most remote localities are Tlaxco and Tulancingo, 108 km away, the first supplying 4200 l per week and the second 70 l (Fig. 2).

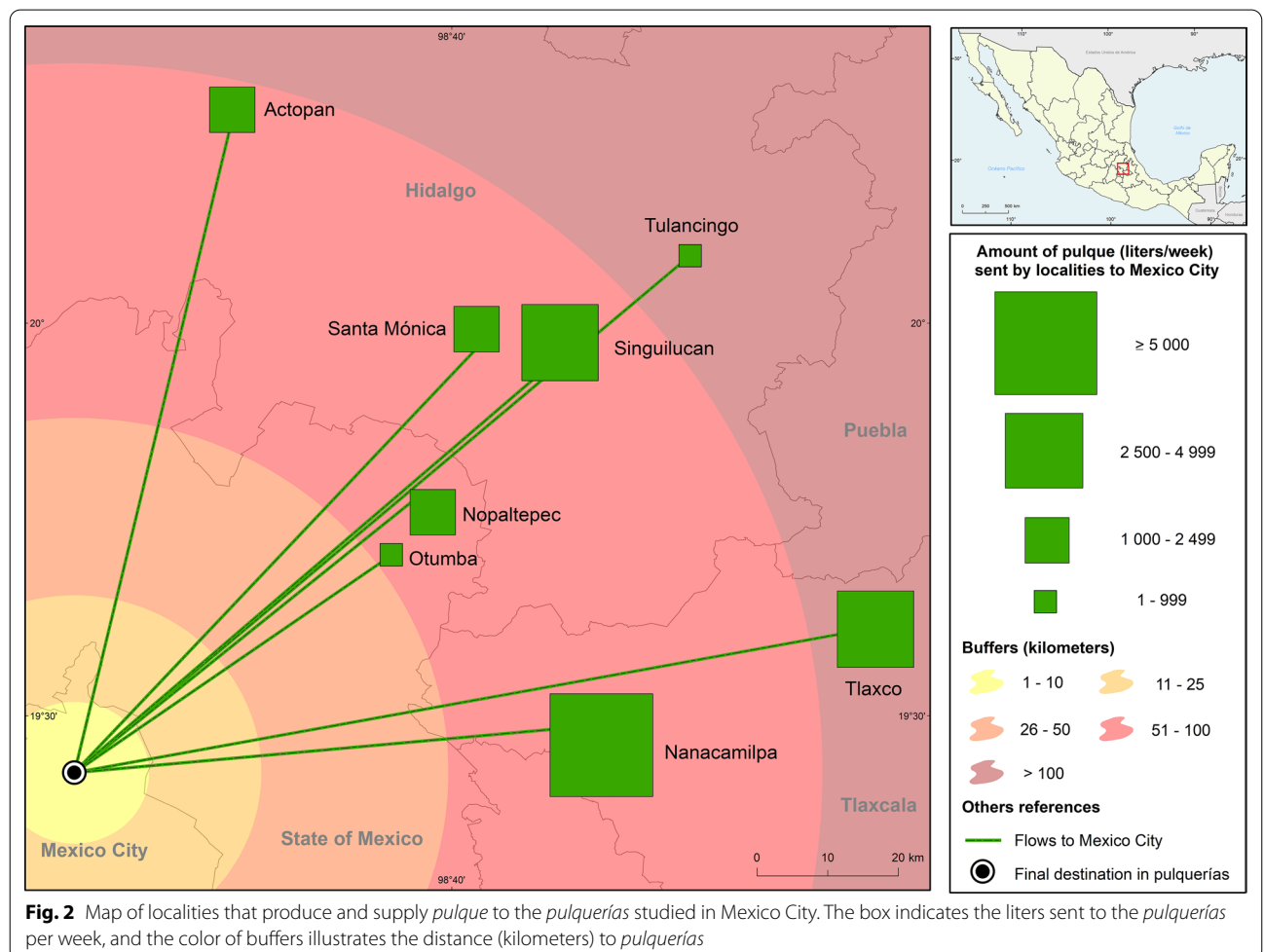
The volume reported is not the total amount of pulque consumed in Mexico City, but an estimate based on the

Table 2 *Pulquerías* studied, pulque sold per week (liters) and supplying localities

<i>Pulquería</i>	Pulque (l)/week	Supplying localities
<i>Las duelistas</i>	3000	Nanacamilpa, Tlax
<i>La paloma azul</i>	2200	Tlaxco, Tlax
<i>La pirata</i>	2000	Tlaxco, Tlax
<i>La hija de los apaches</i>	1600	Singuilucan, Hgo
<i>La catedral del pulque</i>	1200	Nopaltepec, Edo. Mex. and Santa Mónica, Hgo
<i>La bella Cande</i>	950	Santa Mónica, Hgo
<i>La malquerida</i>	900	Actopan, Hgo
<i>La bella Carolina</i>	850	Singuilucan, Hgo
<i>Los chupamirtos</i>	850	Nanacamilpa, Tlax
<i>La antigua Roma</i>	800	Nanacamilpa, Tlax
<i>La reyna Xóchitl</i>	800	Singuilucan, Hgo
<i>De chiripa</i>	800	Nanacamilpa, Tlax
<i>La Gloria</i>	750	Nanacamilpa, Tlax
<i>La tlaxcalteca</i>	750	Nanacamilpa, Tlax
<i>La Rosita</i> (Cuauhtémoc)	600	Santa Mónica, Hgo
<i>Los hombres sin miedo</i>	600	Singuilucan, Hgo
<i>El recreo de Manzanares</i>	450	Actopan, Hgo. and Nanacamilpa, Tlax
<i>La bonita</i>	450	Nopaltepec, Edo. Mex
<i>La hermosa Hortensia</i>	300	Nanacamilpa, Tlax
<i>La Ana María</i>	300	Otumba de Gómez Farías, Edo. Mex
<i>El sol sale para todos</i>	200	Singuilucan, Hgo
<i>La línea de fuego</i>	200	Nanacamilpa, Tlax
<i>La Xóchitl</i>	200	Nanacamilpa, Tlax
<i>La Rosita</i> (Miguel Hidalgo)	80	Singuilucan, Hgo
<i>El gorjeo de las aves</i>	70	Tulancingo, Hgo
Total per week	20,900	

Table 3 Localities and states that produce pulque and liters distributed per week to the studied *pulquerías*

Producing localities, state	Pulque (l)/week
Nanacamilpa, Tlaxcala	7875
Tlaxco, Tlaxcala	4200
Singuilucan, Hidalgo	4130
Santa Mónica, Hidalgo	2150
Actopan, Hidalgo	1125
Nopaltepec, State of Mexico	1050
Otumba de Gómez Farías, State of Mexico	300
Tulancingo, Hidalgo	70
Producing states	Pulque (l)/week
Tlaxcala	12,075
Hidalgo	7475
State of Mexico	1350
Total per week	20,900



pulquerías studied, which are approximately 40% of the *pulquerías* in the city. This estimate missed the amount of pulque sold in other spaces such as traditional markets [22, 30]. Our current estimate illustrates the large decrease in pulque consumption in Mexico City. The amount of liters dropped from 364,800 l in 1896, to 375,000 l in 1923 to finally the current 3000 l [24, 31]. Current consumption is less than 1% of the volume consumed at the peak of the twentieth century.

Traditional knowledge for the management of pulque. The main worker in a *pulquería* is known as the *jicarero*, who serves the pulque to the customers and is responsible for the maintenance and preparation practices of the beverage, allowing it to have a stable fermentation and a pleasant flavor.

All the *jicareros* assured that the pulque must be handled with great care and hygiene to prevent it from entering a state of decomposition, which they colloquially call “pulque being cut,” they affirm that to handle pulque “I must bring my hands very clean, I cannot have grease on my hands, or body lotion, or anything, otherwise the pulque gets cut” (*jicarero* #3).

The containers in *pulquerías* where pulque is kept are important, each *jicarero* chooses one for reasons like their ease of cleaning or because they maintain pulque with a pleasant flavor. The containers can be wooden barrel (82%), aluminum barrel (12%), and plastic barrel (6%). All the containers are washed before the pulque arrives,

some *jicareros* disinfect it by adding ethanol inside the wooden barrels and setting fire for a few seconds. The wooden barrel is the most used container because the *jicareros* perceive that in it the pulque is preserved for a longer time and maintains a good flavor (Fig. 3A). The *pulquerías* keep the pulque in a clean, cold and dark places, where they avoid moving the containers since knocking and heat sources promotes its decomposition.

Another maintenance practice is the addition of sugar to pulque. The *jicareros* add in the morning two cups of sugar cane (400 gr approx.) to the containers with pulque, “so that it works.” This prevents its transformation into vinegar, because pulque contains microorganisms that continue the fermentation of the drink, and the sugar maintains them in a lactic and not an alcoholic fermentation. Otherwise, the fermentation would become acetic and in a state of decomposition [16].

A part of the pulque is sold as white pulque, and the other is destined to prepare *curados*, the specialties of *pulquerías*. *Curados* are prepared in the morning, before opening the establishment, and their preparation is part of the traditional knowledge the *jicareros* transmit to their assistants since the techniques, ingredients, and proportions signify the hallmark of each *pulquería*.

For the preparation of *curados*, ingredients are grinded, using a blender (60% of the *pulquerías*) or a “cube” (40%). The cube is a wooden keg and a stick, like a mortar, where ingredients are crushed with a little pulque until



Fig. 3 A White pulque in a wooden barrel. B The “cube,” wooden keg to crushed the ingredients for *curados*. C Celery (left) and tomato (right) *curados*. D Black sapote *curado* and white pulque (behind)

the ingredients are completely grinded (Fig. 3B). The grind is passed through a strainer (24%) or a cheesecloth (76%). With the strainer, the grind is passed adding white pulque, to allow the remove of the bagasse. Using cheesecloth is more laborious, it consists of placing the crushed or pulp on a clean piece of cheesecloth, gradually adding pulque and squeezing the cloth with the mixture to make it pass through. This procedure is repeated adding white pulque each time until all the pulp has been extracted and only bagasse remains, obtaining a mixture with a more uniform consistency than with the strainer.

Each *pulquería* has their own *curado* recipes with variations in the preparations. For instance, many of them boil before grinding some ingredients like oats, sweet potatoes, red prickly pears, or tejocotes.

Curados are generally stored in “vitroleros,” transparent containers that allow consumers to see the bright colors of the *curados* (Fig. 4A). Less frequently, aluminum and plastic pots are also used to store the *curados*. To maintain the *curados*, the *vitroleros* are placed inside tubs with ice or coolers to keep them at low temperature and make them more palatable and fresher (Fig. 4A, C).

The diversification of the *curados* is a process of continuous invention and creativity, and the appearance and disappearance of flavors depends on the taste of the clientele. For example, in the nineteenth century some popular flavors were eggs, smoke-dried chilies, or maize, which are now uncommon, and instead there are more

recent creations like kiwi, peanut marzipan, or cheese. We recorded 69 flavors of *curados*, grouped into four categories: (1) fruits, (2) vegetables and aromatic herbs, (3) seeds, and (4) other ingredients (Table 4). Certain flavors come with particular presentations, for instance, pineapple, celery, or tomato *curados* at the time of serving are frosted with salt and lemon, while the *curados* of seeds such as oat, pine nut, or peanut are sprinkled with cinnamon. Others flavors such as oysters and shrimp are made with tomato *curado* as a base to which onion, coriander, and shellfish are added (Figs. 3 and 4).

The knowledge that the *jicareros* have to take care of pulque and prepare it is diverse, deep and detailed. This knowledge is more than a set of recipes, for them handling pulque is a great responsibility, considered a living beverage; therefore, it must be treated with respect and be careful [5, 32] “pulque is alive, should not be mistreated, it must be handled with care” (*jicarero* #23).

The work of the *jicareros* is in continuous reinvention, as they are testing new ingredients and combinations that allow them to create new flavors to attract and keep their clientele. This way of preparing and consuming pulque in *pulquerías* contrasts with that of rural localities, where consumption is predominantly white pulque in everyday life, or in religious or community celebrations, it is common the addition of plants grown or collected from surrounding vegetation, such as seeds (*Schinus molle*) or fruits (*Opuntia streptacantha*, *Ananas comosus*) [1, 2].



Fig. 4 **A** Different *curados* in *vitroleros* to show their colors; amaranth, pineapple, guava and oat (left to right). **B** *Botana*, daily and free meal that *pulquerías* offers to pulque consumers, an example: tortillas, beans, chili, and pork meat. **C** Interior of the *pulquería*, with the *jicarero* and consumers. **D** Painting that represents the discovery of agave sap and its extraction to prepare pulque. **E** People drinking pulque, a shrine of the Virgin of Guadalupe (left), and a painting of a pre-Hispanic god

Table 4 Flavors of *curados* (69) in studied *pulquerías*

Fruits (37)	Vegetables and aromatic herbs (8)
Apple (<i>Malus domestica</i>)	Alfalfa (<i>Medicago sativa</i>)
Avocado (<i>Persea americana</i>)	Beetroot (<i>Beta vulgaris</i>)
Banana (<i>Musa x paradisiaca</i>)	Celery (<i>Apium graveolens</i>)
Black sapote (<i>Diospyros nigra</i>)	Cempasuchil flower (<i>Tagetes erecta</i>)
Blackberry (<i>Rubus fruticosus</i>)	Fig leaves (<i>Ficus carica</i>)
Blueberry (<i>Vaccinium corymbosum</i>)	Mint (<i>Mentha x piperita</i>)
Cantaloupe (<i>Cucumis melo</i>)	Peppermint (<i>Mentha spicata</i> subsp. <i>spicata</i>)
Capulín (<i>Prunus serotina</i> subsp. <i>capuli</i>)	Sweet potato (<i>Ipomea batatas</i>)
Cherry (<i>Prunus avium</i>)	
Chikoo (<i>Manilkara zapota</i>)	Seeds (8)
Coconut (<i>Cocos nucifera</i>)	Almond (<i>Prunus amygdalus</i>)
Cranberry (<i>Vaccinium oxycoccos</i>)	Amaranth (<i>Amaranthus hypochondriacus</i>)
Cucumber (<i>Cucumis sativus</i>)	Oat (<i>Avena sativa</i>)
Custard apple (<i>Annona cherimola</i>)	Peanut (<i>Arachis hypogaea</i>)
Fig (<i>Ficus carica</i>)	Pecan (<i>Carya illinoensis</i>)
Grape (<i>Vitis vinifera</i>)	Pine nut (<i>Pinus cembroides</i>)
Green prickly pear (<i>Opuntia albicarpa</i>)	Pistachio (<i>Pistacia vera</i>)
Guava (<i>Psidium guajava</i>)	Rice (<i>Oryza sativa</i>)
Jack fruit (<i>Artocarpus heterophyllus</i>)	
Jocote (<i>Spondias purpurea</i>)	Others flavors (16)
Kiwi (<i>Actinidia chinensis</i> var. <i>deliciosa</i>)	Cajeta (caramelized goat's milk)
Lemon (<i>Citrus aurantiifolia</i>)	Cheese (soft, fresh cheese)
Mamey (<i>Pouteria sapota</i>)	Chocolate
Mango (<i>Mangifera indica</i>)	Coffee (soluble coffee)
Orange (<i>Citrus sinensis</i>)	Cookies (vanilla or chocolate cookies)
Passion fruit (<i>Passiflora edulis</i>)	Mazapan (peanut marzipan)
Peach (<i>Prunus persica</i>)	Mezcal (<i>Agave</i> distilled)
Pineapple (<i>Ananas comosus</i>)	Mojito (rum and peppermint leaves)
Plum (<i>Prunus domestica</i>)	Oysters (tomato <i>curado</i> as a base with oysters, assorted sauces, raw coriander and onion)
	Piña colada (pineapple juice, coconut, milk)
Red prickly pear or "Colonche" (<i>Opuntia streptacantha</i>)	Red wine
Soursop (<i>Annona muricata</i>)	Rompo (eggnog like drink with vanilla)
Star fruit (<i>Averrhoa carambola</i>)	Shrimps (tomato <i>curado</i> as a base with shrimps, assorted sauces, raw coriander and onion)
Strawberry (<i>Fragaria x ananassa</i>)	Strawberries with cream
	Tequila (<i>Agave tequilana</i> distilled)
Tamarind (<i>Tamarindus indica</i>)	Vanilla (artificial vanilla flavor)
Tangerine (<i>Citrus reticulata</i>)	
Tejocote (<i>Crataegus mexicana</i>)	
Tomato (<i>Solanum lycopersicum</i>)	

The diversity of forms of preparing and consuming pulque constitutes the food identity of the different cultural groups that make up Mexico. As is the case with the heterogeneity of forms of consumption of other traditional fermented beverages in the Americas, such as maize *chichas* in the Andean region, *aloja de algarroba* (*Prosopis alba*) of the Gran Chaco region, or *masatos* from *Manihot esculenta* in the Amazonia [33–35].

Being in the pulquería. In the *pulquerías* people drink pulque, listen to music, dance, play cards or meet someone to talk. Unknown people consume their pulque at shared tables, generating relationships between people who met in there (Fig. 4).

Every day *pulquerías* cook "la botana," a free meal—typical Mexican food such as chicken soup, beans, spicy stews, or tortillas with chili—that is offered to accompany

the consumption of pulque (Fig. 4B). That is because *pulquerías* are spaces where people go to eat, since pulque is not only conceived as an alcoholic beverage, but also as part of the daily diet of the people “pulque nourishes you, that’s why you should eat too, here we give everyone their botana, here is the pulquería requirement, first eat and then whatever pulque they want” (*jicarero* #6).

An iconic characteristic of the *pulquerías* is its wall paintings [36]. These represent pre-Hispanic or nationalist themes recreate myths related to the discovery of pulque, passages in the history of Mexico or characters from popular culture. These paintings are highly appreciated and a source of pride for *pulquerías* workers, as well as a visual element to attract customers who attend to observe them (Fig. 4).

Religious elements are also presented, it is often to find shrines directed to the Virgin of Guadalupe (Catholic), to which many pulque workers are devoted. Throughout the year, the *pulquerías* have days of celebration associated with religious events, for instance, the day of the Virgin of Guadalupe (December 12) is one of the most important (Fig. 4E). On this date, ceremonies are held inside the *pulquerías* where workers and consumers of the *pulquerías* attend. There is also a group of *pulquerías* that makes a pilgrimage to the Basilica of the Virgin of Guadalupe located in north of Mexico City. Another festivity is the anniversary of each *pulquería*; on this date, there are religious ceremonies, live musical groups, or recreational activities where workers and clients coexist and celebrate with food and pulque “on December 5, it is the anniversary (of the pulquería) we have a mass at 12 pm where we give food and a liter of pulque to the attendees” (*jicarero* #11).

The *pulquerías* are spaces of recreation, recognition and rituals for the inhabitants of Mexico City. They create conditions for people to coexist intimately through daily food and participation in annual celebrations, creating and strengthening bonds of friendship between people, generating a sense of belonging and identity between individuals, *pulquerías* and the city: “I come here (to the pulquería) because this is my neighborhood, I meet new people, I have a good time, I eat and I really like pulque... I prefer to be here because here I can be who I am” (client #8).

Other spaces for the sale and consumption of pulque *Pulquerías* are not the only spaces where pulque is sold and consumed in Mexico City; in boroughs like Milpa Alta, Xochimilco or Cuajimalpa, there are small remnants of agave cultivation [9, 37]. Pulque production in these places is destined for family self-consumption and for local sale. Producers generally sell pulque in their homes, where they have set up seats and tables in their patios for their clientele [9].

Other important and popular spaces since pre-Hispanic times are the markets [12, 20]. In fixed or itinerant markets, people also sell white pulque and *curados*. In Mexico City, it is often that sellers are not producers but are supplied with pulque from producing localities, just like with *pulquerías*. However, in other regions of Mexico, pulque producers carry and sell their pulque in markets, such as in the State of Mexico, Michoacan, Puebla, and Oaxaca [30, 38–40]. Producers on a daily or weekly basis (depending on the type of market) bring their pulque to these spaces because they are exchange centers for products, have a high influx of people, and it is easier to sell it there than within their ranches. The activity of selling pulque in markets is largely carried out by women [30, 39]. This is a strategy for the division of labor of some families, where pulque-making tasks are assigned to men and sales to women. Another reason is to generate economic independence for women, who by selling pulque, cover the economic expenses of their families [30, 39].

The future of pulquerías Although the majority of *pulquerías* have disappeared, recent interest in pulque has risen, especially among young people, who consider it a beverage of cultural resistance, tradition, linked to the original cultures of Mexico, which provides benefits to health and is far from agroindustry processes [22, 41, 42]. Through social media, people quickly and easily promote attendance to *pulquerías*, which have now begun to receive more customers.

There are many efforts to maintain *pulquerías* alive; groups of producers, *jicareros*, artists, historians, scientists, and journalists have created spaces to disseminate the importance of these spaces in the history and identity of Mexico City and work to promote their conservation and resurgence. Through guided visits to *pulquerías*, exhibitions of paintings, text readings, conferences, *pulquerías* fairs, and the opening of the “Pulque and Pulquerías Museum” in the historic center of Mexico City, *pulquerías* have been shown as safe and attractive spaces, dignifying pulque and the people who work in it [42, 43].

These efforts are essential so that the *pulquerías* that still exist do not disappear. A rise in their popularity and in pulque consumption will consequently generate an increase in production in the localities, which would save both spaces, going from their near extinction to their resurgence.

Conclusions

Pulquerías commercialize a traditional fermented beverage with pre-Hispanic origins and deep historical and cultural relevance in Mexico. This agricultural product is produced in different communities located in a range between 49 and 118 km from Mexico City, generating economic income to a network of people who work in the

marketing, distribution, and production of pulque, both in urban and rural contexts. The consumption of pulque in Mexico City contributes to the maintenance of those food systems, with its biological components—such as the harvested agave species—and cultural components—through the knowledge necessary for the pulque production in central Mexico.

Pulquerías are living historical spaces of Mexico City, they are important for the encounter and recognition of the inhabitants of the city to whom they offer work, recreation, and identity. They are gastronomic laboratories of continuous invention; here, we present a picture of the diversity of forms of preparation of pulque, but these recipes and flavors will be replaced by others in a few years, as it has been recreated since its origins. The conservation and revitalization of these spaces are essential to ensure the continuity of one of the oldest fermented beverages in America.

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Author contributions

GDAR conceived and designed the study, did the fieldwork, analyzed the data, and wrote the manuscript. JP helped in fieldwork and analyzed the geographic data. LPV, MVR, and CJFU wrote the manuscript. AC conceived and designed the study, wrote the manuscript, and got financial support for carrying out the research. All authors read and approved the final manuscript.

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Availability of data and materials

Not applicable.

Declarations

Competing interests

The authors declare that they have no competing interests.

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