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Food sovereignty of the P'urhépecha of Michoacán, Mexico: historical review and critical perspectives from nature-culture relationships

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Abstract

This study aims to analyze the relationships between culture and nature associated with food sovereignty of the P'urhépecha people of Michoacán, central Mexico. We explore how food sovereignty could be analyzed by decentering humans. Firstly, we examine the context and meaning of food sovereignty based on information on the P'urhépecha culture, its history and food patterns. Then, we discuss the concept of food sovereignty from three perspectives: (1) How food sovereignty could be understood by decentering humans; (2) How to define food sovereignty from a relational perspective; and (3) How to do justice to an ontological plurality that involves non-human organisms. We conclude the need of considering new ways to understand food sovereignty, emphasizing the relational perspectives that include non-human entities.

Keywords: Food patterns, Maize, Ethnohistory, Nature-culture relationships

Introduction

Food sovereignty

The notion of food sovereignty (FS) arose as a counterpart to that of food security associated with the idea of green revolution; FS is generally considered as the right of people to have access to healthy, culturally appropriate food, produced through ecologically sound and sustainable methods, including the right of communities to define their own food and agricultural systems [1]. According to *La Vía Campesina* (an international peasants' movement) food sovereignty is the right of people to define their own agricultural and food policies, including the right of farmers and peasants to decide how to produce food and the right of consumers to decide what

they consume, and how and from whom to obtain what it is consumed [2].

Several theoretical currents have influenced the concept of food sovereignty, among them the agrarian collectivism, socialism, Marxism, agrarian social theory, peasant studies, and post-development theories [3]. These theories have criticized and questioned the rupture between society and nature characterizing the global economic systems [4]. Academics and social movements related to agroecology and defense of the territory anchor the concept of food sovereignty to diversified production systems, which rescue local practices and knowledge, are free of pesticides and other agrochemicals, use native seeds, are based on the efforts of the small producers' families, territorially located, and involve healthy and culturally appropriate food in the diverse contexts of regions and continents [5].

From anthropological perspectives, food sovereignty is a topic of recent increasing interest. Although

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anthropology of food has a long history [6], it has been mainly focused on analyzing cultural aspects such as identity, social change, rituality, food insecurity from culturalist or materialistic perspectives, as well as on studies of cooking and biocultural views of food from physical anthropology and nutrition [7, 8]. All these approaches are undoubtedly important but insufficient for a comprehensive analysis of food sovereignty.

In Mexico, food sovereignty is studied from different anthropological perspectives and multiple trajectories, including the importance of local agriculture and sustainability of local consumption [9] other studies include relations of power and hegemony, the symbolic and ritual aspects [10] and food heritage [11]. In this scenario, the Mexican ethnoecology and ethnobiology have developed valuable research approaches accounting for agricultural practices and local knowledge associated with food production, as well as gathering, fishing and hunting [12, 13]. Other authors, from political ecology perspectives, have addressed food sovereignty as part of peasant struggles against their territories and crops [14], for example, Lugo-Morin [15] analyzed the importance of rescuing indigenous food systems as a strategy for designing and implementing public policies aimed at mitigating food insecurity worldwide. For Lugo-Morin [15] the food systems of indigenous peoples can be the key for developing new theoretical models for more sustainable food systems.

Contemporary studies of food sovereignty include the views about the concept of Anthropocene as a framework to understand and discuss changes in agricultural and food systems [16, 17]. This new framework encourages scholars and social scientist to include topics such as human and non-human relationships, decentering humans from a number of concepts and to think and develop relational perspectives to understand the socio-ecological problems [18, 19].

In such sense, the question we try to contribute to answer in this article is how food sovereignty could be understood by decentering humans. We examine this question by analyzing a specific food system throughout historical trajectories, the P'urhépecha food system [16]. For doing that here we use the notion of modes of existence [20], which is helpful to view and organize information from the previous contributions related to this issue.

The importance of thinking in food sovereignty from this perspective lies in the potential to demonstrate how the relational values are formed from indigenous ontologies, and how they expand and recreate relationships with nature [21]. According to Latour [20], the "modes of existence" can be defined as the singular trajectories of being or the diverse existences with specific values of truth, which work as a set of coordinates that make up a whole, a reality [22]. The notion of modes of existence

allows reflecting on culture different coexisting entities, including human and non-human, the relationships they establish and the practices conforming them. In the context of such conceptual framework, two relevant questions in the background of our research are how to define food sovereignty from a relational perspective and how to do justice to an ontological plurality that involves non-human organisms. We explore these questions analyzing the case of the P'urhépecha people of Michoacán, also called Tarascan in the literature. We particularly analyze these questions in relation to the meaning of being P'urhépecha in the context of the cultural history of these people, the influence of modernity in which they coexist and culturally recreate themselves, and, particularly important, through the practices associated with the food system.

Case study

The P'urhépecha region currently comprises approximately 6000 km², located in the north-central part of the State of Michoacán, at elevations between 1600 and 2600 m. This area forms a cultural unit called *P'orhépecho* or *Purhépecherhu*, which means "place where the P'urhépecha live", with common costumes and language, which is denominated "*P'urhé*" or "*P'orhé*". This region covers the area from Los Reyes to Terécuato and the East of the Pátzcuaro Lake; toward the north, people speak P'urhépecha language until the region crossing the Carapan-Zacapu area, reaching the *Paricutín* volcano [23, 24] (Fig. 1).

P'urhépecha people are part of the Mesoamerican region, an outstanding spot of cultural and biological diversity of the World. Mesoamerican cultures are associated with the origin of maize domestication, diversified cultivation systems and contexts, and diversification of maize varieties. The P'urhépecha are part of the Mesoamerican region, they speak the P'urhépecha, which is the only language belonging to the Tarascan linguistic family. The P'urhépecha interact with a regional remarkable biological diversity including endemic species of flora and fauna and regional varieties of crops. Several activities are part of people's subsistence, including farming native varieties of maize, beans, squashes and other regional vegetables and trees, trading a broad spectrum of products, handcrafting, using forest products through harvesting, fishing, and hunting. Nowadays, people look for jobs in regions near the coast in activities of harvesting products of intensive agriculture [25]. Other activities that represent significant income for the P'urhépecha families are remittances from members of the family who migrated, mainly to the USA and Canada.



Fig. 1 Purhépecha's municipalities of Michoacán, México

Methods

This review is part of a larger investigation directed to analyze relational perspectives of food sovereignty. This study summarizes information from the authors, as well as published information about the P'urhépecha food system and food sovereignty in different historical periods. The review was conducted directly from primary and secondary resources including data bases such as Google Scholar and Scopus. We also reviewed the principal repositories of these at the UNAM (Universidad Nacional Autónoma de México), which allowed organizing the information in chronological order following the main periods of the regional history that have been documented. We then analyzed critically the resources through the importance of nature-culture relationships, especially from relational ways to understand the socioecological problems [18, 19].

Results and discussion

Pre-Hispanic food (before 1521)

The P'urhépecha have an important place framed in the Mesoamerican history. According to Pollard [26], their current territory is the Pátzcuaro Lake basin. These people were hunter-gatherers that occupied the northern zone of the Pátzcuaro Lake, and contacted the inhabitants of Jarácuaro, who were farmers-fishermen [26, 27, 28]. Through alliances and wars, the Purhépecha-Uanacaze became a strong people [29]. The P'urhépecha people had their own traditions, they practiced maize agriculture and shaped landscapes with terraces and irrigation systems ([30, 31], Table 1).

Toward the Post-Classic period (900–1521 AD), we can find the nature-culture relationships in one of the prominent figures of the P'urhépecha pantheon, *Xaratanga*, the "mother goddess of maintenance" and fertility. *Xaratanga* maintained a relationship with animals

Table 1 P'urhépechas food characteristics

	Pre-Hispanic period (before 1520)	Colonial period (XVI)	Contemporary (XX-XXI)
Priority food	Corn, pumpkin, chili	Corn, pumpkin, chili	Corn, pumpkin, chili
Plants reported	Amaranth, tomato, maguey, beans, wild plants (quelites), cuajiniqui (<i>Inga</i> spp.), mamey (<i>Pouteria sapota</i>), cacao (<i>Theobroma cacao</i>), zapote (<i>Diospyros digyna</i>), chichapote (<i>Manilkara zapota</i>), prickly pear (<i>Opuntia</i> spp.), capulin (<i>Prunus salicifolia</i>) and tejocote (<i>Crataegus mexicana</i>)	Conquest included to diet several foods, such as wheat, vine, barley, lentils, beans, chickpeas, cabbage, lettuce, radishes, carrots, peas, garlic, onion, and turnips; fruits such as peaches, apples, pears, quinces, and olives, rice, sugar cane, and bananas	In addition to those cultivated since colonial times, there is a great variety of vegetables such as squash, beans, wheat, potatoes, chayotes, tomatoes, onions, wheat, and potatoes
Animals	Whitefish, sardines, catfish. Honeycomb, deer, turkeys, macaws and dogs; rabbits; turkeys ducks, charales (<i>Chirostoma attenuatum</i> , <i>C. estor estor</i> , <i>C. grandocule</i> and <i>C. patzcuaro</i>) frogs (<i>Rana dunni</i>), achoques (<i>Batysiredon dumerilii</i>), water snakes (<i>Thamnophis melanogaster</i>), armadillos (<i>Dasyurus novemcinctus</i>), (<i>Sciurus</i> sp.), gophers (<i>Zygoeomys trichopus</i>), roasted opossums (<i>Didelphis virginiana</i>)	The conquest brought livestock, not just for food, but in terms of changes in land use and farming techniques, now aided by horses, mules and donkeys. The animals incorporated into the p'urhépecha landscape were pigs and sheep	There are in P'urhépecha area oxen, horses, cows, pigs, chickens, among others. In Lake Patzcuaro, you fish approx. 14 native species and 4 introduced. P'urhépechas hunt squirrels, deer, wild birds, rodents and consume wild honeycomb worms, rabbits, armadillos, opossums, hawks
Elaborated food	Cooked corn, atoles, tortillas, tamales, corundas, quelite breads, ceremonial meals with wild animals	Inclusion of beef and pork in some local dishes	In the daily food, dishes based on corn, beans, broad beans, rice, dried meat, brown sugar, butter, among others more industrialized such as pasta, tuna, canned shrimp, bottled beers, soft drinks, tortillas, etc.
Food technology	Parángua or fire stones, firewood, tortilla	Inclusion of instruments, for example, metal and glass utensils. Addition of culinary techniques such as frying and baking. African and Asian culture also joined Michoacan cuisine	Modernization of indigenous kitchens through the increasing use of electrical appliances such as gas stoves, blenders, and refrigerators
Landscape	Semi-sedentary corn-growing populations occupied Patzcuaro Basin toward the Pre-Classical (1500 BC). Corn agriculture reached large areas of territory, shaped landscapes with terraces and irrigation systems	The high rainfall occurred during the early Hispanic period, and the total abandonment of certain agricultural areas produced erosion and deterioration of the lands	Among the forms of transformation of the landscape, the diversity of means of production stands out: horticulture, fishing, hunting, aquatic extraction, and beekeeping; and pottery, wheat, wood and palm handicrafts, bread production, among others
Social relevant aspects	During the early postclassic Xaratanga, the "mother goddess of maintenance", goddess of fertility, maintains a relationship with animals and plants	Famines, territorial conflicts, epidemics, among other phenomena that made relationships with nature more complex. At this time, people not accepted European animal fats and other foods such as cow's milk, even until the beginning of the twentieth century	The forties were crucial for the P'urhépecha in social, political, cultural, nutritional changes and relations with the environment, promoted by modernization. Since the 1940s, the migratory phenomenon brings new gastronomic preferences. In the 1990s, international agreements affected food production, preparation, and consumption practices
Relational values	Maize is a part of relation with Xaratanga and other gods. The base of food sovereignty is maize and all the relation with territory is dominated by maize	The relation between maize and people, gods territories are suffering a strong transformation. Many publications about food and transformation of territories but there is a lack of information concerning to relational values of purhepecha people	There are multiple values simultaneously coexisting, the modernity has a strong energy to move maize and other agricultural products as economic capitals, it coexist with the relational values such as the personality, preference of plant and also about how people is related with catholic gods

and plants, was the provider of the different varieties of maize, chili, and beans, controlled access to fish in the Pátzcuaro Lake, among other virtues. The P'urhépecha used to offer to her sacrifices of quails and ducks. Likewise, it is possible to account for the stratification of population: in addition to nobility, the governors and the military elites, the merchants had certain privileges in relation to people that were primarily farmers [27, 32].

According to the Relations of Michoacán [27], food produced and consumed in the region mainly included maize and beans, and a broad spectrum of other products [33]. Table 1 refers to some of the principal consumed animals and plants in the region. However, it is crucial to consider that people's diet varied according to the social stratum the families belonged to; for example, meat was reserved to the elites or to a broader span of consumers during festivities [34]. Similar to other Mesoamerican peoples, the P'urhépecha consumed a high diversity of domesticated and wild species of plants, animals and mushrooms, mostly a great variety of vegetables called *xaquá*, prepared in various ways for daily cooking and rituals to thank gods like *Xaratánga* [35, 36].

In the Relación de Cuitzeo, Acuña [37] mentioned that the P'urhépecha consumed cooked maize tortillas and tamales, sometimes wrapped with maize bracts or leaves and stuffed with beans and wild animals' meat, they also consumed honeycomb worms, a tradition that continues to this day [38, 39], people also consumed fermented corn and maguey beverages [37]. This document mentioned that when the pre-Hispanic P'urhépecha abandoned their semi-nomadic habits, they raised turkeys, macaws, and dogs to sacrifice them during festivities. The *Tariacuri*, the P'urhépecha leader, consumed maize cooked as atoles (beverages prepared with maize dough and a variety of ingredients), tortillas, and tamales [40], in the Vocabulario en Lengua de Mechuacan by [41] (1559), there are some references to the P'urhépecha foods, including the names of some animals and plants.

There are few references regarding the pre-Columbian P'urhépecha cuisine and food. According to Martínez [42], there are no descriptions similar to those abundant for the Aztec food carried out by the chronicler Fray Bernardino de Sahagún and others; however, the Relations of Michoacán [[27] and Cuitzeo [37] provide specific references to some of the dishes consumed by the P'urhépecha by the time of the arrival of the Spaniards. In addition, the Vocabulario en Lengua de Mechuacan of Gilberti [41] is an important reference to the food for that time. In that text, there is a particular reference to maize, whose most common preparation was through nixtamalization (cooking maize with lime) for preparing tamales, atapaquas, corundas, among other meals, but there are also

references to the use of other parts of the plant, such as the sweet stem or leaves [43, 44].

We can mention that the archeological records show the relevance of natural products to the culinarian culture of the ancient P'urhépecha, but in the literature most studies have an anthropocentric view of the world and, by extension, of the relation of food-materiality and nature, which could be the clue to understand the non-anthropocentric view of food. What we know about nature-culture relationships is primary in how the plants and animals were transformed and incorporated into food, and how plants such as maize were extremely important for feeding people. But also, it was also important for its association with other entities, for example *Xaratánga* who was sculptured with corn stalk, so the personality of the goddess probably had an association to maize personality, this includes a relation between maize-goddess, life and death [45].

Colonial food

With the arrival of the Spaniards in the sixteenth century, the influence of the Iberian culture and food had repercussions on the Mesoamerican diet through the inclusion of new food ingredients, culinary technology, and cultivation practices. Likewise, the Mediterranean culture was not the only one that arrived at Michoacan lands; African slaves and Asian immigrants also brought their cultural baggage and food traditions to this territory. Local foods gradually increased their diversity, including wheat, wine, barley, lentils, beans, chickpeas, cabbage, lettuce, radish, carrots, peas, garlic, onion, and turnips; also, fruits like peaches, apples, pears, quinces and olives, rice, sugar cane, bananas, coconuts, and different spices, all of which gave rise to a new P'urhépecha cuisine [43]. Although the food inclusion made the P'urhépecha food more dynamic, it was not the product of a friendly syncretism. The region lived famines, territorial conflicts, epidemics, and other phenomena that conflicted relationships with nature, with other cultures, and involved abandonment of traditional food and/or adoption of new food. An example of this process is the repulsion for the consumption of animal fats and other foods such as cow's milk that prevailed until the beginning of the twentieth century [46, 47]. The basis of the New Spain's diet continued being maize, beans, chili and squash, but during the Colonial period, progressively increased the large-scale cultivation of Old World crops, and some South American cultivated plants, outstandingly potatoes, were also introduced [43].

The soil-water agriculture was very important for the P'urhépecha, but, during this period, the first generalized soil erosion throughout the region took place [48]. According to Fisher et al. [49], it was caused by

several factors: the total abandonment of some agricultural regions that had been managed by the P'urhépecha settlers, and that after the population decline became more susceptible to erosion, likewise the incorporation of new European agricultural crops and practices deepened soil degradation, in addition, a period of high rainfall has been documented that occurred during the early Hispanic colonization time. The instability of the landscape accelerated in the eighteenth century due to changes in land tenure, administration, monopolization of resources, and the arrival of people to populate the P'urhépecha region contributed to the desertification processes of the area [50].

In this period, cattle were introduced, not only for food but also for labor, determining changes in land use and cultivation techniques, now aided by cattle, horses, mules, and donkeys. Other animals incorporated into the P'urhépecha landscape, like pigs and sheep, which were progressively incorporated to traditional dishes such as *churipo*, a soup prepared with meat, vegetables and chili pepper [46, 51, 52, 53].

According to Kemper [54] the culinary of the P'urhépecha people during the Colonial time remained strongly linked to pre-Hispanic traditions. There were significant changes and transformations, for example, the new Peninsular and Creole elites, the mestizos, and friars preferred foods with Mediterranean influence and were the main consumers of meat and other animal products in the area of the Pátzcuaro Lake. The P'urhépecha continued consuming large amounts of fish, which was affected by the decline in fishing activities.

The P'urhépecha food did not experience losses of components; however, the new relationships with animals and plants, determined significant changes in maize fields, which became more uniform crop species land [44, 54]. Although the Colonial period marked significant cultural changes in the history of P'urhépecha food, other more recent events have radically changed the relationship with food and reconfigured food sovereignty [54, 55].

The literature documenting the Colonial period reveals, on one hand, the lack of food sovereignty among indigenous people, because of the colonial domain of lands for animals, and because of the cultural and demographic changes, including population decline. On the other hand, the literature shows that most documents consider foods as a cultural process, neglected the new nature-culture relational interactions that occurred during this period.

Twentieth and twenty-first centuries

According to Kemper [54], there were no dramatic changes in the P'urhépecha diet due to the introduction

of new plants and animals to local food systems during the last century. However, before the twentieth century the most crucial period that marked changes throughout the country was the Independence Revolution (1810–1821). Unfortunately, there is scarce information on the P'urhépecha diet and agriculture during that period.

During the Mexican Revolution, in the first two decades of the twentieth century, people of Michoacán did not experience significant changes in terms of feeding patterns [54]. However, famines were reported during the revolutionary period due to the looting of annual crops by bandits and revolutionary and governmental armies who reached the communities and massively took and consumed the available food. Several times, people participating in the dispute destroyed the crops that would ensure food for the year to come [56]. In the following years, between the Mexican Revolution (and even from the Independence period) and the decade of the 1940s, for Kemper [54], food production was a continuity of the Colonial period. However, it is also relevant to consider that commercial and large-scale agriculture arrived at the Pátzcuaro Lake region during this period and specific notions of rural development. Table 1 lists some animal and plant species commonly consumed in the region. The diet was based on corn, beans, and other crops; some families practiced agricultural activities with the help of yokes of oxen and plows.

From the decade of the 1940s and onwards, primary activities (agriculture, fishing, and gathering and use of forest products) sustained the P'urhépecha economy together with other activities such as handicrafts and commerce. The exchange made it possible to interchange resources between warm and cold climate areas [23, 25, 57, 58].

During the forties, the lake was relatively well-conserved, and it formed a complex ecosystem that included the use and management of species by the groups settled on its shores [25, 59]. In the 1940s, people of the region lived almost exclusively from fishing [60]. In the eighties, fishing continued being a practice of great importance for food and family economies [61, 62].

During this period, the ways of how the P'urhépecha related with nature to achieve food sovereignty had significant changes. The importance of *Xaratánga* became neglected; instead, people developed relations with catholic divinities, but those relations were also mediated by plants such as maize [63]. This plant escorted to some divinities related to agricultural practices, for example during the *Fiesta de Santa Inés* in the community of Cherán K'eri (Fig. 2). Santa Inés, corn and other plants and animals are closely related, Santa Inés protects the crops production, and people, as retribution made food based on corn, also they prepared altars



Fig. 2 Santa Inés in the community of Cherán K'eri

decorated with maize and other earth products. Maize was and continues to be the most important crop for the P'urhépecha, from both the nutritional and cultural points of view. People know about the complex forms of denomination and knowledge about it, including the expertise about types and races, their parts, the care of seeds, and life cycles, as well as the environmental and cultural requirements for its development and consumption of the species [64, 65].

The domestic animals consumed in the P'urhépecha plateau were mostly turkeys, pigs, sheep, cows, goats, and chickens [23, 66, 67]. Argueta [23] described fishing techniques that link the pre-Hispanic past with current knowledge about the lake and water resources management. His research is a contribution to food and ethnozoological studies. Also, this author takes up the work of Gorenstein and Pollard [68], distinguishing the annual production of maize, amaranth (*Amaranthus* spp.), beans, fish, and bushmeat as substantial elements of the P'urhépecha diet [68].

According to Tapia [69], the P'urhépecha production systems in the 1980s strongly depended on the regional agriculture and the course of the foreign markets; this author considered that the boost to food production at the national level had a significant influence on the modernization of production systems in Michoacán. However, the traditional P'urhépecha foods were opposed to modern markets. [42] published a cookbook documenting the types of traditional soups made with maize dough called *atápakua*; Méndez and Martínez [70] summarized a cookbook of animals from the lake area, in which documented the ways the local wild fauna was prepared specifically by the P'urhépecha communities. These authors described how the P'urhépecha maintained the customs of hunting wild animals, and the culinary and consumption contexts (Tables 2, 3, and 4). González-Rivadeneira and Argueta [71] documented the importance of ethno-biological research for studying food, considering a relational approach as the key to solve political problems concerning food sovereignty, and promote the importance of a critical perspective to analyze and conceptualize this topic.

For the second half of the twentieth Century, the consolidation of neoliberal federalism impacted the state of Michoacán. Some policies implemented during the 1990s were the General Agreement on Tariffs and Trade (GATT) and the North American Free Trade Agreement (NAFTA). The NAFTA was signed in 1993 and went into effect in 1994 [58, 80], which specifically affected practices of production, preparation, and consumption of food, and motivated the modernization of indigenous kitchens through the increasing use of household appliances [58].

During the last decades, two new processes have taken place in Mexico, which have impacted and could have significant additional effects on the purpose of constructing food sovereignty for the P'urhépecha and other indigenous peoples. One of them is the trade agreement between Mexico, Canada and the USA, and the other is the recognition of Mexican food as intangible cultural heritage.

Table 2 Edible plants reported in the literature for the P'urhépecha region

#	Name Spanish	Scientific name
1	Quintonil,quelite de trigo	<i>Amaranthus hybridus</i>
2	Quelite cenizo	<i>Chenopodium berlandieri</i>
3	Mostaza	<i>Brassica campestris</i>
4	Lengua de vaca	<i>Rumex crispus</i>
5	Lengua de vaca	<i>Rumex conglomeratus</i>
6	Barba de chivo	Sin identificación
7	Pisekua	Sin identificación
8	Quelite de agua (shirshakua)	Sin identificación
9	Encino	<i>Quercus</i> spp.
10	Nurite	<i>Satureja macrostema</i>
11	Jaltomate	<i>Jaltomata procumbens</i>
12	Zarzamora	<i>Morus microphylla</i>
13	Xoconostle	<i>Opuntia joconostle</i>
14	Nopales	<i>Opuntia tomentosa</i>
15	Capulí	<i>Prunus serotina</i>
16	Mora silvestre	<i>Rubus adenotrichos</i>
17	Amaranto	<i>Amaranthus</i> sp.
18	Rabanillo	<i>Brassica campestris</i>
19	Hierba jedeonda	<i>Reseda luteola</i>
20	Amole	<i>Sycios microphylla</i>
21	Andan	<i>Helianthus</i> spp.
22	Toronjil morado	<i>Agastache mexicana</i>
23	Mezoquelite	<i>Bidens ostruthoides</i>
24	Hierbabuena	<i>Hedeoma piperitum</i>
25	Nurite	<i>Satureja laevigata</i>
26	Maguey, hocimetl	<i>Agave inaequidens</i>
27	Coztomate	<i>Phystrlis acuminata</i>
28	Tomatillo	<i>Physalis pubescens</i>
29	Anís	<i>Tagetes micrantha</i>
30	Jicote	<i>Agave inaequidens</i>
31	Mostaza	<i>Brassica rapa</i>
32	Quelite, cenizo	<i>Chenopodium berlandieri</i>
33	Nopales	<i>Opuntia atropes</i>
34	Verdolaga	<i>Portulaca oleracea</i>
35	Capulines	<i>Prunus serotina</i> subsp. <i>capuli</i>
36	Berro	<i>Rorippa nasturtium-aquaticum</i>
37	Zarzamora	<i>Rubus Liebmannii</i>
38	Juan primero	<i>Rumex obtusifolius</i>
39	Jitomate silvestre	<i>Solanum lycopersicum</i>
40	Anís	<i>Tagetes micrantha</i>
41	Epazote	<i>Dysphania ambrosioides</i>
42	Maíz	<i>Zea mays</i>
43	Trigo	<i>Triticum</i> spp.
44	Cebada	<i>Hordeum vulgare</i>
45	Repollo	<i>Brassica oleracea</i>
46	Cilantro	<i>Coriandrum sativum</i>
47	Hierbabuena	<i>Mentha spicata</i>
48	Avena	<i>Avena sativa</i>
49	Haba	<i>Vicia faba</i>

Table 2 (continued)

#	Name Spanish	Scientific name
50	Chilacayote	<i>Curcubita ficifolia</i>
51	Calabaza	<i>Curcubita pepo</i>
52	Frijol	<i>Phaseolus vulgaris</i>
53	Papa	<i>Solanum tuberosum</i>
54	Maguey	<i>Agave</i> spp.
55	Chayote	<i>Sechium edule</i>
56	Hinojo	<i>Foeniculum vulgare</i>
57	Pera	<i>Pyrus</i> sp.
58	Ciruelo	<i>Prunus</i> sp.
59	Cerezo	<i>Prunus</i> sp.
60	Manzano	<i>Malus</i> sp.
61	Durazno	<i>Prunus persica</i>
62	Membrillo	<i>Cydonia oblonga</i>
63	Tejocote	<i>Crataegus mexicana</i>
64	Zapote blanco	<i>Casimiroa edulis</i>
65	Manzanilla	<i>Matricaria chamomilla</i>
66	Bledo negro	<i>Amaranthus</i> sp.
67	Bledo rojo	<i>Amaranthus</i> sp.
68	Bledo blanco	<i>Amaranthus</i> sp.
69	Chía negra	<i>Amaranthus cruentus</i>
70	Chía roja	<i>Chenopodium berlandieri</i>
71	Chía blanca	<i>Ammaranthus hypochondriacus</i>
72	Kokoc o frijol ayocote	<i>Phaseolus coccineus</i>
73	Chiles	<i>Capsicum annum</i> , <i>C. frutescens</i>
74	Coliflor	<i>Brassica oleracea</i> var. <i>botrytis</i>
75	Lechuga	<i>Lactuca sativa</i>
76	Rábano	<i>Raphanus sativus</i>
77	Zanahoria	<i>Daucus carota</i>
78	Chícharo	<i>Pisum sativum</i>
79	Nabo	<i>Brassica rapa</i> subsp. <i>rapa</i>
80	Granada de castilla	<i>Punica</i> sp.
81	Naranja	<i>Citrus sinensis</i>
82	Lima	<i>Citrus aurantiifolia</i>
83	Limón	<i>Citrus limon</i>
84	Chirimoya	<i>Annona cherimola</i>
85	Chabacano	<i>Prunus armeniaca</i>

Sources González-Rivadeneira [72], Caballero and Mapes [73], Farfán-Heredia et al. [74], Mapes et al. [75], Argueta [23], Núñez [76], Méndez and Martínez [70]

The TLC-NAFTA 2.0 or T-MEC was signed in 2019, as the new version of the NAFTA signed in 1993. It is known that from 1994 to 2019 the area planted with maize in Mexico decreased 2 million hectares, nearly 22% of the total area cultivated with this staple crop, which made Mexico a maize importing country [81, 82]. Several scholars have noticed that with T-MEC the agricultural sector has been exposed to unfair competition with the USA, even when they have been subsidized by the government [83] to adopt the International Union

Table 3 Edible species of fungi reported in the literature in the P'urhépecha region

#	Name P'urhé/name Spanish	Scientific name
1	Charapiti terekua/Trompa de puerco	<i>Hypomyces lactifluorum</i>
2	Iarin terekua Hongo de Iarini/hongo de ocote	<i>Neolentinus lepideus</i>
3	Urundu terekua/Patas de gallina	<i>Ramaria flava</i>
4	Kuini jantsiri terekua/Patita de pájaro	<i>Ramaria botrytis</i>
5	Xandziri terekua/Hongo de pie	No identificado
6	Kutšikua terekua/Hongo de oreja	<i>Helvella lacunose</i>
7	Runuans terekua/Oreja de ratón	<i>Helvella crispa</i>
8	Kuku terekua/Hongo amarillo	<i>Cantharellus</i> gpo. <i>cibarius</i>
9	Tsikuimu terekua/Pana terekua/ Panza de burro/ panza de vieja/panza de res	<i>Boletus michoacanus</i>
10	Tiamu terekua/Hongo colorado	<i>Hypomyces</i> sp.
11	Tiripiti terekua/Hongo amarillo	<i>Amanita</i> gpo. <i>caesarea</i>
12	Urapiti terekua/Hongo blanco	<i>Russula brevipes</i>
13	Tsitipikua terekua/Xongo	<i>Laccaria laccata</i>
14	Uachi terekua/Hongo café, Guachitas, pashacuas	<i>Lyophyllum</i> aff. <i>loricatum</i>
15	Uachiuia terekua/Pachikua terekua/Guachitas, pashacuas	<i>Lyophyllum decastes</i>
16	NN/ Le llaman champiñón o seta blanca	<i>Pleurotus floridanus</i>
17	NN/ hongo de pan	<i>Boletus aestivalis</i>
18	NN/ Huitlacoche	<i>Ustilago maydis</i>
19	NN/ Moradito	<i>Laccaria laccata</i>
20	NN/ Hongo globoso	<i>Calvatia cyathiformis</i>
21	NN/ Hongo llanero	<i>Agaricus campestris</i>
22	NN/ Guachitas, pashacuas	<i>Lyophyllum connatum</i>
23	NN/ Patitas de pájaro	<i>Ramaria araiospora</i>
24	NN/ Patitas de pájaro	<i>Ramaria flavigelatinosa</i>
25	NN/ Patitas de pájaro	<i>Ramaria fenica</i>
26	Panterekua/ Vientre de buey, vientre de anciana	<i>Boletus affedulis</i>
27	NN/ frijol pequeño	<i>Clitocybe gibba</i>
28	Sirat agants or siráata angánts terekua jeramba/NN	<i>H. lactifluorum</i>
29	NN/ frijol pequeño	<i>Laccaria laccata</i>
30	NN/ caca de nana	<i>Lycoperdon perlatum</i>
31	Kuinit jantsiri terekua/Pata de pájaro café	<i>Ramaria</i> aff. <i>rubiginosa</i>
32	Oxen yoke/NN	<i>Sparassis crispa</i>
33	NN/ Hongo de miel	<i>Armillariella tabescens</i>
34	NN/ pambaso	<i>Boletus edulis</i>
35	NN	<i>Xerocomus spadiceus</i>

Sources González and Argueta [77], Castro-Sánchez et al. [78], Farfán-Heredia et al. [74], Caballero and Mapes [73]

for the Protection of New Varieties of Plants. The latter would imply the dependence of Mexican producers from the transgenic seeds commercialized by Bayer-Monsanto, Pioneer, Syngenta and Dow [84]. For the moment, a Presidential Decree (2020) and the Federal Law for Fomenting and Protecting Native Maize (2020) maintain Mexico free of sowing transgenic maize, but this condition could change in the context of T-MEC [85, 86].

The implementation of the free trade policy impacted the P'urhépecha people during the following two decades. Policies related to free trade promoted the

abandonment and sale of lands because small and medium-sized farmers would not be able to compete with large corn-producing and importing companies. These companies expanded and replaced maize with other profitable crops, including in such a process forest and secondary vegetation areas. In addition, the international trade policies impacted the P'urhépecha traditional subsistence farming systems; for instance, the traditional agro-silvo pastoral systems were replaced by monoculture agricultural systems or other systems dominated by cattle. In other cases, the local

Table 4 Animal species reported in the literature as food among the P'uhrepecha people

#	Name P'urhé/name Spanish	Scientific name
1	Ardillas	<i>Sciurus</i> spp.
2	Codornices	<i>Cyrtonyx montezumae</i>
3	Palomas	<i>Columba</i> spp.
4	K'upipu/abeja	<i>Apis mellifera</i>
5	Kaparhi/ abejorro o jicote	<i>Bombus</i> spp.
6	Jési/ larva de avispa	<i>Vespula pensylvanica</i>
7	Uauapu/avispa	<i>Polybia occidentalis</i> , <i>Polybia parvulina</i>
8	Karhasi/ Larva de mariposa	<i>Eucheria socialis</i>
9	Pescado blanco	<i>Chirostoma estor</i>
10	Charal blanco	<i>Chirostoma grandocule</i>
11	Charal prieto	<i>Chirostoma attenuatum</i>
12	Charal pinto	<i>Chirostoma patzcuaro</i>
13	Acúmara	<i>Algansea lacustris</i>
14	Chegua	<i>Allophorus robustus</i>
15	Choromu	<i>Neophorus robustus</i>
16	Tiro	<i>Allotoca vivipara</i> , <i>Goodea atripinnis</i> , <i>Skiffia lermæ</i>
17	Lobina negra	<i>Micropterus salmoides</i>
18	Carpa	<i>Cyprinus carpio</i>
19	Carpa herbívora	<i>Ctenopharyngodon idellus</i>
20	Mojarra	<i>Oreochromis aureus</i>
21	Charamu	<i>Allotoca dugesti</i>
22	Tirruhu pitsipiti	<i>Goodea luitpoldi</i>
23	Trucha	<i>Neophorus diazi</i>
24	Venado	<i>Odocoileus virginianus</i>
25	Conejo	<i>Sylvilagus</i> spp.
26	Pavo	<i>Meleagris gallopavo</i>
27	Pato	<i>Anas diazi</i>
28	Armadillo	<i>Dasybus novemcinctus</i>
29	Tuza	<i>Zygozomys trichopus</i>
30	Tlacuache	<i>Didelphis virginiana</i>

Argueta [23], Núñez [76], Méndez and Martínez [70], Manin et al [33], Pollard [79]

varieties of maize were replaced by hybrid varieties, which need technological and chemical packages promoted by the green revolution [87].

The cultural heritage aspect related to the inclusion of the Mexican Cuisine in the Intangible Cultural Heritage List (UNESCO 2010), through the proceedings titled “The traditional Mexican cuisine: ongoing communitarian, ancestral, popular culture: the paradigm of Michoacán”. We highlight the term “paradigm of Michoacán” because, although apparently with less economic importance than the T-MEC 2.0, it may involve a greater impact on knowledge and practice of the P'urhépecha cuisine. This is because it has tended to standardize the traditional food, leaving the decision about what is or not “traditional” in the hands of “experts”, and subduing the cooks to a fixed pattern of standardized recipes,

restricting the local variation of dishes, and a sort of petrification of the ancestral creativity [52, 53].

While the cultural heritage is strong for the P'urhépecha, the migration is an important phenomenon in the region, promoted by international trade policies. Migration, together with narcotraffic, have had consequences on the relationship with food and food sovereignty. Migration has influenced an increase of monetary incomes through remittances, while narcotraffic and violence have motivated migration and land abandonment, thus causing drastic events and progressive process of scarcity of traditional food products [88]. As documented by González-Rivadeneira [72], women of Cherán K'eri experimented this situation during an armed confrontation occurred in 2011 caused by the presence of illegal lumberjacks in the communal territory. At that time,

nobody could go out to market food products, and there were two sources of food, one from edible fungi and plants of the community's territory and other from the purchase and supply of stores. Remittances were crucial to maintain the activism during the community conflict in 2011 [72, 89, 90, 91].

To this end, the P'urhépecha relational values are intertwined with a large trajectory process of cultural change and different necessities, the continuity of the high importance of maize, and the ways people interact with the plant are connected with several relational values, according to the P'urhépecha's world view, but these values are distinct and not commensurable compared with other values, for example modern values [5]. The complexity of what maize is, as an agent or an economic product announce the complexity of how people articulate how and why non-human nature matters to them [92].

Concluding remarks

Critical perspectives of the P'urhépecha food sovereignty

Anthropological and ethnobiological views on food have shown how the relationship of the P'urhépecha with the environment goes beyond the utilitarian vision of plants and animals [23, 78]: from the existence of *Xaratánga*, they have shaped symbolic, cultural relationships that go beyond food-nutrition, and that they are part of what could be called a P'urhépecha "ontology of the world". This aspect is particularly disturbing in terms of food sovereignty, because if we take an ontology vision [93, 94, 95] seriously, perhaps the understanding of food from a notion of pluriverses may be more fruitful. This would be especially helpful in light of the importance of indigenous worlds for the construction of the concept of food sovereignty [96, 97]. From this viewpoint, food-plants, food-animals, food-fungi, food-ferments could have a different role than agricultural food, ecologically produced, and other categories that reduce the internal and external characteristics of these non-human beings [93].

If we take the definition of food sovereignty from *La Via Campesina*, as referred to by Pimbert [4], we could say that the P'urhépecha have food sovereignty to the extent that they consume and prefer, for the most part, the varieties of creole maize, known and appropriated by people. Also, for other foods like fish, beans, squashes, among others. Ethnographies and ethnobiological works noted that peasant social life is attached to certain P'urhépecha traditions. Garibay and Bocco [58] characterized the agricultural economy of these communities as centered on maize, accompanied by other plants, and diversified by livestock practices and artistic activities, which would account for a sustainable way of life and economy in relative balance with nature [98, 99, 100].

Cultural change and food sovereignty in the literature

The definition of food sovereignty for indigenous communities includes practices and cultural knowledge; it means an ethnic characterization of sovereignty [101], subsuming the cultural, social, environmental, and political changes in which the communities are actants. Therefore, considering relational values could be a fruitful way of thinking about food in terms of the importance of specific forms of relationships with non-human nature.

The P'urhépecha region lived processes of change and modernization promoted by the State from the end of the nineteenth Century to the twenty-first Century. The transformation impacted causing reductions of the plateau's forests and the basin of the Pátzcuaro Lake, which resulted in a progressive decreasing access to wild food (Table 2, 3, 4). The regional forests partially recovered during the 1940s and 1950s, apparently related with the increase of industrial activities. During these decades, the construction of the Mexico-Morelia-Guadalajara highway, contributed to transform the peasant economy. The region was significantly influenced by the introduction of industrial food products and the commercialization of manufactured products in the communities (Table 1, [58, 102]).

The modernization process, included the adoption of new habits and practices, resulted from external social and cultural influence. Migration affected the P'urhépecha families since the 1940s. People migrated to cities in Mexico or, in many cases, to The United States and/or Canada. Numerous persons, mainly men, migrated seasonally and, on their return with money, they built their houses in the North American style, got colorful cars, acquired modern tools for growing maize, introduced new crops, or invested money in establishing avocado plantations. These cultural changes contributed to the transformations of the P'urhépecha being and its relationship with money, goods, and natural resources, which according to Velasco [103], influenced a general rethinking of its ontological condition.

In this context, in which the P'urhépecha ontological condition is in transformation, food sovereignty could be understood rather as a negotiation process. In such a process, the traditional P'urhépecha ecological knowledge, identity, and local practices are part of a pattern of using multiple products, debatable, without clear limits of a syncretic process in constant change. It means that the food sovereignty condition of indigenous people has to consider the historical changes in the relationship with food, nature, cultural practices, and ecologies on a local scale. We do not consider that the modernity of indigenous peoples necessarily contributes to food sovereignty; however, we notice that food sovereignty should be considered as a dynamic construction. It is built in cultural

settings of constant change, where the alterities, the modes of existence within the P'urhépecha communities themselves are diverse. Food patterns could be understood as a result of "indigenous-mestizo" or "mestizo-indigenous" aggregates or mixtures of components and processes in which indigeness is part of modernity and modernity is also part of indigeness, following Marisol de la Cadena [97]. It does not mean that modern foods such as ultra-processed food is part of food sovereignty, but that the P'urhépecha food is occurring in modern contexts, where knowledge and judgments are human-centered at the same time. This food coexists and is adopted and created in a scenario of different values including those non-anthropocentric, which incorporate other ways to prepare food [92].

In this sense, the P'urhépecha food sovereignty can be understood as a result of interactions, negotiations, interfaces and adaptations that occur between the different actors and their ways of life, knowledge and practices to obtain products and food. These may involve agriculture, livestock, use of modern agricultural technology and water collection systems, management of forest, rivers and lakes, among other aspects. We believe that the P'urhépecha food sovereignty cannot be universally delimited, it has to consider the history of food production and consumption and the relational values with plants like maize [104], as well as animals, mushrooms and other organisms.

Forms of existence to food sovereignty

Food security continues being a political justification of the so-called green revolution. Food security is supposed to be an alternative to guarantee food, but this thinking generated a more significant problem since it has significantly contributed to change the global temperature and climate, the biochemical composition of the oceans, rivers and lakes, the degradation of soils, and the global loss of biodiversity. This problem may be the product of a global political-economic system (i.e., capitalism) that, centered on humans, accumulation and economic growth, has caused the planetary crisis in which we are possibly reaching the point of no return [105].

In contrast, as a counter-hegemonic discourse, food sovereignty considers not just the right of people to have access to health and food, but also the importance of culturally appropriate food and production systems through ecologically sound and sustainable methods. It includes the right of communities to define their own food and food production systems [1], but, in many cases, it has to consider the cultural relational values that include different views, considerations that define non-human entities, and how they are included in food systems.

Food sovereignty could be enriched of a discourse nourished by community views, not Cartesian, of diverse ontologies, from which there is no one single nature and many cultures, but many natures and many cultures. In such a context, the obvious question then is: how does food sovereignty take seriously the diverse forms of existence with which human cultures coexist? [20, 93, 106]. For authors like Altieri and Nicholls [107], agroecology, insofar as it recognizes the diversity of life forms that can feed humans, is a way of including these other non-human beings in the narrative. For Acosta [96], understanding from national legislation the "balance with Pachamama" is also an alternative. However, it seems that they continue an anthropocentric view of food.

An anthropocentric view of food implies that, as mentioned in the definition by Vía Campesina [2] and by Pimbert [4], agroecology, sustainable methods, fair trade, and other concepts closely linked to food sovereignty still revolve around an only explicitly human problem. Although interesting contributions such as the Rights of Nature or Pachamama made from the legislative point of view in the Ecuadorian and Bolivian constitutions, respectively, a strategy has not yet been constructed that allows recognizing the multiple interacting forms of existence in what is called food sovereignty. To do justice to an ontological plurality involving non-human organisms in the concept of food sovereignty, it is necessary redefining the expression "the right of people" for "the rights of people, plants, and other organisms"; for instance, the right of maize to be fed and cultivated with clean water, fertile soil, its relations with other plants and animals, and to create community with people.

In the case of the P'urhépecha, as mentioned above, maize is one of the elements that shape the landscape in the region; also, maize continues having importance in food, festivals, and ceremonies of the community. Maize is irreplaceable in the P'urhépecha mode of existence. However, we know little about this plant from the relationship it maintains with the P'urhépecha people. It is known that it is a plant with a natural history [108] and ethnohistory [109], its emergence being closely linked to human nutrition. If corn is considered one more actor in the P'urhépecha food sovereignty, with a specific agency [110], with specific power relationships [111], the approach to food sovereignty would perhaps imply other types of ontological relationships with non-human life forms.

This review shows that the information available on the P'urhépecha food system throughout history is still limited. Most studies available have described food from a utilitarian point of view, there are few works that consider food from agricultural practice, including the process of preparation, consumption, and relational

values that people constructed and continue constructing with what they eat. The incorporation of a historical perspective into the dialogue about food sovereignty and relational values makes it possible to realize that the importance of the relationship between human beings and plants and animals goes beyond food itself. Despite changing historical contexts, entities such as maize remain present, not only in dishes but also in the symbolic and relational worlds of people; therefore, the reflection on food sovereignty in the light of relational values will allow rethinking food sovereignty not only as a right about material life conditions but on the modes of existence, inhabiting and creating worlds.

It is pertinent to considering the crucial role of maize in P'urhépecha' people subsistence, a plant domesticated in the Mesoamerican area, cultivated by the P'urhépecha since pre-Hispanic times. But also, maize as a plant that is the personhood of the *Xaratánga* divinity, a plant that shaped landscapes during pre-Hispanic and colonial periods; and a plant that continues being the essential element of the P'urhépecha's food and farming. In addition, it is pertinent to consider the multiplicity of cultural values involved in the interactions between the plant and humans. Considering all the above, we can understand the plant as a product, but also as an entity who escorts catholic representations, with its preference of growing, and its own history of relationships with the P'urhépecha. Therefore, we must include in the concept of food sovereignty the idea of the right of maize and, similarly, other species to exist, to interact and relate with people to join the human food sovereignty, and at the same time, it could maintain their own mode of existence. We consider this is a prominent but neglected studied conceptual framework of interactions that we will continue constructing, exploring and studying: (1) How food sovereignty could be understood by decentering the humans; (2) How to define food sovereignty from a relational perspective; and (3) How to do justice to an ontological plurality that involves non-human organisms.

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References

1. Perfecto I, Vandermeer J, Wright A. Declaration of Nyéléni. In: Nature's Matrix: Linking Agriculture, Conservation and Food Sovereignty. London Sterling: Earthscan. 2007. <http://nyeleni.org/spip.php?page=forum&lang=en>. Accessed 20 March 2020.
2. La Vía Campesina. Qué es la soberanía alimentaria. <https://viacampesina.org/es/que-es-la-soberania-alimentaria/>. 2003. Accessed 15 March 2022
3. La EA. invención del desarrollo. Colombia: Editorial Universidad del Cauca; 2012.
4. Pimbert M. Food Sovereignty. Encyclopedia of food security and sustainability 2018. Suppl. 3: 181–189.
5. Scott J. The moral economy of the peasant rebellion and subsistence in southeast Asia. London: Yale University Press; 1976.
6. Garine I. Les modes alimentaires : histoire de l'alimentation et des manières de table. In: Poirier J editors. Histoire des moeurs, t. 1 : Les Coordonnées de l'homme et la Culture matérielle, Francia, Gallimard, Encyclopédie de la Pléiade; 1990. p.1447–1627.
7. Contreras J, García M. Alimentación y cultura: perspectivas antropológicas. España: Ariel. 2005.
8. Mintz S, Du Bois C. The anthropology of food and eating. Annu. Rev. Anthropol 2002. Suppl.31: 99–119.
9. Bak-Geller S, Pasquier A. Almanaque de la sustentabilidad alimentaria en la Ciudad de México; UNAM. Mexico. 2022.
10. Good C, Corona L. Introducción: estudiando la comida y la cultura mesoamericana frente a la modernidad. In: Good C, Corona, L, editors. Comida, cultura y modernidad en México. Perspectivas antropológicas e históricas. México: Conaculta. 2011, p. 11–38.
11. Bak-Geller S, Matta R, de Suremain C. Patrimonios alimentarios. Entre consensos y tensiones. México: San Luis Potosí: El Colegio de San Luis; 2019.
12. Durand L, Figueroa F, Guzmán M. Introducción. In: Durand L, Figueroa F, Guzmán M, editors. La naturaleza en contexto. Hacia una ecología política mexicana. México: Universidad Nacional Autónoma de México. 2015. p. 137–164.
13. Hernández X. E. La agricultura en la península de Yucatán, en: Beltrán, Enrique, editors. Los recursos naturales del sureste y su aprovechamiento, Publ IMRNR, 1959. p. 3–57.
14. Lazos Chavero E. De la agrobiodiversidad al control de las transnacionales: La soberanía alimentaria como demanda política en México. En: La naturaleza en contexto. Hacia una ecología política mexicana. Editado por Durand, L., Figueroa, F. y Guzmán, M. Ciudad de México: Universidad Nacional Autónoma de México. 2015. p. 137–164.
15. Lugo-Morin D. Indigenous communities and their food systems: a contribution to the current debate. J Ethnic Foods. 2020;7(suppl. 6):1–10.
16. Reisman E, Fairbairn M. Agri-food systems and the Anthropocene. Ann Am Assoc Geogr. 2021;111(Suppl. 3):687–97.
17. Zimmerer K, Haan S, Jones A, Creed-Kanashiro H, Tello M, Carrasco M, Meza K, Plasencia F, Cruz-García A, Tubbeh R, Jiménez Y. The biodiversity of food and agriculture (Agrobiodiversity) in the anthropocene: Research advances and conceptual framework. Anthropocene. 2019. suppl. 25a

18. Bray T. The social life of food. In Chou C, Kerner S. Food, social change and identity. Consumption and public life. Palgrave macmillan; 2021.
19. Roe EJ. Things becoming food and the embodied, material practices of an organic food consumer. *Sociol Rural*. 2006;46(suppl. 2):104–21.
20. Latour B. An inquiry into modes of existence. An anthropology of the moderns. USA: Harvard University Press; 2013.
21. Keleman A, Chatti D, Overstreet K, Dove M. From moral ecology to diverse ontologies: relational values in human ecological research, past and present. *Current Opinion in Environmental Sustainability* 2018. Suppl. 35:1–7.
22. Fisher M. The lightness of existence and the origami of “French” anthropology Latour, Descola, Viveiros de Castro, Meillassoux, and their so-called ontological turn. *Hau: J Ethnogr Theory* 2014; 4(suppl. 1): 331–355.
23. Argueta A. Los saberes P’urhépecha. Los animales y el diálogo con la naturaleza. México: Gobierno del Estado de Michoacán. Michoacán; 2008.
24. Barrera-Bassols N. Etnoedafología P’urhépecha. *México Indígena*. 1988;24(Suppl. 4):47–52.
25. Argueta A. Los P’urhépecha. Etnografía contemporánea de los pueblos indígenas de México. Región centro. México: Instituto Nacional indigenista; 1995.
26. Pollard H. The tarascan empire. Possclasic social complexity in western Mexico. In: Nichols D, Pool C, editors, *The oxford handbook of mesoamerican archaeology*. Oxford: Oxford University Press. 2012a. p. 434–448.
27. Alcalá, J. Relación de las ceremonias y ritos y población y gobierno de los indios de la provincia de Michoacán. México: Balsas Editores; 2000.
28. Malmstrom V. Geographical origins of the tarascans. *Geogra Rev*. 1995. <https://doi.org/10.2307/215553>.
29. Pollard H. Del corazón imperial a la periferia colonial. La cuenca del Lago de Patzcuaro, 1400–1800. In: Enkerlin L, editor. *Abiendo caminos. El legado de Joseph Benedict Warren en la historia y a la lengua de Michoacán*. Morelia: Instituto Nacional de Antropología e Historia 2012b. p. 219–239.
30. Espejel C. Los tarascos. In: León-Portilla M, editor. *Historia documental de México 1*. México: Universidad Nacional Autónoma de México; 2017. p. 315–64.
31. Pollard H. Un modelo para el surgimiento del estado Tarasco. In: Williams E, López L, Esparza R, editors. *Las sociedades complejas del occidente de México en el mundo mesoamericano*. Zamora: El colegio de México; 2009. p. 225–53.
32. Pollard H. Markets, tribute, and class in Tarascan commodity consumption: the Lake Pátzcuaro Basin. *Americae*. 2017; suppl. 2:1–22.
33. Manin A, Pereira G, Lefèvre C. El uso de los animales en una ciudad tarasca posclásica: estudio arqueozoológico del sitio de Malpaís Prieto (Michoacán, México). *Revista Archaeobios* 2015. suppl.1: 28–42.
34. El PH. imperio tarasco en el mundo mesoamericano. *Relaciones Estudios de historia y sociedad*. 2004;25(suppl. 99):115–45.
35. Martínez R. Dioses propios y ajenos: deidades patronas y realeza sagrada entre los purépechas del siglo XVI. *Revista Española de Antropología Americana*. 2008;39(suppl. 1):53–76.
36. Monzón C. Los principales dioses tarascos: un ensayo de análisis etimológico en la cosmología tarasca. *Relaciones*. 2005;104(suppl. 26):138–68.
37. Acuña R. Relación geográfica de Cuiseo [Cuitzeo] de la Laguna. In: Acuña R, editor. *Relaciones geográficas del siglo XVI: Michoacán, México*. CDMX: UNAM-IA; 1987. p. 85–6.
38. Argueta A, Castilleja A. Las uauapu en la vida de los p’urhépecha o tarascos de Michoacán. *Relaciones Estudios de historia y sociedad Suppl*. 2012;33(131):283–320.
39. Castilleja A, Argueta A. Los jóvenes panaleros de Cherán. In: Pérez M, Valladares L, editors. *Juventudes indígenas, de hip hop y protesta social en América Latina*. México: INAH; 2014. p. 99–130.
40. Brandes S. Ritual eating and drinking in Tzintzuntzan: a contribution to the study of mexican foodways. *West Folk*. 1990;49(Suppl 1):63–175.
41. Gilberti M. *Vocabulario en lengua de Mechuacan*. México: Centro de Estudios de Historia de México, 1990.
42. Martínez S, Rosalinda M, Méndez A, y Tomás E. *Recetario de las atápa-kuas purépechas*, No. 37. *Cocina Indígena y Popular*. Conaculta. 2004. No. 37.
43. Ojeda L, Dávila C. La cocina tradicional indígena de Michoacán. *Diálogo*. 2015;18(suppl. 1):47–66.
44. Oseguera D. El maíz en la cocina michoacana: vigencia del legado purhépecha. *Revista de Geografía Agrícola* 2008; suppl. 47: 7–16.
45. Brito E. Symbolism and use of maize in pre-hispanic and colonial religious imagery in Mexico By Eva Leticia Brito Benítez. *E-conservation journal*; 2014. p. 116–128.
46. Rendón S. La alimentación tarasca. *Anales del Museo Nacional de México*; 1947(suppl. 2): 207–228.
47. Urrieta L. Familia and comunidad-based saberes: learning in an indigenous heritage community. *Anthropol Educ Quaterly*. 2013;44(suppl. 3):322–34.
48. Armillas P. Notas sobre sistemas de cultivo en Mesoamérica; cultivos de riego y humedad en la cuenca del Río de las Balsas. *Anales Del Instituto Nacional De Antropología E Historia*. 1949;6(Suppl. 3):85–113.
49. Fisher C, Pollard H, Israde-Alcántara I, Garduño-Monroy V, Banerjee S. A reexamination of human-induced environmental change within the Lake Pátzcuaro Basin, Michoacan, Mexico. *PNAS*. 2003;100(Suppl. 8):4957–62.
50. Endfield G, O’Hara S. Degradation, drought, and dissent: an environmental history of colonial Michoacán, West Central Mexico. *Ann Assoc Am Geogr*. 2010;89(suppl. 3):402–19.
51. García C. La cocina en Charapan. La cocina purépecha en Charapan. *Espacio femenino*, México: Tsimarhu Estudio de Etnólogos. 2013.
52. Iturriaga Y. Reflexiones sobre la cocina tradicional mexicana y la UNESCO. *Archipielago*. 2010;19(Suppl. 70):57.
53. Iturriaga Y. Reflexiones sobre la cocina tradicional mexicana y la UNESCO. *Archipielago Revista Cultural de Nuestra América*. 2010;18(70):57–9.
54. La KR. comida en Tzintzuntzan, Michoacán: tradiciones y transformaciones. In: Long J, editor. *Conquista y comida: consecuencias del encuentro de dos mundos*. México: Universidad Nacional Autónoma de México; 2019. p. 365–95.
55. Foster G. *Empire’s children. The people of Tzintzuntzan*. México: Imprenta Nuevo.1948.
56. García J. José Inés Chávez García, ¿Rebelde, bandido social, simple bandolero o precursor de los cristeros? *Hist Mex*. 2010;60(suppl. 2):833–95.
57. Barrera-Bassols N. *Ecogeografía* In: Toledo V, Álvarez Icaza P, Ávila P, editors. *Plan Pátzcuaro 2000: investigación multidisciplinaria para el desarrollo sostenido*. México: Fundación Friedrich Ebert; 1992. p.11–36.
58. Garibay C, Bocco G. *Cambios de uso del suelo en la meseta Purépecha (1976–2005)*. México: Secretaría de Medio Ambiente y Recursos Naturales. 2011.
59. Toledo VM, Barrera- Bassols N. *Ecología y desarrollo rural en Pátzcuaro*. México. México: Instituto de Biología. UNAM; 1984.
60. Resendi S, Celi C. Organización económica de los tarascos. In: Mendieta L, editor. *Los tarascos; monografía histórica, etnográfica y económica*. México: Imprenta universitaria; 1940. p. 235–71.
61. Toledo VM, Caballero J, Mapes C, Barrera-Bassols N, Argueta A, Nuñez M. Los purépechas de Pátzcuaro: una aproximación ecológica. México: SEP. Dirección General de Culturas Populares. 1980.
62. Argueta A, Castilleja, A. Conocimientos y tecnología p’urhépecha sobre la pesca en el Lago de Pátzcuaro, en: Florescano, E. y Sánchez, G. (coords.). *El pescado blanco, en la historia, la ciencia y la michoacan*. México, Gobierno de Michoacán y Universidad Michoacana; 2018. p. 185–225.
63. Motte-Florac E. Le maíz chez les p’urhépecha de Sierra Tarasca (Michoacan, Mexique). *Cahiers du lacito* 1988; (Suppl. 3): 3–80.
64. Argueta A, Ramírez A, Alonso P. El maíz en la cultura Purhépecha de Michoacán. México: Cuadernos 22. *Culturas Populares-SEP*; 1982.
65. El MC. maíz entre los purhépecha de la cuenca del lago de Pátzcuaro, Michoacán. *México América indígena*. 1987;47(Suppl 2):345–79.
66. Rendón S. La alimentación tarasca. In: González L, Blanco C, editors. *Michoacán a la mesa*. México: Colegio de Michoacán. Michoacán; 1996.
67. Caballero J. Notas Sobre el Uso de los Recursos Naturales entre los Antiguos Purhepecha de la Cuenca del Lago de Pátzcuaro, Michoacán. *Biótica* 1982;7(1):31–42.
68. Gorenstein S, Pollard H. *The tarascan civilization: a late prehispanic cultural system*. Nashville: Vanderbilt University; 1983.
69. Tapia J. Alimentación y cambio social entre lo purhépechas. *Relaciones* 1989; 37(suppl.10): 563–616.

70. Méndez R, Martínez S. Recetario de Pescado, aves y otros animales de la región lacustre de Pátzcuaro, Michoacán. *Cocina Indígena y Popular*. México: Conaculta. 2005. No. 55.
71. González-Rivadeneira T, Argueta A. En Cherán nadie se muere de hambre: aportes de la etnobiología a la seguridad alimentaria. *Espacio Regional*. 2016;1(suppl. 13):81–93.
72. González-Rivadeneira, T. Sistema de alimentación de la comunidad P'urhépecha de Cherán: un enfoque a partir de la etnobiología evolutiva. Tesis para obtener el título de Maestra en Estudios Mesoamericanos. UNAM. 2016.
73. Caballero J, Mapes C. Gathering and subsistence patterns among the P'urhépecha Indians of México. *J Ethnol*. 1985;5(1):31–47.
74. Farfán-Heredia B, Casas A, Moreno-Calles A, García-Frapolli E, Castilleja A. Ethnoecology of the interchange of wild and weedy plants and mushrooms in Phurépecha markets of Mexico: economic motives of biotic resources management. *J Ethnobiol Ethnomed*. 2018;14(1):1–19.
75. Mapes C, Toledo VM, Barrera N, Caballero C. La agricultura en una región indígena: la Cuenca del lago de Pátzcuaro. In: Rojas T, editors. *Agricultura Indígena, Pasado y Presente*. CIESAS, México; 1994. p. 275–341.
76. Núñez M. La agricultura tradicional de la cuenca de Pátzcuaro, Michoacán. México: Centro de Estudios Sociales y Ecológicas; 1989.
77. González-Rivadeneira T, Argueta A. De la forêt à l'assiette, les connaissances traditionnelles sur les champignons comestibles de la communauté P'urhépecha de Cherán K'eri. *Revue d'ethnoécologie* 2018;suppl. 13:1–20.
78. Castro-Sánchez E, Moreno-Calles A, Meneses-Eternod S, Farfán-Heredia B, Blancas J, Casas A. Management of wild edible fungi in the Meseta Purépecha region, Michoacán, México sustainability. *Suppl*. 2019;11:1–16.
79. Pollard H. Ecological Variation and Economic Exchange in the Tarascan State. *Am Ethnol*. 1982;9(suppl 2):250–68.
80. Harvey W. In defense of eucuaros and biodiversity in a Purhépecha community, Michoacán. *Mexico Corpus*. 2016;6(suppl. 2):1–24.
81. SIAP, Información Agrícola del maíz 1994-202019. Sistema de Información Agroalimentaria y Pesquera, Secretaría de Agricultura y Desarrollo Rural, México. 2021. siap.gob.mx. Accessed 04 April 2022.
82. T-MEC. 2020. Textos finales del Tratado entre México, Estados Unidos y Canadá (T-MEC). Versiones contenidas en el Decreto Promulgatorio del T-MEC. Gobierno de México. 2020. www.gob.mx. Accessed 04 April 2022.
83. Biles J. Tratado entre México, Estados Unidos y Canadá (T-MEC), un Nafta 2.0 en la era Trump: implicancias geopolíticas en la crisis global. 2019. <http://sedici.unlp.edu.ar/handle/10915/110159>. Accessed 04 Apr 2022.
84. Espinosa, A. El T-MEC pone en riesgo al maíz mexicano: Espinosa. *Sputnik News*, alcanzadoelconocimiento.com. 2019. Accessed 04 Apr 2022.
85. Cámara de Diputados. Ley federal para el Fomento y Protección del Maíz Nativo. 2020. https://www.diputados.gob.mx/LeyesBiblio/pdf/LFFPMN_130420.pdf. Accessed 04 Apr 2022.
86. López-Obrado A. DECRETO por el que se establecen las acciones que deberán realizar las dependencias y entidades que integran la Administración Pública Federal, en el ámbito de sus competencias, para sustituir gradualmente el uso, adquisición, distribución, promoción e importación de la sustancia química denominada glifosato y de los agroquímicos utilizados en nuestro país que lo contienen como ingrediente activo, por alternativas sostenibles y culturalmente adecuadas, que permitan mantener la producción y resulten seguras para la salud humana, la diversidad biocultural del país y el ambiente. SEGOB, Diario Oficial de la Federación. 2020 https://www.dof.gob.mx/nota_detalle.php?codigo=5609365&fecha=31/12/2020. Accessed 04 April 2022.
87. Astier M, Orozco-Ramírez Q, Walker R, Galván-Miyoshi Y, González-Esquivel C, Simmons C. Post-NAFTA changes in peasant land use-The case of the Pátzcuaro Lake watershed region in the Central-West México. *Land* 2020. *Suppl*.9(75): 1–11.
88. Ochoa A, Sánchez G. Michoacán. Historia Breve. FCE, Colmex. 2011.
89. Dietz G. La comunidad purhépecha como cultura híbrida: regionalizaciones y localizaciones de "lo indígena". *Diálogos Latinoamericanos* 2001. *Suppl*. 3: 3-42.
90. Farías A. Miradas etnográficas y representaciones de ciudadanía en jóvenes indígenas, migrantes purépechas de México. *Revista Temas Sociológicos* 2018; *Suppl*. 23: 187–214
91. Jasso I. La presentación de las identidades étnicas en espacios interculturales: la población purépecha de Michoacán, México. *Revista Intercultural Communication Studies*. 2012. 21 suppl.1: 23–35.
92. Himes A, Muraca B. Relational values: the key to pluralistic valuation of ecosystem services. *Curr Opin Environ Sustain*. 2018;35:1–7.
93. Descola P. Más allá de la Naturaleza y la cultura. In: Montenegro L, editor. *Cultura y Naturaleza*. Bogotá: Jardín Botánico de Bogotá. José Celestino Mutis. 2011. p. 267–294.
94. Latour B. We have never been modern. Cambridge, MA: Harvard University Press; 1993.
95. Viveiros de Castro E. Perspectival anthropology and the method of controlled equivocation in Tipití. *J Soc Anthropol Lowland South Am*. 2004;2(Suppl. 1):3–22.
96. Acosta A. Introducción. In: Daza E, Artacker T, Lizano R, editors. *Cambio climático, biodiversidad y sistemas agroalimentarios. Avances y retos a 10 años de la Ley Orgánica del Régimen de la Soberanía Alimentaria en Ecuador*. Quito: Abya-Yala; 2020. p.7–17.
97. De la Cadena M. Indigenous cosmopolitics in the Andes: conceptual reflections beyond "Politics." *Cult Anthropol*. 2010;25(Suppl 2):334–70.
98. Álvarez, P. y Garibay, C. Producción agropecuaria y forestal. In: Toledo V, Álvarez Icaza P, Ávila P, editors. *Plan Pátzcuaro 2000: investigación multidisciplinaria para el desarrollo sostenido*. México: Fundación Friedrich Ebert; 1992. p. 91–133.
99. Toledo V, Argueta A. Cultura indígena y ecología. En: Pátzcuaro 2000: investigación multidisciplinaria para el desarrollo sostenido editado por Toledo, V., Álvarez Icaza, P. y Ávila, P., México: Fundación Friedrich Ebert. 1992. p. 219–238.
100. Toledo VM, Argueta A. Naturaleza, producción y cultura en una región indígena de México: las lecciones de Pátzcuaro. In: Leff E, Carabias J, editors. *Cultura y manejo sustentable de los recursos naturales coordinado*. México: UNAM-CIIH; 1993. p. 413–43.
101. Gahman L. Food sovereignty in rebellion: decolonization, autonomy, gender equity, and the Zapatista solution. *Solutions*. 2016;7(suppl. 4):77–83.
102. Beals R. Cherán: un pueblo de la sierra tarasca. México. El Colegio de Michoacán; 1946
103. Velázco L. Agentes étnicos transnacionales: las organizaciones de indígenas migrantes en la frontera México-Estados Unidos. *Estudios Sociológicos*. 2002;20(suppl. 2):335–69.
104. Rocillo-Aquino Z, Cervantes-Escoto F, Leos-Rodríguez JA, Cruz-Delgado D, Espinoza-Ortega A. What is a traditional food Conceptual evolution from four dimensions. *J Ethn Food*. 2021. <https://doi.org/10.1186/s42779-021-00113-4>.
105. Svampa M. Antropoceno. *Lecturas globales desde el Sur*. Argentina: Editorial Cartonera de la Facultad de Filosofía y Humanidades de la Universidad Nacional de Córdoba. 2019.
106. Haraway D. Ciencia, cyborgs y mujeres La reinención de la naturaleza. España: Gráficas Rógar. 1991.
107. Altieri M, Nicholls C. Agroecología y resiliencia al cambio climático principios y consideraciones metodológicas. In: Altieri M, Nicholls C, editors. *Agroecología y cambio climático. Metodologías para evaluar la resiliencia socioecológica en comunidades rurales*. Lima: Redagres; 2013. p. 7–20.
108. Hake S, Ross-Ibarra J. The natural history of model organisms: genetic, evolutionary and plant breeding insights from the domestication of maize. *eLife* 2015; *Suppl* 4:1–8
109. Hartigan J. Care of the species. *Races of corn and the science of plant biodiversity*. Minneapolis: University of Minnesota Press Minneapolis. 2017.
110. Jones O, Cloke P. Non-Human Agencies: Trees in Place and Time. In: Knappett C, Malafouris L, editors. *Material Agency. Towards a Non-Anthropocentric Approach*. Springer. 2012.
111. Karaosmanoğlu D. How to study ethnic food: senses, power, and intercultural studies. *J Ethn Food*. 2020;7(Suppl):11.

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