Wild Edible Mushroom Lore in a Suburban Mestizo Community

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ABSTRACT
Objective: To record the mycological lore related to wild edible mushrooms (WEM) in Santa Ana Jilotzingo, a mestizo rural community greatly influenced by the urban area of Mexico City.
Design/Methodology/Approach: Unstructured and semi-structured interviews were conducted over the course of three years.
Results: Sixty-six WEM species were recorded. Ninety-one traditional names were documented: 65 Spanish names, 3 Nahuatl names, 4 mixed names, and 19 indeterminate names. Local gatherers have a precise knowledge of the biology, ecology, and distribution of the used species; the knowledge preserved by older people is more diverse and accurate. Nowadays, gathering WEM in the rainy season has lost its relevance as an economic activity. However, WEM foraging as a livelihood food supplement remains important for the community.
Study Limitations/Implications: The 2020 pandemic hindered the field work.
Findings/Conclusions: In the study area, relevant mycological lore still survives despite complex adverse conditions, such as acculturation, migration, and deforestation.

Keywords: ethnomycology, macromycetes, nomenclature, urbanization.

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INTRODUCTION

Wild edible mushrooms (WEM) are a non-timber forest resource of great value and relevance worldwide, thanks to their ancestral use as food, medicine, and sacred elements. Mexico has the second largest mycocultural heritage in the world, and its lore and exploitation have been of paramount relevance for the survival of Mesoamerican pre-Hispanic cultures. Nowadays, WEM continue to be an important cultural element for various indigenous and mestizo communities. More than 450 species are consumed in the country, and they are known by over 5,000 traditional names (Pérez-Moreno *et al.*, 2020). The analysis of the fungal-community relation in Mexico has focused mainly on ethnic groups. In contrast, their use in Mestizo populations settled in rural areas strongly influenced by urbanization has received little attention. These conurbation areas

experience several problems, including acculturation, deforestation, changes in land use, and biodiversity loss. These situations have caused strong transformations in the natural environment cosmovision of these populations and, consequently, in the use of their natural resources, including the loss of mycological lore (Ruan-Soto, 2018). Therefore, the objective of this study was to record, describe, and analyze the WEM lore of the inhabitants of Santa Ana Jilotzingo, a Mestizo community from a rural area strongly influenced by the northwestern urban area of Mexico City.

MATERIALS AND METHODS

Study Area

Santa Ana Jilotzingo, municipality of Jilotzingo, State of Mexico (19° 25' 59" and 19° 33' 26" N and 99° 19' 56" and 99° 28' 25" W) (Figure 1) has a predominantly temperate sub-humid climate, with summer rains C(w), according to the modifications made by García (1973) to the classification developed by Köpen. The forest represents most of the territorial extension (67.56%), with an altitude of 2,400 to 3,700 m a.s.l., with 12.48%, 5.53% and 4.41% of the areas dedicated to agriculture, pasture, and urban use, respectively. The municipality has a population of 19,877 inhabitants. The community of Santa Ana Jilotzingo has 998 inhabitants, 509 of which are women and 489 are men (INEGI, 2020).

Ethnomycological Method

The field study was conducted from June to December 2012 and 2014 to 2020. The municipal authorities were contacted to inform them of the purpose of the research and obtain their authorization. Subsequently, local collaborators were selected for the research using the snowball sampling technique (Sandoval, 2002). During the participant observation and ethnomycological surveys, unstructured and semi-structured interviews were conducted. Nine key collaborators and 45 randomly selected persons were interviewed (n=54). The semi-structured interviews were based on a guide of questions that sought to obtain information related to the traditional names, phenology, biology, ecology, mushroom concept, culinary practices, and WEM lore transmission. The transcriptions of the interviews were the basis of the data analysis, and the comparative method was applied.

Species Collection and Identification

Sporomes were collected with preferential sampling based on the knowledge of key collaborators. Routine mycological techniques were used for the fungal taxonomic identification, based on macro- and microscopic characteristics, and using specialized keys. The specimens were taken to the IZTA herbarium of the FES Iztacala, UNAM.

RESULTS AND DISCUSSION

Sixty-six species of edible wild mushrooms were recorded, out of which 59 can be classified as terricolous, 4 as lignicolous, 1 as fungicolous, and 2 as both lignicolous and terricolous (Figure 2). Ninety-one traditional names were documented: 65 Spanish names,

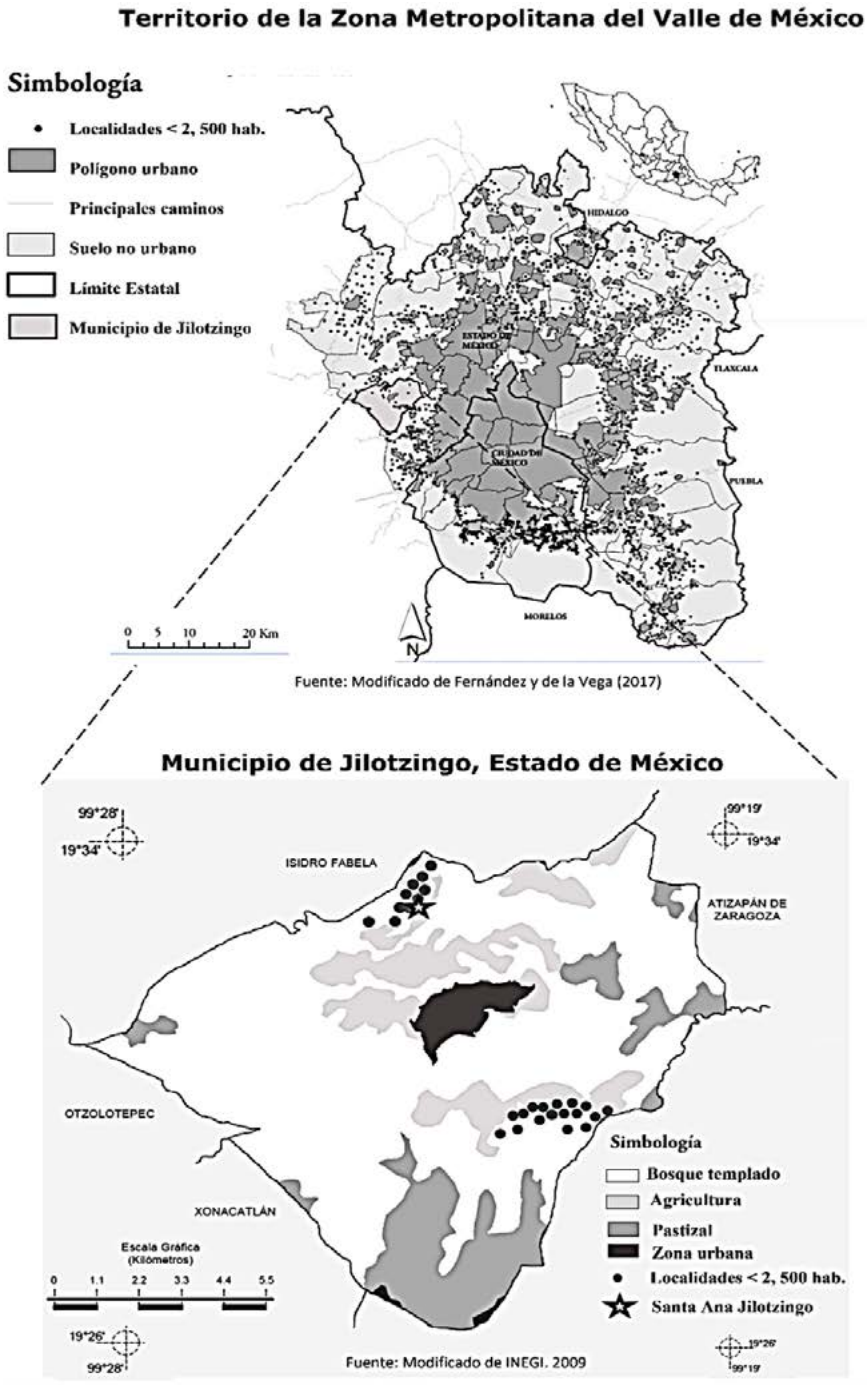

Figure 1. Location of Santa Ana Jilotzingo, Jilotzingo, State of Mexico, modified from the original figure developed by INEGI (2009).

3 Nahuatl names, 4 mixed names (a combination of Nahuatl and Spanish names), and 19 indeterminate names, with unspecified origin (*e.g.*, *chamacuero* or *solis*).

WEM belonged to three trophic groups: 53 ectomycorrhizal, 12 saprophytic, and 1 parasitic (Table 1). The number of species and traditional names reported in this study

Figure 2. Wild edible mushrooms consumed in Santa Ana Jilotzingo: a) *Lactarius deliciosus* (enchilado=seasoned with chili); b) *Ramaria* sp. (patita de pájaro=bird's little leg); c) *Phaeoclavulina* sp. ("ixlitos"); d) *Clavulina cinerea* ("ixlitos"); e) *Amanita vaginata* ("comal"); f) *Hypomyces lactifluorum* (trompa de cochino=pig's trunk); g) *Clavariadelphus truncatus* (chichi de vaca=cow udder); h) *Gyromitra infula* ("chamacuero"); and i) *Amanita* aff. *novinupta* ("solis").

represent a greater biocultural abundance than other areas of central Mexico (Domínguez-Romero *et al.*, 2015; Montoya *et al.*, 2019). Forty-nine percent of the 99 traditional names documented in Santa Ana Jilotzingo belong to simple primary names given by the shape of some object, such as *comales* (griddle), *panalito* (honeycomb), *mazorca* (corncob), or

Table 1. Species of wild edible mushrooms known to the community of Santa Ana Jilotzingo.

Species name	Trophic group	Habitat	Phenology	Associated vegetation	Traditional name	
Agaricus campestris (L.) Fr.	SA	TE	Jun-Jul	Grassland	Hongo de San Juan (ES) Sanjuanero (ES) Sanjuanes (ES)	
Albatrellus ellisii (Berk.) Pouzar	EC	TE	Sep-Oct	BQ	Carda (ES)	
Amanita aff. *novinupta*	EC	TE	Aug-Sep	BA	Mantecoso (ES) Tuetanillo (ES)	
Amanita rubescens Pers.	EC	TE	Aug-Oct	BP-A/BQ	Solis (IN)	
Amanita basii Guzmán & Ram-Guill.	EC	TE	Jul-Sep	BA	Amarillo (ES) Yema – Yemita (ES) Tecomate (NA) Quishimon-Quishimones (IN)	
Boletus smithii Thiers	EC	TE	Aug-Oct	BA	Bonsha (IN) Bonshon (IN) Cema de madroño (ES) Queta de madroño (IN)	Semas o Quetas
Boletus aestivalis Peck.	EC	TE	Aug-Oct	BA-P/BP	Cema blanca (ES) Queta blanca (IN) Cema de oyamel (ES) Queta de oyamel (IN) Cema de ocote (IN) Queta de ocote (IN)	
Retiboletus griseus (Frost) Manfr.	EC	TE	Aug-Nov	BQ	Cema de encino (ES) Queta de encino (IN)	
Leccinellum rugosiceps (Peck)	EC	TE	Sep-Nov	BQ/BQ-P	Cema de escoba (ES) Queta de escoba (IN)	
C. aff. *tabernensis* *Cantharellus* sp.	EC EC	TE TE	Aug-Oct Aug-Oct	BQ BA	Duraznillo (ES) Pericón (ES)	
Clavariadelphus pistillaris L. ex Fr *Clavariadelphus truncatus* Donk	EC EC	TE TE	Aug-Sep Aug-sep	BQ BQ	Chichi de vaca (MI) Lágrimas (ES)	
Clavulina cinerea (Bull.) J. Schröt. *Clavulina cristata* (Holmsk.) J. Schröt. *Phaeoclavulina* sp.	SA SA EC	TE TE/LI TE	Aug-Sep	BA-P BA-P BP	Isles-Islitos (IN) Ixlitos (NA)	
Collybia dryophila (Bull.) P. Kumm.	SA	TE	Jul-Sep	BP	Shorita o Chorita (IN)	
Gyromitra infula (Schaeff.) Quél.	SA	TE/LI	Jul-Sep	BA-P	Chamacuero (IN)	
Helvella crispa (Scop.) Fr.	EC	TE	Jul-Sep	BA	Gachupín (ES)	
Helvella elastica Bull.	EC	TE	Jul-Sep	BA	Comedia (ES)	
Helvella lacunosa Afzel	EC	TE	Aug-Oct	BP/BA	Cabeza negra (ES) Negritos (ES) Señoritas (ES)	
Hygrophoropsis aurantiaca (Wulfen) Maire	SA	LI	Jul-Sep	BA	Falso duraznillo (ES)	
Hygrophorus chrysodon (Batsch)	EC	TE	Jul-Sep	BQ-P	Patriota (ES)	
Hypomyces lactifluorum (Schwein.) Tul. & C. Tul.	PA	FU	Aug-Sep	BA	Orejas rojas (ES) Trompa de cochino (MI)	Orejas
Lactarius aff. *indigo*	EC	TE	Aug-Sep	BQ	Orejas azules (ES) Añil (ES) Azul (ES)	
Russula brevipes Peck	EC	TE	Jul-Sep	BA-P	Orejas blancas (ES) Motico (IN)	

Table 1. Continues...

Species name	Trophic group	Habitat	Phenology	Associated vegetation	Traditional name	
Infundibulicybe gibba (Pers.)	EC	TE	Aug-Oct	BP	Tejamanil de ocote (MI) Tablita de ocote (ES)	Tejamanil o Tablitas
Infundibulicybe squamulose (Pers.)	EC	TE	Aug-Oct	BA-P	Tablita de oyamel (ES) Tejamanil de oyamel (MI)	
Lactarius deliciosus (L.: Fr.) Gray	EC	TE	Jul-Sep	BA-P	Enchilados (ES)	
Bovista fusca Lév. *Lycoperdon perlatum* Pers. *Lycoperdon* sp. 1 *Lycoperdon* sp. 2	SA SA SA SA	TE TE TE TE	Sep-Nov Aug-Sep Aug-Sep Aug-Sep	BA BA/BP BA BA	Pedos de burro (ES) Burundanga (ES)	
Lyophyllum decastes (Fr.) Singer *Lyophyllum* sp.	EC EC	TE TE	Jul-Sep Jul-Sep	BQ BQ/BQ-P	Hongo de Lobo (ES) Clavito (ES) Quinguimu (IN) Quishimones (IN) Amontonado (ES)	
Amanita vaginata (Bull.: Fr.) Vitt. *Melanoleuca grammopodia* (Bull.) Murrill *Melanoleuca* sp.	EC EC EC	TE TE TE	Aug-Sep Sep-Oct Ago-Sep	BA BP/BA-P BQ-P	Comal-Comalito (NA)	Comales
Morchella angusticeps Peck *Morchella esculenta* (L.) Per	EC EC	TE TE	Oct-Dec Oct-Dec	BA BA	Panalito (ES) Mazorca (ES) Pancita (ES)	
Neoboletus sp.	EC	TE	Sep-Oct	BA-P	Galambo (IN)	
Pleurotus sp.	EC	LI	Sep	BQ-P	Seta de madera (ES) Hongo de maguey (ES)	Patitas o pies de pájaro
Ramaria araiospora var. *araiospora* Marr & D.E. Stuntz	EC	TE	Sep	BQ/BQ-P	Pata-Patita de pájaro (ES) Pie de pájaro roja (ES)	
Ramaria cystidiophora Marr & D.E. Stuntz	EC	TE	Aug-Oct	BQ	Pata-Patita de pájaro de anís (ES) Pie de pájaro de anís (ES)	
Ramaria fennica (P. Karst.) Ricken	EC	TE	Aug-Sep	BQ-P	Pata de pájaro morada (ES) Pie de pájaro morada (ES)	
Ramaria flava (Schaeff.) Quél.	EC	TE	Aug-Oct	BQ	Pata-Patita de pájaro amarilla (ES) Pie de pájaro amarilla (ES)	
Ramaria rubiginosa Marr & D.E. Stuntz	EC	TE	Aug-Sep	BA-P		
Ramaria sp. 1	EC	TE	Aug-Sep	BA-P		
Ramaria sp. 2	EC	TE	Aug-Sep	BQ		
Ramaria flavigelatinosa Marr & D.E. Stuntz	EC	TE	Aug-Sep	BQ	Tembloroso (ES)	
Ramaria rasilispora var. *rasilispora* Marr & D.E. Stuntz *Ramaria* sp. 3	EC EC	TE TE	Aug-Oct Aug-Oct	BQ BQ-P	Pata-Patita de pájaro blanca (ES) Pie de pájaro blanca (ES)	
Ramaria rubricarnata var. *rubricarnata* R. *Ramaria* sp. 4 *Ramaria* sp.5	EC EC SA	TE TE LI	Aug-Sep Aug-Sep Aug-Oct	BA BQ BA-P	Pata-Patita de pájaro naranjada (ES) Pie de pájaro naranja (ES)	
Russula violacea *Russula* coff. *fragantissima* *Russula* sp. 1	EC EC EC	TE TE TE	Aug-Oct Aug-Oct Aug-Oct	BA-P BQ-P/BA-P BA	Hongo de madroño (ES)	
Strobilomyces sp.	EC	TE	Aug-Oct	BQ	Carbonera (ES)	

Table 1. Continues...

Species name	Trophic group	Habitat	Phenology	Associated vegetation	Traditional name
Suillus pseudobrevipes A.H. Sm. & Thiers	EC	TE	Aug-Sep	BA-P	Babosos (ES)
Tremella mesenterica Retz.	SA	LI	Aug-Sep	BA	Shoron (IN)
Tricholoma cf. *fulvum* (DC.) Bigeard & H. Guill	EC	TE	Aug-Sep	BA	Hongo de oyamel (ES) Amargos (ES)
Tricholoma aff. *flavovirens*	EC	TE	Aug-Sep	BA	Hongo de venado (ES)
Tricholoma sp.	EC	TE	Aug	BQ-P	Hongo de venado blanco (ES)
Turbinellus floccosus (Schwein.) *Turbinellus kauffmanii* (A.H. Sm.) *Giachini*	EC EC	TE TE	Aug-Sep Sep	BA BA	Cotixe (IN) Corneta-Cornetitas(ES) Trompeta-Trompetita (ES)

Trophic groups: EC: ectomycorrhizal; PA: parasitic; SA: saprotrophic. Habitat: TE: terricolous; LI: lignicolous; and FU: fungicolous. Phenology: Jul: July; Aug: August; Sep: September; Oct: October; Nov: November. Vegetation type: BQ: *Quercus* forest; BP: *Pinus* forest; BQ-P: *Quercus-Pinus* forest; BA: *Abies* forest; and BA-P: *Abies-Pinus* forest. Traditional names: ES: Spanish; NA: Nahuatl; IN: indeterminate; and MI: mixed.

corneta (funnel). Thirty-five percent are secondary names related to various similar species, grouped in ethnotaxa; the first lexeme indicates the group to which it belongs (buns, ears, *tejamanileros*, or *tablitas*) and the second lexeme differentiates the species based on their color or their associated vegetation (white, oyamel, ocote, or oak buns).

The community's gatherers conceive mushrooms as organisms whose characteristics clearly differentiate them from plants and animals. Three main ideas were recorded regarding the origin of mushrooms: a) spontaneous generation; b) propagation from other fungal structures; and c) presence of a seed in the soil. Gatherers believe that the main environmental conditions favorable for the mushrooms' development are humidity, temperature, light, soil, organic matter (leaves, needles, or wood), and associated vegetation. Likewise, mushrooms are divided into two major groups: a) "those above" which grow at higher altitudes in the *Abies religiosa-Pinus* spp. forests; and b) "those below" which grow at lower altitudes in the pine-oak forests (*Pinus* spp. and *Quercus* spp.). Additional areas are recognized in coarse grass and pasture or the plains. Gatherers have a very accurate knowledge of the phenology of the species throughout the year.

WEM are mainly collected to supplement human diet and to generate extra income for the families. According to testimonies, the community still practices recreational, opportunistic, and intensive harvesting, although less frequently than in previous decades. Intensive harvesting is mainly focused on sales and self-consumption and is mostly in charge of *hongueras* and *hongueros* (mushroom gatherers) who, alone or with their families, travel long distances and spend several hours seeking edible mushrooms to ensure that the greatest number of species are collected. Sales in the area are limited to a small number of people, who do not consider themselves as mushroom gatherers; these sales are made on demand or by offering any available mushrooms to their acquaintances. People from Santa Ana Jilotzingo who provide tourist services on Saturdays and Sundays at the Capoxi dam also sell WEM and offer fresh and stewed mushrooms.

The following nine common ways of cooking WEM were recorded:

1. Roasted with salt on a griddle or on a grill.
2. As ingredients in broths or soups, seasoned with *epazote*.
3. Fried with *epazote*, onion, and garlic.
4. As ingredients in *quesadillas*.
5. Served with *mole*.
6. Cooked with eggs.
7. Battered and fried.
8. In pies.
9. Cooked in green sauce (with or without meat).

The lore transmission in the community under study occurs in several directions: vertically (from parents to children), horizontally (between individuals of the same generation, such as siblings, cousins or couples), and obliquely (from one generation to another, without the need for a consanguineous relationship, *e.g.*, from parents-in-law, neighbors, friends or acquaintances). Lore is exchanged in the field, during the commercialization process, and in food preparation. In general, elders can identify a greater number of WEM, know their traditional names, and have more accurate information than younger people. This phenomenon has been documented in Santa Ana Jilotzingo as well as in other areas of the State of Mexico, where a decline in mycological lore has been recorded among the new generations, as a consequence of urbanization (Lara-Vázquez *et al.*, 2013).

CONCLUSIONS

Ethnomycological lore survives in the suburban mestizo community, mostly concentrated among the elders, despite the deep environmental and sociocultural changes that have taken place, including acculturation, deforestation, and changes in land use.

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