

Socio-environmental comparison in indigenous agricultural productive systems: Tontotuna, Totoró-Colombia and Tsotsil, Chamula-Mexico

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Abstract: A comparison of the conservation practices associated with the management of the family agricultural production system called the Trau Misak garden and the Patchocona garden is presented. In the indigenous peoples of the Tontotuna Reservation, Municipality of Totoró-Cauca-Colombia and the Tsotsil people, Municipality of Chamula-Chiapas-México, respectively. The methodology was framed in hermeneutics and was based on ethnobotany, interrelating the axes of time, space and culture. Given the holistic and complex nature of this research, ethnography and participatory action research were used with descriptive techniques for the dynamics of use and management of plant resources in Trau Misak and Patchocona'. The results present the comparative transformation strategies that are generated and used in Trau Misak and Patchocona', strengthening the identity of each indigenous people, facing the problems of survival and contributing to the reduction of hunger, by laying the foundations for food security.

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INTRODUCTION

Social systems are not independent from environmental systems; they depend, to a great extent, on biodiversity and the services that ecosystems provide (TOLEDO, 1991); that is why in current contexts it is still of great relevance to continue developing socio-environmental studies with clear objectives that allow a clearer understanding of participatory processes of reflection and decision-making of local communities in the dynamics of transformation of their territories, based on traditional knowledge and cultural practices, as in this case, generated in the Trau Misak and Patchocona', in their different contexts.

In addition to being one of the foundations of the dynamics of traditional agricultural systems (RINCÓN et al., 2014), the relationship of respect for nature and the quality of life of its inhabitants is directly linked to the environment and associated natural resource practices, through which local communities function as a whole. The traditional production unit, called Trau Misak family garden in the native language "Nam Trik", for the indigenous community of the Resguardo Tontotuna de Totoró, Colombia and the family garden or milpa or traspatio or Patchocona', for the Tsotsil people of Chamula, Mexico; is the main strategy of traditional family survival in both regions, where different cultural events occur and which (ZARAGOZA et al., 2006) calls them as environmental contributions for the indigenous nucleus and for other neighboring social groups.

In the living spaces of the indigenous territories that include the Trau Misak and Patchocona', there are situations of loss and deterioration in the conservation of plant resources and associated practices, due to climate variability, the increasing extractive activities that impact the availability of plant resources, the supply of environmental services that support traditional production systems and the livelihoods of local communities, which influence value systems, significance, ancestral knowledge and traditional practices. Inadequate soil use also causes soil impoverishment due to the shortening of crop rotation cycles because of the incorporation of potato monoculture for the Tontotuna and the increase of pesticides in the productive dynamics for the Tsotsil.

Hernández-X, (1981), defines a traditional agricultural system as one that is nurtured by the cultural heritage of an agricultural population, which incorporates the use of natural resources based on a long empirical experience; (MARIACA, 2012), recognizes the home garden as the concept used to refer to one of the most diverse and rich traditional agricultural systems that exist in the tropics; the (FAO, 2005), defines the home garden as a place where vegetables, vegetables, fruits, medicinal plants, edible herbs, timber trees and poultry are grown; (ARANGUREN; MONCADA, 2018), identify multifunctional family agricultural spaces as Chacras, which allow food security and sovereignty, the conservation of biological and genetic diversity, and the materialization of traditional indigenous knowledge specific to the Andean indigenous community of Fakcha Llakta Otavalo-Ecuador. In turn, (SANABRIA, 2001), identifies the huerta or Tul, for the Nasa indigenous people of Tierradentro, as a permanent space for family care, cultivated with several species of useful plants, generally herbaceous and shrubs, grown around the house in an area between 1/2 and 1 ha.

The family garden, in any of the denominations of each indigenous people, is a diversified and complex production system that goes beyond the agricultural or ecological scope, since it includes forestry, economic, social, cultural, educational, health and even psychological and spiritual aspects; aspects that must be addressed to understand the existing dynamics and the worldview that evolves in it, sometimes unnoticed or sometimes not feasible to understand.

Hernández-X, (1981) and Mariaca, R, (2012), indicate that the practices and the use of ancestral family agriculture strengthen the cultural systems underlying the established forms of social organization that are articulated on the basis of the common needs of the population. Ancestral wisdom allows local communities to know the diversity and variability of the climate and soil of the territory they inhabit and in the different thermal zones to know what to sow and when to do it and, above all, to make crosses of varieties and crop associations, in order to have a diverse harvest; which currently continues to be, in some local communities, the basis for survival.

The processes of continuity in the resistance and struggle for the territory, which are reflected in the community and cultural practices that indigenous peoples carry out on a daily basis to protect, conserve and strengthen their identity, traditional knowledge and cosmovision, among others, are some of the aspects associated with the permanence and relevance of the territories; characteristics that ultimately shape and guarantee their survival. The armed conflict, the usurpation of territories by settlers, landowners and other social groups, in addition to state policies that afflict them, are aspects against which these indigenous peoples struggle day by day and for which they have seen their ancestral right to the land, their traditions, culture and even the desire to return to their territories violated.

For the Tsotsiles, the milpa or *traspatio*, and for the Tontotuna, the vegetable garden or family garden next to the house, are places where changes in the different social, political and economic processes of the local communities are reflected. For example, it shows the degree of incidence of government institutions in recommending the planting of certain species brought from outside the territory, considered by both indigenous groups as foreign plants, such as *Fragaria sp* (strawberry) and *Physalis sp* (golden berry), and the lack of support for the cultivation of species planted since ancestral times denominated as their own plants, such as *Oxalis sp* (oca) and *Tropaeolum sp* (majua). In the case of the Tsotsil people, the crops of *Lycopersicon esculentum* (ribbed tomato), *Lycopersicon esculentum var. cerasiforme* (tomatillo), have been substituted due to changes in consumption patterns, which also reduce the planting of citrus fruits such as *Citrus sp* (lime and grapefruit) due to the increase in the bottled beverage trade; the increase in the use of agrochemicals and expensive industrialized machinery, which, supported by government programs, modifies cultivation techniques and generates indebtedness.

In these traditional agricultural systems, shared community work is strengthened, as well as the allocation of care actions and family time invested; strategies that are part of the transmission of traditional knowledge, which lead to the survival and conservation of the biodiversity of both their territories and the associated plant resources.

Geographic Context

General information Totoró-Cauca-Colombia

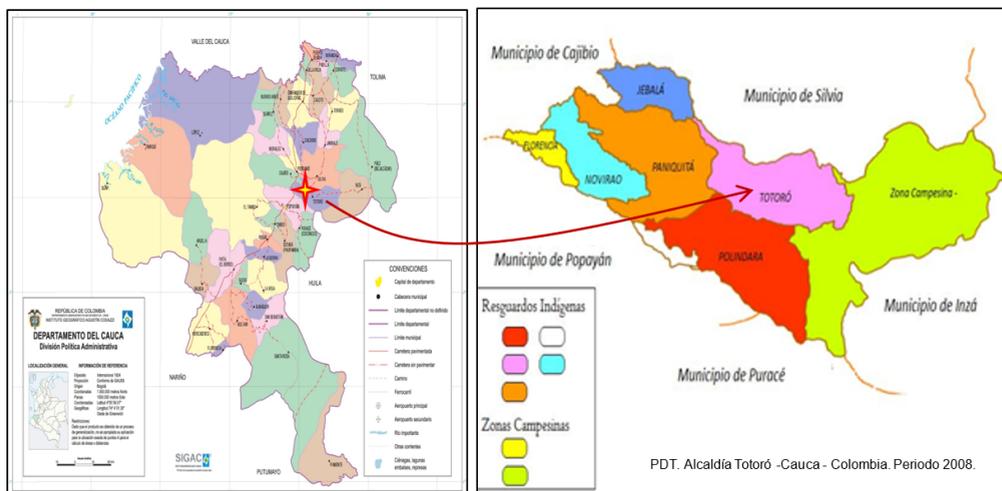
Totoró is a geographic region in the southwestern Colombian Andes, located in the core of the Colombian Massif; it comprises 42,198 hectares distributed among bioclimatic tiers ranging from sub-Andean to paramo ecosystems with an average temperature of 14°C and an average rainfall of 2,000 mm. It is located at 2° 38' north latitude and 2° 15' west longitude and 2,750 masl (CRC, 2009) (Illustration 1).

Since before the Conquest, the territory comprising the Totoró reservation was inhabited by the Páez ethnic group, made up of the Totoró, Novirao, Paniquita, Polindara and Jebalá families, who maintained cultural and labor relations with neighboring groups of the Coconuco, Guambiano (Misak) and Yanaconas peoples. During the colonial period, the Totoró managed to obtain the colonial title of 1630 from the Spanish crown in the Royal Court of Quito, which recognized the territory that is now known as the Totoró indigenous reservation (CRIC, 2010).

During the Independence period (1810-1819), the Totoró people, together with the indigenous communities of southern Cauca, Coconucos, Guambianos and Yanaconas, battled the Spaniards to protect their territories and cultures, but their resistance was overcome and they were forced to withdraw. The territories were used for the construction of large agricultural and cattle ranches, characteristic of the Territorial Development Plan (2008).

Towards the end of 1819, Totoró acquired the status of municipality and the current indigenous reserves in Totoró, Paniquita, Polindara, Jebalá and Novirao were consolidated.

Figure 1. Location of Totoró-Cauca-Colombia



Source: https://www.gifex.com/fullmap/2009-09-17-3/Mapa_de_America.html

According to the Ethnic and Cultural Safeguard Plan of the Tontotuna indigenous people (2011), the land is the natural mother of this people, the one that keeps the culture

alive, it contains the great riches that are protected, valued and cared for by the entire community such as water, animals, plants and trees.

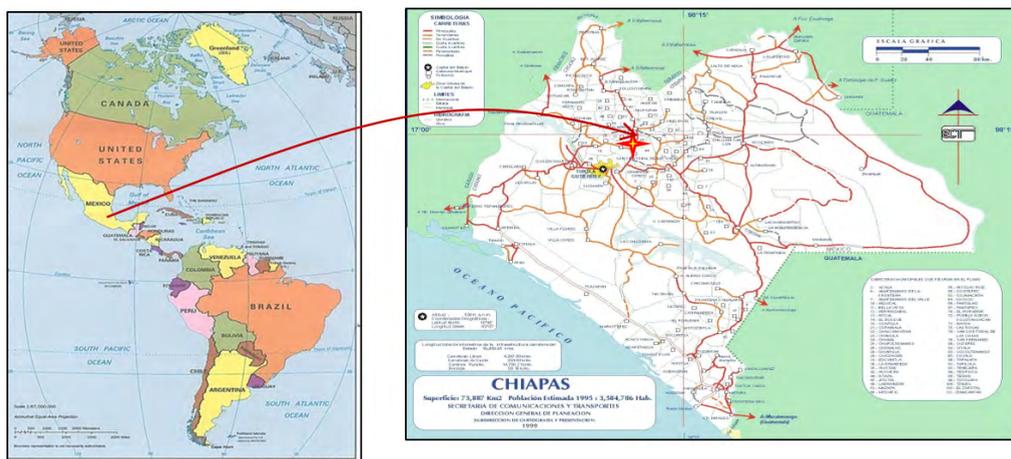
General information about the Chamula-San Cristóbal de Las Casas-Chiapas-Mexico region

San Cristóbal de Las Casas is located in the central highlands of the State of Chiapas, at 2,100 meters above sea level. Two thirds of its surface area are mountainous. The rest of the area is made up of endorheic basins, the relief is heterogeneous. To the north there is a mountainous area known as Sierra de San Cristobal; to the south there is the plateau of San Cristobal and between them, it is located the Sierra Madre de Chiapas. The climate is temperate and humid with an average annual temperature of 15 °C; the wet season runs from May to October. It is located in the geographic formation of the intermountain valley. Its altitude is 1,940 meters above sea level, located at 16° 44' 0' north latitude and 92° 38' 0' west longitude, (INEGI, 2010) (Illustration 2).

The municipality of Chamula is located in the geographic region known as Los Altos de Chiapas, with a high predominance of pine-oak forests in southeastern Mexico, a predominantly indigenous region with the highest percentage of indigenous population in the state (87%), 65% of whom are Tsotsil (CUADRIELLO et al, 2008). The municipality is located at 16°50' and 16°45' north latitude and 92°35' west longitude and its municipal center is located 8 km from the city of San Cristóbal de Las Casas, (INEGI, 2010).

The landscape is made up of vegetative associations that include pine and pine-oak forests, shrub acahuales and grasslands (GONZÁLEZ et al., 1996). During the last few decades, the forests have been deforested as a result of agriculture, cattle ranching and the extraction of timber products for both self-supply and commercialization (PARRA et al., 1993).

Figure 2. Localization of San Cristobal de las Casas-Chiapas-México



Source: https://www.gifex.com/fullmap/2009-09-17-3/Mapa_de_America.html

METHODOLOGY

The interdependence between the organizational and preparatory phases of the of the research, indicated how the integration of these two processes supported the exploratory phase, for the indigenous Resguardo of the Tontotuna people, Cauca-Colombia in the páramo ecosystem between the years 2015-2016 and for the Tsotsil people, Chamula, Chiapas-Mexico, in the pine and pine-oak ecosystems, for the second half of 2018. In the exploratory phase, the different territories were visited; there was interaction and agreement with the directives and representatives of the authorities that make up the Cabildo of the Tontotuna indigenous people, and in the case of the Tsotsil people, with the family nuclei.

The methodological approach was framed in the hermeneutic “Since the interpretation seeks the essence of social and human phenomena and generates new fields of meanings, allowing the identification of a scenario of symbolic appreciation as a relevant object of study based on the processes of understanding “ (GADAMER, 1977).” It was based on the factors that interrelate the axes of time, space and culture, and that according to (HERNÁNDEZ-X, 1981) comprises: (a) dialectical processes that are generated from the interrelation of environment and culture through the dimension of time, (b) an interdisciplinary field that includes the study and interpretation of knowledge, cultural significance and traditional uses of the elements of flora.

Given the holistic and complex nature of the research, there was the need to apply the interdisciplinary approach, where some ethnographic techniques were used, given that people’s perceptions of the territory determine their behavior in it. Participatory action research, as a methodological approach, helped to understand and value the social and cultural reality of the indigenous people. Thick description techniques, social mapping and epistemological, methodological and theoretical foundations facilitated the process to support the qualitative research model.

The methodological reflection was complemented with discursive analysis and inquiry, since the intentionalities constitute important traits that guide and help defining the methods in the search processes, theoretically based on the fact that the subject is an autonomous entity that not only understands itself, but also explains the world of the text according to its “being in the world”, according to (RICOEUR, 1981, 2003). In this regard, all narration is a construction of meanings, elaboration of significances, where the subject can differentiate between the events and the interpretation that can be made of them.

According to (GHENO-HEREDIA, 2010), oral history and life history, which is descriptive-interpretative-reflective, is a key tool to work on the itinerary of social and collective actors, which requires the researcher’s point of view to make the information obtained come alive and to recreate past contexts from his or her own experience and upon the complexity of these processes.

The articulation with the process of conservation of plant species present in the home garden-garden in both territories, allowed understanding the rationalities, practices and strategies of the indigenous groups on their environment; since the environmental transformation in the territories of Totoró and Chamula, have occurred fundamentally

by processes and actions not only ancestral, but by a population dynamics that alternates between the continuous and discontinuous, and that according to (MARTÍNEZ, 1989), are part of the socio-environmental, economic, cultural, political and symbolic relations of the indigenous peoples.

As a unit of analysis, the Trau Misak vegetable garden in the Tontotuna indigenous peoples and the Patchocona' vegetable garden in the Tsotsil people were identified as traditional agroecosystems, which are in close relationship with the environment and form an important part of the cosmovision of these indigenous peoples; they integrate the processes of conservation and recovery of their own vegetable resources and seeds. Some of their products are for self-consumption and/or family economy, while others are used to meet the demand of regional and national markets; several of their seeds are preserved in these agroecosystems and used to restore their traditional crops and for cultural ceremonies.

1. Methodological sequence:

1.1 Sociocultural characterization

The exploratory phase, where ethnographic tools allowed us to make a preliminary diagnosis of the context in which this research is framed. The activities were carried out with the prior informed consent of the Tontotuna and Tsotsil indigenous peoples. A dialogue was held with different members of the families involved in the maintenance of the Trau Misak orchard and the Patchocona' vegetable garden, guided by members of the respective indigenous peoples. We inquired from a historical perspective, based on their biocultural memory, knowledge and cosmovision about the territory, taking into account traditions and socio-environmental, cultural, economic and political relations.

1.2 Socio-environmental assessment.

It constituted the search for a broad understanding of the dynamics related to the Tontotuna and Tsotsil territory, from a socioecological perspective, as a basis for identifying the decision-making of local communities. The key attributes of the system that give identity to the territory were defined and became the basis for the dialogue and the integrality of values through narrative as an ethnographic method.

2. Botanical and ethnobotanical collections.

The crops found, in addition to being the basis of the families' diet, integrate elements of use, management and identity; agroecosystems were identified, and within these, the habitats considered locally as the Trau Misak vegetable garden and the Patchocona' orchard. We worked with 100 Tontotuna and 40 Tsotsil families; the interviews were later analyzed in the office, some in Nam Trik, Spanish and Tsotsil.

Forty-five botanical species and their varieties were collected in the Trau Misak orchards, whose botanical and taxonomic identification work was carried out by Professor Bernardo Ramírez, taxonomist of the Universidad del Cauca. The revised and identified specimens are kept in the CAUP Herbarium of the Universidad del Cauca. In the Patchocona' orchards, information was collected on 50 botanical species, and the

botanical identification was carried out through photographic records by the researcher Ramón Mariaca Méndez.

The ethnobotanical information was documented through informal unstructured interviews in places such as the vegetable garden, the orchard, the kitchen or the stove, washing places, agricultural work spaces, community halls and meeting rooms of both the Tontotuna Resguardo and the Tsotsil people. With the different Tontotuna and Tsotsil families we talked about the origin, forms of use, management, commercialization of the vegetable resources; selection and location of the site to cultivate, management, plants chosen for sowing, form of sowing, fertilizers used. These activities were mainly carried out by the women, since the men left early in the morning to carry out different businesses in local and regional markets.

3. Workshop with focus groups and local authorities. It allowed us to identify key people, elders, lobbyists, leaders, heads of households and their willingness to share their knowledge. It led us to understand what their roles are in relation to environmental services, how they relate to other actors in the territory, and at what levels these relationships occur, taking into account the fact that the roles, visions and motivations of the different actors change over time. Twenty and five community workshops were held for the Tontotuna Resguardo and the Tsotsil people, respectively.

RESULTS AND DISCUSSION

1. Introduction to the indigenous territorial dynamics present in the traditional orchard-gardens of Totoró-Cauca and San Juan Chamula-Chiapas.

Land ownership has played a determining role in the configuration of social relations in Latin America and Mesoamerica, the ethnographic research developed in the communities of the Tontotuna Indigenous Territory and the Tsotsil people, such as the traditional production system called traditional orchard and vegetable garden, recognized as Trau Misak and Patchocona', allowed the identification of this strategy adopted by these peoples, as one of the purposes to offer socio-environmental and economic alternatives to the western capitalist system that has historically been in power.

The Trau Misak orchard and the Patchocoana' orchard are cultivated and conserved as a strategy of survival and conservation of the resources associated with them. They are located near or next to the family house, mainly with the purpose of helping to safeguard not only the family food needs but the different small-scale crops of plants that are planted there.

In the Trau Misak gardens, 37 species of plants were recorded, including their varieties, from 12 families and 16 genera, which mainly include food resources. Regarding the management of the species, seven (7) categories of use were recognized: food (37), medicinal (9), forage (15), ritual (12), nitrogen fixer (10), living fence (9) and condiment (6).

Table 1 shows the frequency of cultivation, use and conservation status of the food resources associated with the Trau Misak orchard in the upper zone of the Tontotuna territory, which have been managed and conserved by generations over time.

Most of the plant resources are in a state of conservation (C): *Oxalis tuberosum* (white, red and purple goose), *Solanum andigenum* (caluncha potato), *Ullucus tuberosus* (pink, red and white ulluco), *Zea mays* (capiro, yellow, white capio, six-month, yearling and yucatan corn), *Phaseolus vulgaris* (vara bean), among others; likewise, all plant resources are being managed (M): *Oxalis tuberosum* (white, red and purple oca), *Solanum andigenum* (caluncha potato), *Tropaeolum tuberosum* (majua), *Zea mays* (capiro, yellow, yearling, six-month and yucatan corn), *Pisum sativum* (piquinegra pea), *Phaseolus vulgaris* (vara bean), *Brassica sp* (cabbage, purple and white cabbage) and *Raphanus sativus* (radish), among others.

Some plant resources are in the process of recovery (R), and although they are being conserved, their management has not been ongoing, so they are disappearing, particularly due to the scarce commercialization in both the Totoró and Popayán markets. Examples include *Oxalis tuberosum* (purple oca), *Solanum andigenum* (caluncha potato), *Ullucus tuberosus* (red and white ulluco), *Triticum aestivum* (wheat), *Zea mays* (yucatan corn), *Arracacia sp* (purple and white arracacha), and *Arracacia sp* (purple and white arracacha).

The dynamics of use and management of plant resources in both the Trau Misak orchard and the Patchocona' orchard have changed over time, but have always been part of the family units. This genetic patrimony is not attributed to an individual, but to a community that is represented by its cultural relations, solidarity, reciprocity and survival.

Similarly, Table 1 shows that many species share three established categories, such as *Oxalis tuberosum* (purple goose), *Zea mays* (Yucatan corn), *Ullucus tuberosus* (red ulluco, white ulluco) and *Solanum andigenum* (caluncha potato), among others. The frequency of cultivation per orchard is related to the conservation status of the food resources associated with the Trau Misak orchards, being the resources with the highest frequency of cultivation *Ullucus tuberosus* (pink ulluco), *Zea mays* (six-month corn) with 60%, followed by *Zea mays* (capiro and yellow corn) 53%, *Zea mays* (annual corn) 43%, *Oxalis tuberosum* (white, red and purple oca) 34%, *Tropaeolum tuberosum* (majua) 24%, *Zea mays* (Yucatan corn), *Pisum sativum* (black piqui pea), *Cucurbita ficifolia* (Mexican) and *Vicia faba* (fava bean) 20%, *Ullucus tuberosus* (white ulluco) and *Arracacia sp* (purple arracacha) 15%, *Arracacia sp* (yellow, white arracacha), *Brassica sp* (cabbage), *Brassica sp* (purple cabbage, white cabbage) and *Raphanus sativus* (radish) 10%, *Solanum andigenum* (potato caluncha) 8%, *Pachyrhizus tuberosus* (jackfruit) 7%, *Triticum aestivum* (wheat) 5% and *Vicia faba* (purple bean) 4%; This indicates that the plant food resources with a frequency of less than 20% are in danger of disappearing.

The Trau Misak orchards and Patchocona' orchards do not have an exact surface area, nor are there defined crops to plant, their shape generally follows the rectangular distribution and is relatively distant from the forest, the grazing area and other orchards and plots with commercial monocultures, which include for the Tontotuna, *Solanum sp* (potato), *Ullucus tuberosus* (ulluco), *Allium cepa* (onion) and for the Tsotsil indigenous

people, *Zea mays* (corn), *Allium cepa* (onion) and *Phaseolus sp.* (beans). *Chamaemelum nobile* (chamomile), *Mentha spicata* (peppermint), *Salvia rosmarinus* (rosemary) and *Mentha sp* (mint) are medicinal plants commonly planted in both family units (Table 2). In addition to being work spaces, they are also places where the leftovers from the family kitchen are reused as organic fertilizer.

The family necessities, which are reflected in their economic, food, environmental, social and cultural problems, are the main causes that lead the Tontotuna and Tsotsil to strengthen their orchards-gardens by generating monetary income, supporting agricultural development activities, obtaining certain agricultural supplies, reproducing seedlings, manufacturing and repairing agricultural and household implements, and testing new crops.

In both, the Trau Misak and Patchocona' gardens, all the elements that comprise them are arranged in an orderly fashion: the physical space and its cultivation time, the boundaries, the site and the amount of seeds to be cultivated. It is decisive that the space must be next to the house; nature is the one that determines when to sow (dry and rainy periods). Trees such as *Brugmansia sp* (borrachero) constitute a living fence that protects the crops and allows isolation from other family houses; aromatic plants such as *Ruta graveolens* (rue), *Salvia officinalis* (salvia) and *Chamaemelum nobile* (chamomile), function as biological control. Due to the importance of medicinal plants for the Tontotuna and Tsotsil indigenous community, they are also included in Table 2.

According to FAO (2000), family gardens are true experimental fields for the development of new products and agricultural practices aimed at modifying the environmental conditions of production, always including the conservation of their territories; these range from selecting lines adapted to small-scale production to improving productivity and expanding the possibilities of choice according to changes in family needs and market possibilities.

The traditional Trau Misak and the Patchocona' vegetable garden in the Tontotuna and Tsotsil indigenous peoples

Traditional family vegetable gardens in the Tontotuna and Tsotsil territories have certain regional characteristics that identify them. They are places of conservation of plant species - domestic and edible plants - that reflect their cultural differences and are related to their own cosmovision, generating strategies that have allowed them to survive over time.

In the current economic circumstances, family vegetable gardens represent an important capital for local groups with scarce economic resources and the populations most vulnerable to food insecurity. The Trau Misak and Patchocona' survival spaces contribute to local communities, namely:

- The preservation of aesthetic and cultural values;
- Products that guarantee food for the family, with an energy yield in kcal/ha greater than the yield obtained through junk food coming from commerce, (MARIACA,

2012);

- The oral transmission and practice of traditional knowledge;
- The major source of income for indigenous families and a means by which they can ensure a minimum self-sufficiency throughout the year, an income during periods when there are no harvests, when the gardens function as a dynamic bank of plant germplasm in the case of the Tontotuna and also an animal reserve in the case of the Tsotsil people;
- A living laboratory of plant domestication (Tontotuna) and animal domestication (Tsotsil).
- A space for the transmission of traditional knowledge and family unity.

Among the crops grown in the Trau Misak gardens (Table 1), it can be identified those that have been in the hands of the community members of the region and that have been conserved (C), managed (M) and some are in the process of recovery (R). Approximately 50% of the families keep the seeds in their plots, 15% get them donated and the remaining percentage through exchange (INCODER, 2013). Since 2015 with the arrival of the Ministry of Social Protection - Administrative Department for Social Prosperity - DPS -, with the IRACA project, the Trau Misak vegetable gardens have been strengthened, as they continue to promote food security in Tontotuna families, foster the recovery of food from the region for self-consumption, support productive initiatives, while strengthening the leadership and empowerment of the communities.

Table 1. Crops present in the Trau Misak orchards - High Zone, Municipality of Totoró-Cauca

CROP	BOTANICAL FAMILY	SCIENTIFIC NAME USE	USE	CROP FREQUENCY PER ORCHARD	C	M	R
White Oca (potato)	Oxalidaceae	<i>Oxalis tuberosum</i>	Food, fodder	34/100	X	X	
Red Oca (potato)					X	X	
Purple Oca (potato)					X	X	X
Caluncha potato	Solanaceae	<i>Solanum andigenum</i>	Food, fodder, medicinal, ritual.	8/100	X	X	X
Majua	Tropaeolaceae	<i>Tropaeolum tuberosum</i>	Food, fodder	24/100		X	

Pink Ulluco	Basellaceae	<i>Ullucus tuberosus</i>	Food, medicinal	60/100	X	X	
Red Ulluco				60/100	X	X	X
White Ulluco				15/100	X	X	X
White capio corn	Poaceae	<i>Zea mays</i>	Food, fodder, nitrogen fixer, live fence , ritual	53/100	X	X	
Capio corn				53/100	X	X	
Yellow corn				53/100	X	X	
One-year corn crop				43/100	X	X	
Six-month corn crop				60//100	X	X	
Yucatan corn				20/100	X	X	X
Piquinegra peas				Fabaceae	<i>Pisum sativum</i>	Food, fodder, nitrogen fixer, live fence , ritual	10/100
Purple peas	X	X					
Vara bean	Fabaceae	<i>Phaseolus vulgaris</i>	Food, live fence , ritual	40/100	X	X	
Malabar gourd	Cucurbitaceae	<i>Cucurbita ficifolia</i>	Food	10/100		X	
Yellow Cassava	Apiaceae	<i>Arracacia xanthorrhiza</i>		10/100	X	X	
Purple Cassava		<i>Arracacia sp</i>		15/100	X	X	X
White Cassava		<i>Arracacia sp</i>		10/100	X	X	X
White Fava Bean	Fabaceae	<i>Vicia faba</i>	Food, nitrogen fixer,	20/100	X	X	
Purple Fava Bean				4/100	X	X	
Peló wheat	Poaceae	<i>Triticum aestivum</i>	Food, ritual	2/100			X
Hairy Wheat							X

Green cabbage	Brassicaceae	<i>Brassica sp</i>	Food, fodder	7/100		X	
Purple cabbage				4/100		X	
Purple cabbage				7/100		X	
White cabbage				7/100		X	
Radish		<i>Raphanus sativus</i>	Food, condiment	5/100		X	X
Yellow onion	Amaryllidaceae	<i>Allium cepa</i>	Food, seasoning, medicinal	40/100	X	X	
White onion				60/100	X	X	
Red shallot				40/100	X	X	
White garlic	Liliaceae	<i>Allium sativum</i>	Food, seasoning, medicinal, ritual	60/100	X	X	
Purple garlic or pate' perro				30/100	X	X	
Common Spinach	Amaranthaceae	<i>Spinacia oleracea</i>	Food	80/100	X	X	
Jicama (Íquima)	Fabaceae	<i>Pachyrhizus tuberosus</i>		7/100	X		X

Source: Martha Lucía Ordóñez Serna & Olga Lucía Sanabria Diago, 2014 - 2017.

Table 2. Medicinal plants found in the Huerta Trau-Misak-High Zone. Municipality of Totoró – State of Cauca, Colombia

RESOURCE	BOTANICAL FAMILY	SCIENTIFIC NAME	USE
Peppermint	Lamiaceae	<i>Mentha sp</i>	Medicinal, fungicidal
Chamomile	Asteraceae	<i>Chamaemelum nobile</i>	
White angel's trumpet	Solanaceae	<i>Brugmansia sp</i>	
Calendula	Asteraceae	<i>Calendula officinalis</i>	
Sage	Lamiaceae	<i>Salvia sp</i>	

Fennel	Apiaceae	<i>Foeniculum sp</i>	Seasoning
Oregano	Lamiaceae	<i>Origanum sp</i>	
Wormwood	Asteraceae	<i>Artemisia sp</i>	
Fennel	Apiaceae	<i>Anethum sp</i>	
Cilantro	Apiaceae	<i>Coriandrum sativum</i>	
Peppermint	Lamiaceae	<i>Mentha spicata</i>	Medicinal
Rue	Rutaceae	<i>Ruta graveolens</i>	
Alegria	Balsaminaceae	-	
Siempreviva o congonillo	Crassulaceae	<i>Portulacaria sp</i>	
Chili	Solanaceae	<i>Capsicum sp</i>	Seasoning, fungicidal
Thyme	Lamiaceae	<i>Thymus sp</i>	Seasoning, medicinal
Onion	Liliaceae	<i>Allium cepa</i>	
Peach	Rosaceae	<i>Prunus persica</i>	Food
Birdseed	Poaceae	<i>Phalaris canariensis</i>	Bird food
Garlic	Amaryllidaceae	<i>Allium sativum</i>	Medicinal, seasoning, Ritual

Source: Martha Lucía Ordóñez Serna & Olga Lucía Sanabria Diago, 2014 - 2017.

By 2019, 70% of the families have managed to conserve their seeds, 30% have recovered them through their own seed banks with groups of elders and community members of the region; along with the strengthening of traditional gardens, the Tontotuna community members also dedicate their time to technified crops such as *Solanum tuberosum* (potato) and *Fragaria sp* (strawberry) mainly.

In 95% of the Trau Misak vegetable gardens in the highlands, the work is shared among the members of the family and on several occasions among the community members belonging to the Resguardo. The tasks include cleaning, fertilizing, sowing, border maintenance, weeding and pest control. However, seeds are exchanged among close friends and family members, but not among neighboring communities, since the Tontotuna are very protective of their seeds, as these strategies lead to the survival and conservation of the biodiversity of both their territories and the associated phylogenetic resources.

In the Trau Misak gardens, the survival and harmonious relationship of the Tontotuna indigenous community with the territory they inhabit is evident in the daily prac-

tices of the indigenous people, since they are guided by the “law of the Trau” (law of the garden), which consists of sowing and harvesting, not only food, but also oral traditions.

The denomination “Trau Misak”, in their native language “Nam Trik”; Trau: garden and Misak: own, people, next to the house: “garden next to the house”; it is a place considered by the local community as a space of life in construction, of recovery and strengthening.

The places inhabited by the Tontotuna and Tsotsil indigenous communities are characterized by the presence of different spaces for the family, including the house-habitation, which in both cases is associated with the garden, consisting of one or two rooms where the kitchen and bedrooms are located, the dry bathroom or latrine, and particularly for the Tsotsil, the *pus* or *temazcal*. A space near the house that includes the family domestic unit, the Trau Misak vegetable garden for the Tontotuna and the *traspatio* or *Patchocona*, for the Tsotsil, where food, medicinal and seasoning plants are grown (Table 3), and specifically for the Tsotsiles, fruit trees and, within the garden, the corrals for raising domestic animals such as chickens, turkeys and sheep, and the corn house, where the corn seeds are stored for planting the following season and, on occasion, a place dedicated to the cornfield (*milpa*). For the Tsotsiles, the term ‘*Patchocona*’ in their native language refers to their own family vegetable garden.

Mariaca, (2012), considers for the Mesoamerican case, the formation of diversified gardens in the period from 6,000 to 200 BC; as for the Mayan area, there is some archaeological evidence dating from the fourth to ninth centuries BC, which may resemble the pattern in the Mayan area of the classical period, which consisted almost always of the presence of a central courtyard, which makes it possible to think of the representation of family gardens. In the case of Chiapas, from 1990-2000 the introduction of motor vehicles has changed the structure of home gardens, introducing some agroecological practices carried out by institutions and civil associations in order to improve the nutritional and health status of the rural family.

The history of the Trau Misak gardens does not present dates that identify their ancestry, although it is noted in the Totoró Development Plan, PDT, (2008), that the abundant, striking and fertile Trau Misak gardens, already maintained crops and wild species since pre-Hispanic times; however, the family, environmental, historical and landscape value of these gardens, among others, is seriously threatened by the lack of generational replacement, and by the new uses of soil and water, resulting in the decline of a privileged environment. There is a concern that some community members do not want to dedicate time to the gardens, because they believe that they do not offer an economic benefit and prefer to work as day laborers.

Despite the fact that in the *Patchocona*’ garden, the basic plant is corn; whose cultivation can be an extension of it or belong to this agroecosystem; there are different associated species around this plant, which would be one of the equivalent and similar strategies found in the Trau Misak garden in Totoró, with the difference that in the Tontotuna agroecosystem there is not a basic dominant crop plant, but a diversity of predominant plants; however, the cultivation of potato (*Solanum sp*) is the prevailing crop in the

territory in general, without being included in the family garden. For the Tsotsil people, the word garden does not exist; they use the word *traspatio* or *sitio*, which is equivalent to the Trau Misak garden in the Tontotuna people.

The presence of bushes, trees and some animals in the Patchocona' garden differentiates it from the Trau Misak garden, where there are mostly herbaceous plants and rarely bushes; trees are almost never found in the family garden, although if there are any, they are respected and fulfill their purpose, especially as borders and crop protection; animals are not included, although they are still considered important.

The Patchocona' garden generally has an approximate area of 600 m² where there are various plants including trees for living fences, timber use, protecting trees for crops and the dwelling house, (table 3), unlike the Trau Misak that does not have an exact delimitation, it is outlined according to the size of the land owned by the family or in some cases awarded by the Cabildo if the family is an inhabitant of the territory and has demonstrated continuous community work, upon request of the interested party.

Among the crops associated with the Trau Misak gardens are *Solanum andigenum* (potato or caluncha potato), *Ullucus tuberosus* (ulluco), *Oxalis tuberosa* (oca), *Vicia faba* (broad bean), *Pisum sativum* (pea), *Triticum sp* (wheat), *Zea mays* (maize) identified by the local community as "a one-year and six-month crop", because harvesting is done at the appropriate time (Table 1).

In the Tontotuna and Tsotsil gardens, where there is the presence of secondary shrub and tree vegetation and there are few arvenses; plants that the local people identify as those that affect the cultivated ones and which they have not planted. The process of slash and burn is no longer carried out and the spaces that the vegetation has preserved after long periods of cattle ranching are respected, leaving the land to rest and recover its fertility through the incorporated plant biomass, enriching them in turn with their own seeds, whether they are food, seasonings and/or medicinal, which are generally chosen by the women according to their needs and the knowledge of their elders. In this way, domestic production systems are permanently strengthened as a strategy for the conservation and survival of local peoples.

In the Chamula gardens, 68 plant species were recorded, belonging to 30 families and 57 genera, including herbaceous plants, shrubs and trees. Regarding the use of the species, nine categories of use were identified: food (29), medicinal (21), fodder (18), ritual (15), living fence (8), nitrogen fixer (5), timber (5), live edge (3), firewood (3), condiment (3) and fiber (1 species). Taxonomic identification was carried out in the Herbarium of the Colegio de la Frontera Sur- ECOSUR. Table 3

This has allowed the traditional knowledge of the Tontotuna and Tsotsil indigenous people to be recognized as valuable in their indigenous culture, and in this way they protect and propagate species that respond to specific ecological conditions. It is in this sense, that women are closely linked to the conservation of their own plant resources. At the same time, they also contribute with the preparation of food, cleaning of the home, care and feeding of small species (chickens, rabbits, guinea pigs, pigs, etc.), care and education of the children.

Throughout time, ancestral peoples have been adapting to changes related to land

tenure, climate, insertion of agricultural techniques, political conflicts, prevention of integration of customs foreign to their culture, work relations; creating, modifying and adjusting strategies that allow them to survive over time. Thus, the family production system called the garden is fundamental and plays a major role as a site for the transmission of culture, environmental conservation, unity and family sustenance since the garden is a social, spiritual, family, environmental space, and so on, where food resources are produced for the family, as well as environmental services and non-material culture, among others. In this way, the garden is increasingly strengthened, thanks to the collective work of reciprocal aid with the involvement of the local community.

Table 3. Plant species found in the milpas (corn fields) of the municipality of Chamula, Chiapas, Mexico

BOTANICAL FAMILY	GENUS AND SPECIES	SPANISH NAME	USE	
Amaranthaceae	<i>Amaranthus hybridus</i>	Amaranth	Food, fodder	
Cucurbitaceae	<i>Cucurbita ficifolia</i>	Chilacayote		
Ericaceae	<i>Cavendishia guatemalensis</i>	-		
Fabaceae	<i>Trifolium amabile</i>	-		
Poaceae	<i>Zea mays</i>	Corn		
Amaranthaceae	<i>Beta vulgaris var. Cicla</i>	Chard	Food	
Amoryllidaceae	<i>Allium cepa</i>	Onion		
Apiaceae	<i>Daucus carota</i>	Carrot		
Asteraceae	<i>Lactuca sativa</i>	Lettuce		
Brassicaceae	<i>Brassica oleracea</i>	Cabbage		
Brassicaceae	<i>Brassica nigra</i>	Mustard		
Cactaceae	<i>Opuntia sp.</i>	Cactus (nopal)		
Cucurbitaceae	<i>Sechium edule</i>	Chayote		
Cucurbitaceae	<i>Cucurbita pepo</i>	Pumpkin		
Rosaceae	<i>Malus sylvestris</i>	Apple		
Rosaceae	<i>Prunus domestica</i>	Plum		
Rosaceae	<i>Prunus pérsica</i>	Peach		
Solanaceae	<i>Physalis philadelphica</i>	Tomatillo		
Amaranthaceae	<i>Chenopodium ambrosioides</i>	Mexican Tea		Medicinal, seasoning
Lamiaceae	<i>Mentha spicata</i>	Peppermint		Ritual
Amoryllidaceae	<i>Allium sativum</i>	Garlic		
Asteraceae	<i>Tagetes erecta</i>	Mexican marigold		
Solanaceae	<i>Nicotiana tabacum</i>	Tobacco		
Asteraceae	<i>Chrysanthemum sp.</i>	Chrysanthemum		
Primulaceae	<i>Rapanea juergenseni</i>	-		
Apiaceae	<i>Coriandrum sativum</i>	Cilantro	Seasoning	

Apiaceae	<i>Foeniculum vulgare</i>	Fennel	Medicinal
Rubiaceae	<i>Crusea calocephala</i>	-	
Rutaceae	<i>Ruta graveolens</i>	Rue	
Solanaceae	<i>Brugmansia candida</i>	-	
Araceae	<i>Zantedeschia aethiopica</i>	calla lily	Ritual, living fence
Liliaceae	<i>Lilium sp.</i>	Lily	
Asteraceae	<i>Baccharis vaccinioides</i>	Mesté	Ritual, medicinal, wood, living fence
Asteraceae	<i>Matricaria recutita</i>	Chamomile	Medicinal, ritual
Fabaceae	<i>Phaseolus vulgaris</i>	Bean	Food, fodder, nitrogen fixer
Fabaceae	<i>Vicia faba</i>	Fava bean	
Fabaceae	<i>Erythrina chiapasana</i>	Colorín	Fodder, living fence
Fabaceae	<i>Cajanus cajan</i>	Pea	Food, fodder, nitrogen fixer
Fabaceae	<i>Phaseolus coccineus</i>	Scarlet runner bean	
Fabaceae	<i>Phaseolus coccineus darwini-</i> <i>nianus</i>	Botil bean	
Fabaceae	<i>Phaseolus coccineus darwini-</i> <i>nianus</i>	Botil bean	
Malvaceae	<i>Hibiscus uncinellus</i>	-	Ritual,
Onagraceae	<i>Fuschia arborescens</i>	Lilac Fuchsia	Medicinal, fodder, ritual
Rosaceae	<i>Prunus serótina</i>	-	Food, timber
Rosaceae	<i>Rosa chinensis</i>	China rose	Ritual, medicinal, living fence
Rosaceae	<i>Pyrus communis</i>	Pear	Food, fodder
Solanaceae	<i>Jaltomata procumbens</i>	-	
Scrophulariaceae	<i>Buddleja sp.</i>	-	Fodder, medicinal
Verbenaceae	<i>Lantana cámara</i>	-	Food, medicinal
Viburnaceae	<i>Sambucus mexicana</i>	Blue elderberry	Medicinal, living fence

Source: Compiled by the authors, based on fieldwork, years 2012 and 2018.

CONCLUSIONS

For the Tontotuna and Tsotsiles

The management and conservation of the Trau Misak and Patchocona' family units is based on the recognition and relationship of respect between the community and nature, where the local populations function as a whole and the quality of life of its inhabitants is directly linked to the environment and the management practices and use of its resources, not only vegetable but also natural. This is the case of the family garden, as the main strategy to transmit from generation to generation the traditional knowledge, techniques and practices of the associated vegetable resources, their way of life, their components, relationships, products, benefits and a constant management and conservation of the vegetable resources, cultural events that occur in that physical space and the environmental contributions, in terms of benefits of having a garden, to the indigenous nucleus, as well as to other neighboring social groups.

The Trau Misak and Patchocona' traditional systems are considered systems of con-

tinuous interaction of environmental aspects and social and cultural practices, which are based on traditional knowledge that is transmitted orally from generation to generation.

In the indigenous territories of the Tontotuna and Tsotsil people, traditional cultural practices and agricultural systems survive, characterized by forms of land appropriation and use that have been practiced for millennia, a living expression of the indigenous cultures that inhabit these Colombian and Mexican territories, and by means of particular ways of relating to the environment, between the local ecosystems and cultural actions of intervention, use and relationship with the environment.

The family garden, in any of its denominations and local forms, is a diversified and complex production system that goes far beyond the agricultural or ecological sphere, as it encompasses economic, social, cultural, educational, health and even religious aspects (MARIACA, 2012). This is how the Tontotuna and Tsotsiles generate strategies focused on the survival of their local communities and conservation of natural resources.

The greatest benefit provided by family units as the basis of family food supply and the strengthening of cultural processes for the survival of indigenous peoples, is occurring not only in indigenous peoples, but in most ancestral peoples at local, regional, national and even global levels; according to (MARIACA; CONTRERAS, 2016), indicating that these spaces are evolving according to the needs of the communities to adapt to new social and family circumstances that sometimes include the lack of labor.

The family gardens are under constant construction, here, different socio-environmental, political, economic processes occur that are essential for the culture being established, especially in local indigenous communities of agrarian tradition such as the Tontotuna and Tsotsil, with deep relationships of identity and construction of territory. This rationale is shared in the Ethnic and Cultural Safeguard Plan of the Tontotuna indigenous people PDT, (2008) and by the researcher Mariaca, (2012), in which it is not only the possession of territory that is important, but the symbolic elements that are developed making this the primary strategy for the defense and survival of indigenous peoples.

The territorial dynamics that occur in the Trau Misak and Patchocoana' traditional systems, under a holistic view, generate responses allowing alternatives of representation, conservation, territorial development and control, as spaces of resistance to position the indigenous territories in the local, national and global contexts; which (ESCOBAR, 2010), evidences as a social and, most importantly, a cultural construction. The way in which human beings occupy space, represent it, signify it, use it, and conserve it, defines what we are, how we think and how we relate to each other.

In this adaptive strategy called family garden, culture is increasingly considered as a factor that promotes identity of social, environmental, political and economic nature; for example, for a social group to be recognized as indigenous, it must have a garden in its house. In the case of the Tsotsil and Tontotuna indigenous peoples, the garden is part of their identity and culture; to lose it would mean losing their culture. This indigenous identity supports the concept of prestige, developed by Hernández-X, (1981), as a reason that encourages actions to promote the strengthening of the indigenous culture in the community.

Family units are considered appropriated spaces, traced, traversed, delimited and

marked by the identity of the local communities that occupy them and therefore inseparable from the categories of dominion and power. Ramírez (2016), identifies traditional gardens as represented areas, with a political and cultural appropriation, which has to do with their administration and, therefore, with their delimitation, use, distribution, defense and, most especially, identity.

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Comparação socioambiental em sistemas produtivos agrícolas indígenas: Tontotuna, Totoró-Colômbia e Tsotsil, Chamula-México

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Resumo: Apresenta-se uma comparação das práticas de conservação associadas ao manejo do sistema de produção agrícola familiar conhecido por quintal Trau Misak e quintal Patchocona; nos povos indígenas da Reserva Tontotuna, Município de Totoró-Cauca-Colômbia e no povo Tsotsil, Município de Chamula-Chiapas-México, respectivamente. A metodologia foi enquadrada na hermenêutica e fundamentou-se na etnobotânica, inter-relacionando os eixos de tempo, espaço e cultura. Dada a natureza holística e complexidade desta pesquisa, utilizou-se a etnografia e a pesquisa-ação participativa como técnicas descritivas para a dinâmica de uso e manejo dos recursos vegetais nos quintais Trau Misak e Patchocona'. Os resultados apresentam as estratégias comparativas de transformação que são geradas e utilizadas no Trau Misak e Patchocona', fortalecendo a identidade de cada povo indígena, enfrentando os problemas de sobrevivência e contribuindo para a redução da fome ao estabelecer as bases para a segurança alimentar.

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Palavras-chave: Quintal familiar, Totoró, Chiapas, Trau Misak, Patchocona

Comparación socioambiental en sistemas productivos agrícolas indígenas: Tontotuna, Totoró-Colômbia y Tsotsil, Chamula-México

Martha Lucía Ordóñez Serna
Olga Lucía Sanabria Diago

Resumen: Se presenta una comparación de las prácticas de conservación asociadas al manejo del sistema de producción agrícola familiar denominado huerta Trau Misak y huerto Patchocona'; en los pueblos indígenas del Resguardo Tontotuna, Municipio de Totoró-Cauca-Colombia y el pueblo Tsotsil, Municipio de Chamula-Chiapas-México, respectivamente. La metodología se enmarcó en la hermenéutica y se fundamentó en la etnobotánica interrelacionando los ejes de tiempo, espacio y cultura. Dada la naturaleza holística y de complejidad de esta investigación, se empleó la etnografía y la investigación acción participativa con técnicas descriptivas para las dinámicas de uso y manejo de los recursos vegetales en el Trau Misak y Patchocona'. Los resultados presentan las estrategias de transformación comparativas que se generan y utilizan en el Trau Misak y Patchocona', fortaleciendo la identidad de cada pueblo indígena, enfrentando los problemas de pervivencia

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