 J Hum Ecol, 40(1): 85-94 (2012)

Socio-economic and Cultural Aspects Associated with Handling Grasshopper Germplasm in Traditional Markets of Cuautla, Morelos, Mexico

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KEYWORDS Edible Grasshoppers. Traditional Marketing. Cuautla. Mexico

ABSTRACT Edible insects are a renewable natural resource which provides valuable knowledge for ethnoentomological research. The present study investigates the selection of germplasm of edible grasshoppers by locals in Ladino markets of Cuautla, Morelos, and determined how collecting methods are implemented, as well as the decisions made about conservation and marketing. The researchers also investigated the role of both men and women play with this issue. They evaluated the diversity of insects that are traded inside and outside the markets, where were found three species of the order Orthoptera: *Sphenarium purpurascens* Charpentier 1842, *Sphenarium histrio* Gerstaecker 1873, and *Taeniopoda auricornis* Walker 1870, all harvested in Atlixco, state of Puebla. The researchers revealed the existence of a matriarchy, which plays a principal role in the collection, distribution and marketing of these insects.

INTRODUCTION

Generalities

Mexico is a country characterized by its great biodiversity. However, one of the major challenges is the relationship of humanity with biodiversity, which has been important in biological and cultural evolution (Risser et al. 1991), and in the management, operation, use and benefits of biodiversity (Bellón 1991; Brush 1991; Scoones et al. 1992; Ramos-Elorduy 1999; Reid et al. 2002). Mexican biodiversity has high ethical, cultural, biological, and even economic values (Gómez-Pompa 1985; Randall 1985). The exploitation of natural resources implies a balanced relationship between society and nature (Johnson 1992), through sustainable management, based on the traditional experience of the ethnic groups in order to meet the needs of men (Castillo 2003). In different countries, ethnic groups have handled 90% of the germplasm of their respective settlements, exploiting the resources in a self-sufficient way over many centuries (Posey 1983; FAO 1995, 2000). This includes the ownership, processing, distribution, and consumption of resources, as well as the emission of waste and garbage of societies that are settled on a particular ecosystem (Toledo 2004).

Several authors such as Lévi-Strauss (1966), Toledo (1991), Studley (1998), Gibbons (1999), Berkes et al. (2000), and Jiménez (2002) have promoted the study and use of such knowledge through multidisciplinary and multi-agency aspects of each ethnic group. These parameters are composed of knowledge: beliefs or worldview *(Corpus)* and their practice in the environment *(Praxis)*. The *Worldview* refers to the ethnic groups that have knowledge in relation to their environment that is manifested in the form of rituals, ceremonies and other forms of knowledge that help the community to maintain the balance with nature (Boege 1988; Toledo 2004). The *Corpus* are the expression of personal or communal wisdom, histories and cultures of the people, through oral language (Villoro 1982; Toledo 1991), while the *Praxis* is the set of practices implemented from one generation to another, allowing indigenous groups and their culture to survive without damaging the original resources (Toledo 1991).

Unfortunately there has been an overexploitation of resources and an inability to maintain a sustained production to satisfy the demand of humanity on the food supply (Toledo 1992; FAO 2000). This has led to food shortages especially in rural populations (Schejtman 1996), so that its inhabitants have had to move towards the so

called indigenous "alternative resources", that are abundant, easily obtainable and accessible. A widely known example is edible insects that come from pre-Hispanic times (Ramos-Elorduy 1989; Carbajal et al. 1996).

Insects are part of the Phylum Arthropoda. They constitute approximately 875,000 species, of which 751,000 are known (Wilson 1985), thereby forming the dominant group of animals. Moreover, Mittermeier (1988) postulated that there are three to four million species of insects. This immense diversity of insects has had a varied management regarding their use and benefit by man (Meyer-Rochow 1979; Ramos-Elorduy 2000, 2005). Ramos-Elorduy (2009) reported varied uses of insects such as food, medicine, source of bioactive ingredients, nutraceuticals, organic waste recyclers, compost, decorative, amusement and entertainment, plus other sources of diverse products such as honey, royal jelly, propolis, pollen collectors, silk, carminic acid, lacquer, etc. In addition, these uses are determined by their selective collection of cultural, anthropological, sociological, linguistic and psychological points of view (Meyer-Rochow 1979; Toledo 1996; Carbajal et al. 2000; Castillo and Toledo 2000).

Insects as Food

Since ancient times insects have been and are widely used as food (Bergier 1941; Bodenheimer 1951; Ramos-Elorduy and Pino 1989), therefore they played an important role in the evolution of humankind (Meyer-Rochow 1979; Ramos-Elorduy et al. 1987; Sutton 1988; Tanner 1992; Malaisse 2005; Mitsuhashi 2005; Onore 2005; Tommaseo-Ponzetta 2005; Van Huis 2005). It is now evident that insects form a significant portion of the staple diet in some human societies around the world, particularly in the diet of hunter-gatherer groups that consume insects in large quantities because of their abundance, nutritional value and ease of storage or availability (Bongaarts 1980; Sutton 1988; Arana 1991; Mc Grew 1991; Miller 1994).

Anthropoentomophagy (consumption of insects by humans) (Costa-Neto and Ramos-Elorduy 2006) has been practiced by different ethnic groups and ancient cultures all over the world, being used as food in Tasmania (Sutton 1988), Thailand (Yhoung-aree and Wiwatpanich 2005), China (Zhi Yi 2005), Japan (Mitsuhashi 2005), Korea (Pemberton 1999) and in other countries (Hoffmann 1947; MacGregor 1969; Dufour 1981; Blake and Wagner 1987; Ramos-Elorduy and Pino, 1989; Ramos-Elorduy 1999, 2005). Grasshoppers in Africa also have a high economic value, because identical models were made in gold in Central African Republic (Ramos-Elorduy 1999).

Mexican Case

In Mexico, the consumption of 96 species of edible insects is mentioned in various codexes (Ramos-Elorduy and Pino 1989).

Ramos-Elorduy (2008) has recorded a total of 549 species of edible insects, belonging to the orders Anoplura, Odonata, Orthoptera, Isoptera, Hemiptera, Psocoptera, Neuroptera, Coleoptera, Trichoptera, Diptera, and Hymenoptera. Use of edible insects is widely distributed in Mexico, with a high number of species used in states such as Mexico state (157 species), Hidalgo (136 species), Chiapas (135 species), Oaxaca (95 species), Veracruz (160 species), and Guerrero (87 species). Most species of edible insects are eaten in immature stages (eggs, larvae, nymphs, pupae). The most widely consumed are dragonflies, worms, corn larvae, ants, bees, wasps, aquatic bugs, stink bugs, "xamues", grasshoppers, beetles and flies, most of which are distributed in the terrestrial milieu.

Nutritional Value of Edible Insects

Ramos-Elorduy et al. (1987, 1988, 1998, 2002) have analyzed the nutritional value of edible insects making determinations of moisture, dry matter, proteins, essential and nonessential amino acids, fat or ether extract, fatty acids, ashes, crude fiber and nitrogen free extract, expressed in 100 g dry samples. The mineral content of edible insects has also been studied, as well as vitamin digestibility "*in vitro*" in dry matter and *protein* digestibility *in vitro* and *in vivo and* the proportion of calories they contain (Ladrón de Guevara et al. 1995; Ramos-Elorduy et al. 1981, 1986, 1988, 1990, 1998, 2002). Some species have an important traditional use in a medicinal and nutraceutical role (Ramos-Elorduy et al. 2000).

Added to which, the ancient Mexicans and tribes of North America regarded insects as deities or nahuales, guides, messengers, symbols and drivers of souls, counselor allies to the he-

roes, and symbols of affection or resurrection among others (MacGregor 1969; Ramos-Elorduy 2000, 2005). These aspects have been recorded in paintings, codex, ceramics, ornaments, buildings, tools and weapons (Velásquez 1975), as well as being expressed in histories, legends, beliefs, masks, and totems.

Although grasshoppers are still abundant and widely distributed in many parts of the world, few people appreciate their cultural and nutritional value, and especially their role as a food reserve. It is a mark of their high appreciation, that the Mayas called grasshoppers (*Schistocerca* sp) "holy flower of heaven" (Barrera and Bassols 1953). Different species of grasshoppers were also included in totem that were erected in various indigenous cultures (Bergier 1941; Posey 1978; Ramos-Elorduy 2000), as well as ethno-entomological grasshopper-shaped totems made of wood (Sutton 1988). Grasshoppers are also included in place names such as Chapultepec (grasshhopper hill) or Chapulhuacan (grasshopper land).

Grasshopper Consumption in Mexico

In Mexico, people consume 54 species of grasshoppers (Ramos-Elorduy et al. 2008), The quantity that is collected varies from 3 to 5 tons per family in the season of high abundance. Historically, insects have cultural, food, medicinal and commercial importance. This use of grasshoppers involves their collecting, cleaning, preparation, preservation, also their industrialization, their distribution and their marketing. Grasshoppers are sold along roadsides, at inns, restaurants, and markets in the province or in major cities, with perhaps more sold in the Ladino markets of Mexico. Since the use of grasshoppers is rooted in tradition, many people of different cultures from far-away, come to these sites to buy and rationally exploit these resources (Carbajal et al. 1996).

Objectives

To taxonomically identify the edible species of grasshoppers that are sold in Ladino markets in Cuautla, Morelos, and determine how locals market promote the exchange of empirical knowledge.

To analyze the cultural ties that exists between the public market and the ladino.

General Characteristics of Morelos State

Location

The state of Morelos is located in the central part of Mexico, between latitudes 18º22'5" and 19º07'10" north and longitude 93º37'08" and 99º30'08" west. It is bordered on the north by the Federal District and Mexico state, by Guerrero state to the south and southwest, Puebla state to the east and southeast, and to the west by the states of Mexico and Guerrero. The state is divided into 33 municipalities, one of which is Cuautla, which is also the second largest city of the state (Anonymous 2009).

General Characteristics of Cuautla

Its name in Nahuatl is "*Kuahtlán*", its etymology comes from *Kuah-uitl*, "tree, stake" or tree" *tlan-tli*, "abundance" meaning "woods or forest". The municipality of Cuautla is located in the eastern part of the State of Morelos, at an average altitude of 1,300 meters. The town of Cuautla comprises an area of 153,651 km², at latitude 18º49' to the south and north, and longitude 98º57' to the east and 99º01' to the west, and is bordered by the municipalities of Yautepec, Atlatlahucan, Yecapixtla, and Ayala. The prevailing climate is warm, sub-humid with summer rains, of drier subtype. The principal vegetation type in the area is grassland, with agricultural land-use over a hilly physiography. The region also includes tropical deciduous forest in mountainous areas. Among the native and cultivated fruit trees in the region is mentioned: mamey, loquat, sapodilla, nance, guava, banana, tamarind, and zapote. Some medicinal plants are also cultivated such as basil, "*ruda*", azumiate, pepper tree, eucalyptus, "*muicle*". Among the species of domesticated and wild animals, most common are: horses, donkeys, goats, pigs, dogs, cats, rabbits, gophers, opossums, badgers, bats and bees, wasps, "*mayates*", fireflies, and cicadas. The main ethnic group is Tetelcingo to the north of Cuautla, which is of Olmec origin but also with Nahua roots, whose women still retain their traditional dress, a costume called "Tetelcingo". This group is the most representative of the State for its particular origin and simplicity,

this community retains its own characteristics as the Nahuatl language.

METHODOLOGY

The study was conducted from June 2006 to December 2009, and the methodology is divided into the following points:

A. Definition of the settlements and areas to be sampled in the study, based on a cartographic and bibliographic review of the municipality of Cuautla.
B. Survey Ladino markets where grasshoppers (Orthoptera-Acrididae) are sold.
C. Conduct interviews to determine the sites where grasshoppers were collected and sold in Cuautla Ladino markets. Interviews were applied depending on the accessibility and willingness of each person (Costa-Neto 2002).

Classification and Selection of Edible Insects

Grasshoppers were purchased from Ladino markets of Cuautla, Morelos during the marketing season. Subsequently these specimens and their accompanying fauna were preserved in bottles with 70% alcohol, and labeled with the date, price and place of purchase, as well as the source of collection. Specimens were then mounted, labeled, identified to species, cataloged and placed in the National Scientific Entomological Collection of the Institute of Biology at the Universidad Nacional Autonoma de Mexico.

RESULTS

Background to the Cuautla Markets

The Landino Market refers to an area delimited by four walls and regular trading-posts belonging to mestizos, that are organized by the government administration. Ladino markets are the main axis of distribution and retail in the State of Morelos, and therefore constitute a major source for the procurement of edible insects (grasshoppers and jumil) and derivatives (honey, royal jelly, propolis). Location of the Ladino market is shown in Figure 1, where two markets

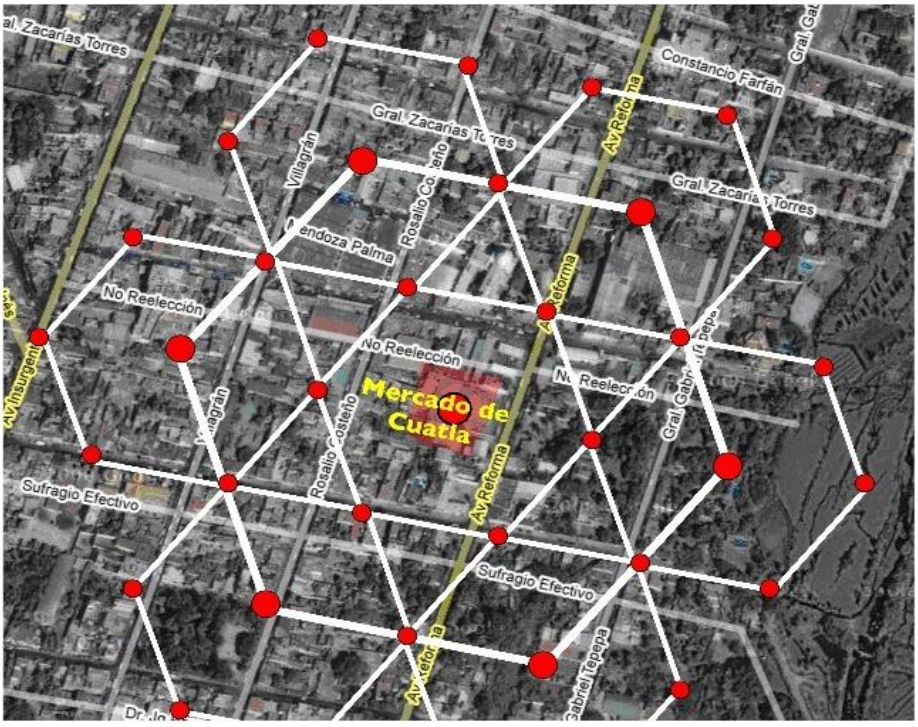

Fig.1. Location of the Ladino market INEGI, 2007

are indicated, one is located in the "Colonia Centro" known as "Old Market", and the other is located in "Colonia Emiliano Zapata" called "New Market".

Edible Grasshoppers

Grasshoppers of the order Orthoptera sold in the new and old markets were: *Sphenarium purpurascens* Charpentier, 1842, and *S. histrio* Gerstaecker 1873 which were harvested in the fields of lucerne in the town of Atlixco, Puebla, and *Sphenarium sp, S. purpurascens* Ch. and *Taeniopoda auricornis* Walker 1870, collected in squash and corn fields in the Municipality of Mixican, Puebla.

Grasshopper's Collection

The grasshoppers ready to sell are all adults, collected during the mating season from early August to late December. These are harvested mainly in the fields of Lucerne, which is located in the municipalities of Mixican and Atlixco, Puebla (INEGI 2000). Most collectors are mestizos, people of mixed heritage or descent, that have a subsistence economy, and collect grasshoppers for sale as well as for personal consumption. They form large groups of 30-60 people which include women and children to collect the insects, but also to work in agricultural fields. Collecting groups need to obtain permission prior to collecting grasshoppers in the land under cultivation. The group of collectors is characterized by an endogamous marital trait society, being reserved exclusively to family members, and may include a few long-term friends or colleagues.

The initiation in these practices is called "*the capture of grasshoppers*" or "pests of lucerne", in which the majority of collectors go together to mechanically control the pests. Hence, the collection of insects to obtain germplasm is a complex process, involving a number of factors including the social relationships (Plattner 1994), marriage customs and non-familial relationships, which are determined and marked by a strong friendship. The family plays a key role in maintaining long-term relationships, indispensable to the organization and preparation of grasshoppers.

The study of the collection was divided into two systems:

a. ***Operational*** elements related to biotic and abiotic environment of the species, in addition to the cultural ties used in site selection, decision making and implementation of ancestral knowledge, as well as the conservation and preparation of grasshoppers after harvesting.

b. ***Functional*** which is related to the harvesting techniques, and implemention of the tools used in this practice. There is usually a leader who determines the time spent by collectors, and verifies the preparation of insects.

Harvesting Operation (Corpus)

Collectors begin their work at 04:00 am and continue until 14:00 pm, spending a total time of 10 hours/day in collecting and processing grasshoppers. This may decrease on rainy days, or when there are social or religious commitments.

Harvesting Functional (Praxis)

The praxis was done with trapping tools that have been developed and implemented by different generations within the communities, which consist of a straw basket of 30 cm diameter, a cotton blanket of variable rectangular size (2.5 to 3 m long) carried by several members of the group, and 1-3 50 kg plastic bags which are transparent so that the condition of the insects can be viewed.

The chronology of activities outlined in Table 1 is described in more detail as follows. The hand-picking technique for collecting grasshoppers is done with the right hand while travelling up and down the crop fields. After every 15 turns through the field**,** the plastic bag is closed with the left hand and shaken, making sure that the grasshoppers do not escape over the edges of the bag. In the case of the wicker-basket technique, grasshoppers are collected only from the upper protruding section of the crop plants, and this is done as often as necessary to capture all the grasshoppers. Helpers assist the collector by moving the basket, which enables the collector to place grasshoppers in separate 3 kg plastic bags, collecting a total of 40 bags per day containing a total 120 kg of grasshoppers.

The use of the large cotton sheet requires a group of two or three collectors each of whom

Table 1: Time management and development of grasshoppers

Time	*Activity*	*Location*	*Contact*	*Notes*
04:00AM	Collect	Crop area	Collectors	Capture grasshoppers
10:00 AM	End gathering	Crop area	Leader	Share of insects obtained
2:00 PM	Initial establishment	Crop area	Leader	Making preparations
6:00 PM	Final preparation	Crop area	Leader	Share knowledge and sales
8:00 AM	Home sales	New Market Cuautla	Seller	Store detail
6:00 PM	Sales end	Old Market Cuautla	Seller	Closed sale
6-8:30 PM	Travel Puebla-Morelos States	Maximum range	Seller	Site Terminal buses Cuautla, Morelos

Table 2: Costs per unit (sardina can) and retail of grasshoppers

Cost in situ (USD)	*Market value (USD)*	*Actual value of a pound and kg (USD)*
0.92-1.26	2.14	3.21 pound – 6.42 kg

takes one end of the sheet and extends it over the vegetation, trapping the grasshoppers beneath the sheet. One man then travels around the edge of the sheet hitting an iron plate called a *"comal"* with a metal serving spoon to make a noise, causing the grasshoppers to jump towards the center of the sheet. When the sheet has been circled a number of times, it is gathered together to form a cylindrical package containing the grasshoppers, so that they can be transported, and processed at home. This technique is similar to that carried out in other countries (Bergier 1941). The package is carefully compressed without damaging the samples. Once at home, the children open the sheet little by little and collect the trapped grasshoppers, depositing them in plastic bags to be processed by their mother. Finally, all the plastic bags are brought together and packed inside a large cotton blanket that provides protection and maintains moisture, so that the grasshoppers can be stored and preserved during the journey to market.

The decision- making for the search is the *corpus* of the environment, combined with agricultural techniques and synergy with the grasshopper's life-cycle. When the group is new or its members exceed 50 years of age, participants in the group are chosen voluntarily by a leader, the majority of which are women. The leader determines the area in which insects will be gathered and the capture sites. Prior to collecting, the leader will explore the area to locate the breeding sites and places where grasshoppers oviposit. The leader also predetermines aspects such as the high-low range of the samples (demand), and the spatial distribution of specimens during their migration. It can be appreciated therefore, that this woman's role is very important.

Decision- making by Gender and Division of Labor

The choice of collectors is an important part of the mutual knowledge and capture technique. The only exception for shorter hours of work is given to children, elderly and pregnant women, and during times of storm and frost. In the case of privately owned fields and where the land is rented, the leaders play an important role in negotiating approval to enter and work through the crops, with the objective of mitigating the grasshopper plague, but without paying any share or right. This casual relationship works through mutual interest because the collectors can help to control pests of the landowner's crops, while the collectors are able to obtain a good profit based on their knowledge and experience of how grasshoppers are distributed within the territory.

The selection criteria of collecting grasshoppers are determined by the knowledge of their niches and transport by parcel, the latter are based on two criteria:

a. Grasshoppers found on the surface of the crop are harvested massively with various techniques such as catching in blanket nets, manual picking, and collecting in empty cans, sometimes with a cover of cloth or plastic. This only applies when there is an abundance of populations.
b. For species that are found in areas of low herbaceous vegetation, they implement hand-picking and wicker basket techniques.

Collecting sites are determined by the characteristics of the area providing ease of access,

with each collecting group aiming to reduce time spent collecting, though this also depends on the number of members in the group and the type of crop. Within this organization, there are two groups of collectors that are subdivided to collect the entire samples, and in some cases a guide is assigned to new members to provide support and reduce potential losses in the collection, while the other group at the end of the day, helps the elderly women to pack and load the cloth blankets with the bags inside.

At the end of the day, men are engaged in other activities, while each group of women grasshopper collectors prepare the proceeds by sieving the grasshoppers in a large crock pot to clean them with water, and separate out any leaves and stones captured. To finalize the cleaning process, the grasshoppers are boiled or roasted with salt and lemon, a process called 'desflemacion'. Finally, they add onion, garlic and red tomatoes; the latter gives the distinctive reddish color to the grasshoppers, known in the area as "*colorado*". Once cooled and dried, the grasshoppers are placed in wicker baskets for transport and sale, usually over the period of a week and a half to two weeks. Grasshoppers may be further conserved by drying until they become crispy.

Sale of Grasshoppers

Gender Roles

Women are the main implementers and sales developers, and have been usually involved in this activity for several years, constituting an "economic matriarchy" in this aspect. They decide the transcendent aspects of the transaction, costs for the operation, haggle the sale, and make decisions when there are risks that threaten the sale.

Each group of collectors (men), appoints beforehand its own buyer with whom they share bonds of friendship, cronyism and in some cases both. Depending on their economic situation, these nuclei may have up to a maximum of four itinerant buyers, who come from different regions. These vendors have a specific marketing route that covers the major points of sale, such as the Ladino markets. In addition to those close to their region, the preparation and distribution of grasshoppers ranges from Matamoros, Yecapixtla and Cuautla, and other cities or towns.

The roving vendors (women) as well as the collectors (men) are all known as 'travelers of the red grasshoppers' because they often have to travel during the months of October and November to places where there is greater demand, that may vary depending on the route and destination.

The first site is located at the bus terminal in Cuautla (maximum range), where the seller has to sell at retail together with some of tenure of vegetables, both inside and outside the old market. In this case the business relationship that exists between vendor and dealer is short term, because social ties are not of interest, but an economic transaction.

The second site lies inside the new market (minimum range), along the corridors where the merchandise is displayed on the floor with a mat or blanket from 09:00 to 18:00 h, but they must pay a mandatory fee of $0.85 USD per day, established by the market administration, and remove from the spot on completing the sale. At this site, the sellers show a great versatility of commercial decisions since the intermediaries are only incidental, therefore decisions need to be made rapidly to evade the competition, with sellers increasing or lowering their price according to the quality (smell, freshness, color, moisture content) and form of preparation (boiled in lemon juice, or in salt water) of the grasshoppers.

Transaction System

Sale is made at the collecting site, when they are in the way back to their point of sale or "new or old market of Cuautla". Sellers' prices can fluctuate between grasshoppers' phenology and the supply and demand of the moment. The transaction is carried out in units of a "pint", which consists of one large sardine can of 450 grams each (or one quart equivalent to 1.8 kg), called *"maquila"* when sold at the market. The *"maquilas"* are transported along with the grasshoppers in plastic buckets or wicker baskets. A woman will usually carry one or two buckets of grasshoppers, with a net quantity of 30 to 40 sardine cans depending on the size. When there is a greater demand a total of 75 sardine cans/day can be sold in around 8 hours. Prices vary according to the place of sale and the quantity (Table 2).

A sardine can is sold at the market for $0.53 USD to $0.65 USD, a 250 g can of Jalapeño chiles is sold for $0.28 USD, and a can of mountain chilis is $0.072. These prices are respected by the competitors and all of them maintain uniformity in their supply and in their demand.

The vendors only accept transactions made with local currency. When there is a buy-back, this is done by prior arrangement with the middleman who is usually the tenant of one or more fixed positions at the market (they also sell avocados, tomatoes and other vegetables in season). The resale value has a net profit of $2.00 USD to $3.00 USD their maximum price, and comes every week to purchase up to $50.00 USD of "*maquila* industry". The market seller displays their wares piled in a small pyramid, and explains to costumers the origin and development of the grasshoppers for sale, emphasizing the years of experience they have in selling grasshoppers, and that they themselves consume the "coloraditos" grasshoppers. The seller will also highlight the dishes that can be prepared with the grasshoppers, for example with crackling and beans, fried in red sauce, marinated with beef jerky, on top of cheese, with another type of hot sauce or cream and as a snack.

Significantly, the vast majority of consumers come from the Federal District, Matamoros (Guerrero), Chinameca (Morelos) and various localities of Guerrero State, the latter come exclusively to the old market to buy grasshoppers. Therefore it exists as an interstate market.

DISCUSSION

As results of this study, we can assert that traditional management of grasshopper germplasm, and transmission of *corpus* and *practice*, used by these collectors and sellers are the basis of continuity and productivity of grasshopper biomass in the Ladino markets of Cuautla, Morelos (Carbajal et al. 2000). These processes are intrinsically linked to the socio-economic condition, as well as to the habits of their use in relation to the ecosystem (Castillo 2000; Jimenez 2002).

It is important to mention and discuss the presence of matriarchs, an ancestral tradition in the communities of grasshopper collectors in the states of Puebla and Morelos. Ramos-Elorduy (2005) reported that this matriarchy plays a key role in rural areas (Dahlberg 1981) including the process of economic development, individual or collective, for decision- making that women apply as farmers, collectors, assistants, sellers, distributors, consumers, and housewives, being the most stable members of the family, since men can migrate to other places and countries in search of work. The implication of their leadership is demonstrated by applying the fundamental notion bases for short and long term critical situations in agriculture, to optimize and stabilize the control of logging and development of insects, as well as creating new paradigms of conservation of habitats and ecosystems.

Furthermore, in addition to social issues, there is an increase in environmental pollution, solid and toxic waste, acid rain, excessive logging, drug trafficking, narcoagriculture, and neoliberal policies that have marginalized the country. This has decimating rural areas and the crops relied on by associations of grasshopper collectors, that unit rather than divide the states of Puebla and Morelos.

CONCLUSION

It was concluded that red grasshopper collectors realize a set of defined practices, allowing uniformity in decision- making because the criteria are unified by a leader, who out of respect for kinship and experience, gives a unanimous decision, so that processes search and resource management are making with a minimum of risks in terms of handling and processing times, this happens from prehispanic times.

- The present study identified three species of insects that are marketed with more demand in the Ladino markets which are: *Sphenarium purpurascens* Ch, *S. histrio* G. and *Taeniopoda auricornis* W. (Orthoptera: Acrididae).
- The importance of the *corpus* and *praxis* is rooted in the traditional management of insect germplasm, and constitutes the primary basis for its sustainability over generations.
- The matriarchy promotes economic contribution and new knowledge of conservation, which are strongly associated with culture, religion and tradition, to create new biological archetypes.
- The aspect of kinship among the collectors plays an important role in the collection, preparation, marketing and conservation of these insects in the Ladino markets of Cuautla, Morelos.
- The old and new markets in Cuautla, Morelos, are the main axis of distribution and

marketing of edible insects through history by the easy access to the general population.

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