ABSTRACT

CARRIE E. PHILPOTT
Gender and Ethnic Differences in the Cultivation of *Stenocereus stellatus* in the Tehuacán Valley and La Mixteca Baja regions of Central Mexico
Under the direction of KATHLEEN C. PARKER

The Tehuacán Valley and La Mixteca Baja regions of Central Mexico have a long history of plant domestication and cultivation and remain one of the few sites in the world with a large endemic flora. Biodiversity of the numerous plants in these regions depends upon the indigenous groups. One endemic species of this area, the columnar cactus *Stenocereus stellatus*, or *xoconochtli*, has been used extensively by the three main indigenous groups in this area: the Nahua, Popoloca, and Mixteca. Individuals of these groups manipulate the desired outcomes of fruit characteristics such as color, size, thickness of peel, and number of spines, relocating some of species with desired traits from wild populations to managed or home garden settings. Traditionally within agriculture, women have gender specific roles as the domesticators of plants and caretakers of home gardens. Due to Mexico's extensive history of structural changes in regard to agriculture and land use patterns, practices of indigenous communities have altered some of the gendered roles of agriculture. By examining the use of *S. stellatus* among these groups through household interviews, this thesis studies how gender and ethnicity differences exist among the three groups in relation to *S. stellatus* cultivation and how current land reform policies impact gender roles. Based on the ethnic, geographic, social, and economic conditions of these three groups, I hypothesize that gender roles differ among the groups in concern to cultivation practices and the selling of *xoconochtli* with greater differences existing among the Popoloca group due to their smaller population.

INDEX WORDS: Mexico, domestication, cultivation, *Stenocereus stellatus*, *xoconochtli*, ethnic groups, gender, land

GENDER AND ETHNIC DIFFERENCES IN THE CULTIVATION OF *STENOCEREUS STELLATUS* IN THE TEHUACÁN VALLEY AND LA MIXTECA BAJA REGIONS OF CENTRAL MEXICO

by

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DEDICATION

To my mother whose love and support have allowed me to achieve my dreams.

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CHAPTER 1
INTRODUCTION

Plant domestication manipulates plant species for desirable traits for humans. Central and southern Mexico has a long history of plant domestication, dating back 10,000 years, and also remains one of the few sites in the world with a large endemic plant population (Harlan, 1971; Hawkes, 1983 as cited in Otero-Arnaiz et al, 2005). A particularly noteworthy site in this region is the Tehuacán-Cuitcatlán Valley, named a biosphere reserve by the Mexican Government-UNESCO in 1998 and one of twelve centers of diversity in Mexico (Dávilia et al, 2002). The Tehuacán-Cuitcatlán Valley hosts many of these endemic plant species, and of particular importance to the region and its history is *Stenocereus stellatus*, one of the numerous columnar cacti. This columnar cactus species thrives in arid and semiarid regions like the Tehuacán-Cuitcatlán Valley (Casas and Barbera, 2002 as cited in Casas et al, 2006). *S. stellatus* has grown to be of great economic significance and value because of its ability to bear edible fruit and need of little maintenance (Pimienta-Barrios and Nobel, 1994; Sedgley and Gardner, 1989 as cited in Casas et al, 1997). The fruits are commonly named *pitaya* (scaly fruit) in more widely spoken Spanish and *xoconochtli* in the local Nahuatl language of the Nahua indigenous group of Mexico; they have constituted part of the diet of this region for thousands of years (Piña, 1977 as cited in Pimienta-Barrios and Nobel, 1994; Pimienta-Barrios and Nobel, 1994; Sedgley and Gardner, 1989; MacNeish, 1967; Smith, 1967 as cited in Casas et al, 1997). The local inhabitants utilize *S. stellatus* for many purposes, including consumption (human food: fruits, seeds, stems), firewood (stems), fencing, and as a mechanism to prevent soil erosion (Bravo-Hollis and Sánchez-Mejorada, 1991 as cited in Casas et al, 1997; Casas, Viveros, and

Caballero, 1994 as cited in Casas et al, 1997). Columnar cactus species thrive in these arid regions because they do not need large amounts of water and fertilizer and therefore remain resistant to drought (Pimienta-Barros and Noble, 1994).

The major ethnic groups inhabiting the area of *S. stellatus* in the Tehuacán Valley, and neighboring La Mixteca Baja, include the Nahua, Mixtec, Popoloca, Mazatec, Chinantec, Ixcatec, and Cuicatec ethnic groups (Casas et al, 1997). Of particular concern to this study are the Nahua, Mixtec and Popoloca groups. The Nahuas, descendents of the Aztecs, comprise various Mexican ethnic groups with Nahuatl, a language from the diverse Uto-Aztecan family which includes 25 distinct languages, as their common language (Beekmen and Christensen, 2003; Vargas-Alarocon et al, 2007). The Nahuas prevail as the most numerous group in both the Tehuacán Valley and Mexico, with substantially smaller populations of Popoloca (Popolocan speakers) and Mixtec (Mixtec speakers). These indigenous groups in the Mexican states of Puebla and Oaxaca are within the Tehuacán Valley and La Mixteca Baja (Casas et al, 1997).

Plant biodiversity of this region depends highly upon the indigenous groups that use the plants in everyday life, therefore manipulating the desired outcomes of fruit characteristics such as color, size, thickness of peel, and number of spines without knowledge of the use of genetics in the "modern" sense. Instead, more traditional methods are employed from their own knowledge base of how to create preferred crops. (Casas et al, 1997; Dávila et al, 2002). By examining how each indigenous group manages and often domesticates *S. Stellatus* in wild, managed, and cultivated populations as part of their daily livelihood (Casas et al, 1997), certain gendered roles can be observed among the three distinct ethnic groups.

Historically, women have often been the domesticators of plants (Chambers and Momsen, 2007). They gather, manage, plant, and domesticate crops in home gardens, seeking to

strengthen subsistence agriculture (Giarracca and Teubal, 2008) and becoming 'seed custodians' (Howard, 2003 as cited in Chambers and Momsen, 2007). These home gardens, mostly cared for by women, conserve the history and culture of indigenous groups and hold a vast amount of resources (Barrera 1980; Alvarez-Buylla et al, 1989 as cited in Beekmen and Christensen, 2003). In Latin America, more than half of the 7.5 million women working in the agricultural sector live in Brazil or Mexico, working and greatly contributing to crop production alongside husbands and male offspring (Giarracca and Teubal, 2008). Women remain crucial to agriculture in places such as Mexico, and along with managing their home gardens, women mainly prepare food and participate in the post-harvesting process, all providing for what the household needs and prefers in concern to nutrition and flavor preference (Momsen, 2004 as cited in Chambers and Momsen, 2007). Among indigenous women, certain trends regarding gender roles in plant management have been observed that lead to clear distinctions between the roles of women in some of the ethnic groups, including the Nahua and Popoloca (Vazquez-Garcia, 2007).

To understand gender differences in Mexican agriculture, it is necessary to refer to the current situation of the Mexican agricultural economy. Agriculture and land reform in Mexico changed significantly due to such factors as the rewriting of Article 27 of the Mexican Constitution, neoliberalism in Latin America designed to deregulate and promote free markets, the International Monetary Fund patronage to reorganize the Mexican debt and government funds (Gerber and Kerr, 1995 as cited in Eakin, 2005), and transnational treaties such as the North American Free Trade Agreement. All these factors have contributed to vast changes in Mexican agriculture, particularly in the role of women in this sector. Numerous reform projects in the past century allow men to earn additional land and production rights (Nash, 1986; IDB, 1995; Katz, 1999 as cited in Hamilton, 2002) and force those men not involved in Mexican

agriculture to seek employment elsewhere in places such as the United States. The influx of male immigrants to the U.S. for work alters the landscape of rural Mexico, leaving behind many women in the changing agricultural economy.

By examining the use of *S. stellatus* among these indigenous groups through household interviews and data collection from three consecutive years of field research in the region, this thesis studies the intersection of evolving gender roles and ethnic practices among the three groups in the states of Puebla and Oaxaca, Mexico, in relation to *S. stellatus* cultivation and how current land reform policies impact gender roles and *xoconochtli* cultivation. Based on the ethnic, geographic, social, and economic conditions of these three groups, I hypothesize that gender roles differ among the groups in concern to cultivation practices and the selling of *xoconochtli*, with greater differences existing between the Popoloca group and the other groups due to the smaller population size of the Popolocas. Also, due to increased migration to the United States, I hypothesize that more women than men participate in selling *xoconochtli* fruit while continuing to be the primary caretakers of the home gardens.

Following this introduction in Chapter One, subsequent chapters will discuss the literature reviewed for this thesis, the methods used for data collection, and the results of the data collection. The final chapter will engage in an analysis and discussion of previous chapters and include final thoughts on the entirety of the project.

CHAPTER 2
LITERATURE REVIEW AND THEMES PRESENTED

Extensive research has been completed on the cultivation and domestication of *S. stellatus*. Past research has focused on genetic differences among the wild, managed, and home garden settings of distinct sites throughout the region and how individuals have manipulated the fruit of this endemic species for many centuries. Some work has included ethnic differences among the indigenous groups involved with *S. stellatus*, principally in the naming of the fruit. However, this thesis seeks to cover ethnic distinctions beyond the naming of the fruit by examining how the three main indigenous groups cultivate and use the fruit based on their specific cultures and histories. Along with ethnic differences are those pertaining to gender--how gender variance between the groups may lead to particular cultivation practices. The literature review focuses on the significance of this endemic species in the biodiversity of Mexico. It also gives background to the ethnic groups in the region and gender distinctions and roles within agriculture. Finally, it highlights the history of property rights and land in Mexico as it relates to gender and immigration.

Biodiversity in the region

Within the borders of Mexico exists a vast array of plant species that occur in a wide variety of environments and habitats. Many regions of Mexico support unique biota; this adds to the collective biological diversity of the country. The Tehuacán-Cuicatlán Valley and La Mixteca Baja region of central-southern Mexico are home to some of the greatest areas of biodiversity not only in Mexico, but also on a global scale (Casas et al, 1997). The Tehuacán-

Cuitcatlán Valley, situated in the southeast state of Puebla and in the northwestern part of the state of Oaxaca, hosts between 10 and 11.4% of the flora of Mexico. With a mean annual temperature of 21 °C and annual precipitation of 400 mm, this semi-arid region has a varied topography that can support numerous plant communities (Dávila et al, 2002). Measuring approximately 10,000 km², this valley has a high rate of endemism, with 365 endemic species, representing 13.9% of its total flora. With 180 plant families found in the valley, 42.2% have at least one endemic species in the region (Dávila et al, 2002). Within the Cactaceae family, of the estimated 850 species found in Mexico, 81 species exist in the Tehuacán-Cuitcatlán Valley (Dávila et al, 2002). Apart from its status as a region with a vast biodiversity of plants, this valley "is recognized as one of the sites where agriculture first developed in the New World" (MacNeish, 1967 as cited in Carmona and Casas, 2005). South of the Tehuacán-Cuitcatlán Valley in northwestern Oaxaca, southeastern Puebla, and northeastern Guerrero is the La Mixteca Baja region (Casas et al, 1997). Larger than the Tehuacán Valley, with an estimated area of 50,000 km², this mountainous region has an mean annual temperature of 22 °C and mean annual precipitation of 760 mm. The columnar cacti species, part of this vast biodiversity, grow in the low, dry, and warm habitats of this region in thorn-scrub and tropical deciduous forests (Casas et al, 2006).

Domestication and significance of S. stellatus

The use of *S. stellatus* by humans dates back to approximately two phases, 3500-2300 B.C. and 200 B.C.-A.D. 700, with this information provided from evidence of archaeological excavations in the Tehuacán Valley. Although initially not considered a central component of diet due to trace amounts of the remains, other evidence suggests that *S. stellatus* was used

consistently over time, especially in Ajalpan and Santa María. Cultivation of the species did not occur during these phases, but can be seen in present times in its domestication in managed populations and home garden settings (Smith, 1976; Cullen, 1967 as cited in Casas et al, 1997). Along with other columnar cacti in the region, *S. stellatus*, has constituted a significant plant resource over a long range of time. Due to domestication of the species, it continues to thrive in the Tehuacán Valley and has become a focus of study for those interested in plant domestication. In particular, this study examines how the indigenous groups in the region are impacted by this domestication process based on the intersection of gender roles and indigenous practices of the three groups in the region.

Domestication can be defined simply as the relationship between humans and an intended plant or animal. However, this definition is too simplistic. Domestication involves human control of plant or animal reproduction, movement, distribution, nourishment, and protection. Many would argue that a sense of ownership is implied, with human intervention as a key element. Humans maintain this dominant role because they have the choice and power to elect genetic variants, and thus change phenotypic expression (Zeder, 2006; Smith, 2006 as cited in Zeder 2006). Even some of the first farmers recognized how a population could be domesticated from its wild use to genetically desirable and improved stock in a managed population while simultaneously keeping the wild population as a sort of gene pool in reserve for future uses (Vaughan et al, 2007).

In the case of *S. stellatus*, its domestication becomes a prime focus of this study as it is one of the most important cultivated species of columnar cacti (Pimienta-Barrios and Nobel, 1994). These edible fruits of *S. stellatus* are commonly named *pitaya* (scaly fruit) by Spanish, and *coapetilla* (thick serpent) by ancient Mexicans (Pimienta-Barrios and Nobel, 1994) in wider

spoken Spanish and *xoconochtli* in the local Nahuatl language of the Nahua indigenous group of Mexico (Casas et al, 1997). They are domesticated based on several factors of fruit characteristics, including color, size, thickness of peel, sweetness, and number of spines. Of primary concern is the color of the pulp. Generally, there are six variants: red, pink, white (or green), purple, orange, and yellow. The peel thickness represents another focal trait in domestication, as fruits in the wild generally have thicker peels than those in managed or homegarden settings. Consumers of *xoconochtli* prefer the thinner peel. Spines are another factor of concern in harvest of fruit from the top of the cactus (as its primary location for growth), as the individual picking the fruit does not wish to encounter many spines. Most consumers also desire large fruits with a particular sweetness. *Xoconochtli* can be eaten both fresh and dried, and used in other types of preparation, including jams (Casas et al, 1997). *Xoconochtli* and other *pitaya* fruits remain an important factor in the lives of groups whose ancestors first made use of this species thousands of years ago.

Ethnic groups in the region

The three primary ethnic groups of concern to this study are the Nahua, Mixtec and Popoloca groups although ten different indigenous groups inhabit the study area (Casas et al, 1999). Mexico has one of the largest indigenous populations of Latin America. Although Spanish is widely spoken, it is not the only language spoken in Mexico, with many people speaking either an indigenous language such as Nahuatl or Mayan, Spanish, or both[1] (CIA-The World Factbook, 2005). The Nahuas, descendents of the Aztecs, are one of the largest ethnic groups in Mexico. Their language, Nahuatl, is from the diverse Uto-Aztecan family, which

[1] According to the CIA-The World Factbook (2005), 92.7 percent of the Mexican population speak Spanish only while 5.7 percent speak Spanish and an indigenous language. The remaining 0.8 percent speak just an indigenous language.

includes 25 distinct languages and is the largest indigenous language spoken in Mexico (Navarrete-Linares, 1998 as cited in Vargas-Alarocon et al, 2007; Gilberto Vargas-Alarocon et al, 2007). The Popolocan indigenous group can be found primarily in the state of Puebla, and the Mixtecs, in the state of Oaxaca of the Tehuacán Valley and La Mixteca Baja regions (Casas et al, 1997). The Popoloca population and Popoloca speakers number in the thousands—a small number in comparison to the Nahua or Mixtec populations. Pivotal to this study is the work by Vazquez-Garcia (2007) who noted in her research of Popoloca and Nahua groups involved with plant management in Veracruz, Mexico, that Popolocans are seen by other indigenous groups as less civilized. They received criticism from neighboring Nahua groups for their practices, such as their gender relations and subordination of women in plant gathering. Some Nahua and Popoloca communities vastly differ in household roles. One reason for these differing household roles results from more Nahua emigration from the community (Vazquez-Garcia, 2007). The Mixtecs, in the areas south of the other two groups, also have an extensive migration history. The Mixtecs migrate to other large cities in Mexico, such as Veracruz, and to cities in the U.S. *Oaxaqueños*, meaning people from the state of Oaxaca, is a common name given to these Mixtec migrants (Velasco Ortiz, 2005). Because of their distinct languages, each group has differing classifications of *S. stellatus*. Research indicates that the Mixtec population classification differs from that of the Nahua and Popoloca. This classification perhaps reflects regional and geographic differences, with more Nahua and Popoloca populations found in Puebla and the Tehuacán Valley and Mixtec groups found in Oaxaca and La Mixteca Baja (Casas et al, 1997). However, *xoconochtli* remains a term recognized on a broad scale regardless of the fact that it is a Nahuatl word. Although the term *pitaya* is always recognized, *xoconochtli* came to represent

S. stellatus consistently in all groups and individuals interviewed, regardless of the ethnic distinctions.

Many indigenous knowledge practices have become favored by those practicing sustainable development techniques in the face of the modernization and large scale economic development (Briggs and Sharp, 2004). Because of a concentration and favoring of Spanish speakers and those of Spanish descent, common in numerous Latin American countries and cultures, indigenous movements in the 1980s and 1990s grew to immense importance. With laws and decrees passed to respect indigenous rights and diversity throughout Latin America, replacing the former laws which called for complete separation of indigenous and mestizo (mixed) groups, indigenous rights seemed to change throughout Latin America and those countries with large indigenous communities. Land, as discussed in subsequent sections, became a prominent concern for these indigenous groups as based on their extensive history and involvement with the land (Deere and León, 2001, Velasco Ortiz, 2005).

Indigenous groups oftentimes are the basis of knowledge for plant domestication, as many practices and procedures can be traced to the colonial era of the Spanish with extensive documentation by the Spanish of how they learned of the traditional practices (González Jácome, 2003; Briggs and Sharp, 2004). Indigenous knowledge, once viewed as counter to the research conducted in the more "developed" countries, is now valued in the sustainable resource debate. Indigenous knowledge often holds vital plant resource information as these groups of people have lived with and cultivated certain plants for centuries before the arrival of modern agricultural technology (Briggs and Sharp, 2004). Many studies have concluded that traditional farming methods, although differing from the large scale production typical to most Western nations, hold valuable knowledge for prosperous cultivation and production. Without the

extensive use of pesticides, fertilizers, and machinery necessary in larger commercial operations, these indigenous systems rely on past practices that have proved successful in centuries of cultivation (Blanckaert et al, 2007).

Gender, gender in agriculture, and gender in Mexico

A vital concern to discussion of gender in history remains the Western-centered viewpoint and how scholars of privilege view women and equality among the sexes. A Western view on equality could be quite different from an indigenous Mexican view (Wood and Haskett, 1997, p. 330). The geography of the viewpoint proves a vital element in how the construction of gender changes among cultures. In any case, gender remains a significant component of how societies function. Judith Lorber describes gender as a social institution, where "…gender is a process of creating distinguishable social statuses for the assignment of rights and responsibilities" (as cited in Kirk and Okazawa-Rey, 2001). Certain spaces hold meaning in traditional views of women, such as the home as a "woman's space"; and institutions, like spaces, hold meaning because society constructs their meanings. Thus they become types of "produced spaces" that a certain group of people, usually the dominant authority, organize and administer (Harvey, 2001 as cited in Grabill, 2001). In most cases, the dominant authority that has constructed the spaces and institutions for women, defining certain spheres, roles, and practices based on each sex, is male. One argument describes the roles of women and men as based on a system of gender complementarity and parallelism, instead of one based solely on the exploitation of women. Women and men could work in two distinct but equal spaces in gender parallelism and within gender complementarity, with the task each sex performs balancing the tasks of the other sex, making each task important (Powers, 2005, pp. 15-17). The terms gender

parallelism and complementarity demonstrate that women do work alongside men, hold important roles, and perform vital duties; but in many regards, this separation of activities based on gender prevailed only in pre-conquest Mexica and Nahua cultures. After Spanish conquest and changing gender roles, these terms cannot account for the numerous differences and oppressive forces imposed on women by men in the post-colonial and current era. Within Latin America, as in many other regions and cultures, women continue to be deprived of many of the benefits that men have. Within the past decades, many strides have been taken to end discrimination towards women and to recognize their importance across all spaces, including those of the home and work space. Specifically for rural women in Latin America, emphasis has been given to women's access to land and land ownership. Because of a dominant agrarian lifestyle and system of control imposed by men that is common to Latin America, women could not claim the title of head of household to be able to receive land grants and inheritance (Deere and León, 2001) leaving women unable to acquire larger plot sizes. Even with numerous programs, accords, laws, and legislations made, women beneficiaries to land are still far less common--21%, compared to the percentage of men, 79% (Deere and León, 2001).

Historical records have shown that within agriculture, women often times are the domesticators of plants (Chambers and Momsen, 2007), becoming 'seed custodians' (Howard, 2003 as cited in Chambers and Momsen, 2007). These home gardens, mostly cared for by women, conserve the history and culture of indigenous groups and hold a vast library of plant knowledge (Barrera 1980; Alvarez-Buylla et al, 1989 as cited in Beekmen and Christensen, 2003), but generally remain close to the house and are much smaller than other plots owned away from the home and by men. In Latin America, many women working in the agricultural sector live in Mexico (Giarracca and Teubal, 2008). Women participating in agriculture in

places such as Mexico manage their home gardens, prepare food for the family, and participate in the post-harvesting process (Momsen, 2004 as cited in Chambers and Momsen, 2007).

Among indigenous women, certain trends regarding gender roles in plant management that lead to clear distinctions between the roles of women in the Nahua and Popoloca ethnic groups have been observed. In a study by Vazquez-Garcia (2007), the management of uncultivated edible plants by different genders differs between the Nahua and Popoloca groups, with more Nahua women involved in plant management than Popoloca women. Among Popoloca women, "men are seen as socially responsible for them and are expected to accompany the family" (Vazquez-Garcia 2007, p. 69). More Nahua women speak Spanish, or speak Spanish with greater fluency, than Popoloca women. They have more access to plants for collection than Popoloca women, who typically have more traditional roles and stay near the house. Popoloca women have more restricted access to *ejido* lands, woodlands, and gathering spaces than Nahua women; and certain gender ideology, such as not touching or looking at blossoming trees while menstruating, widely prevail in Popoloca culture. Both groups greatly value the home garden as a space for women and see the disappearance of a certain uncultivated plant resource from home and market use, the *quelites*, as signs of diminishing indigenous knowledge and food independence within the community (Vazquez-Garcia, 2007).

Ejido land in Mexico, land history, and gender

Communal landholdings by Mexican indigenous groups existed before Spanish arrival and following conquest. The European notion of the "discovery of the Americas" discredits these native residents who had employed their agricultural techniques from centuries of living in the region. Even after Spanish arrival and the implementation of the hacienda complex,

indigenous groups continued to hold communal property and produce for subsistence. Although an urban market grew for export to Europe, the Spanish simultaneously permitted the people to cultivate goods on their own ancestral land or to work on the haciendas, allowing the traditional methods (Meyer et al, 2007). Following dictatorship, the Mexican Revolution fostered the writing of Article 27 of the 1917 Mexican Constitution, which states that all of the lands incorporated by the private landholders be given back to the people. Article 27 envisions a return to the Mexican past of *ejido*, or communal lands.[2] (Bouquet, 2009). However, with the onset of neoliberal politics developing in the 1980s, Mexican farmers of small holdings now suffer due to these free market philosophies and minimal government intervention (Eakin, 2005). The government of President Carlos Salinas de Gortari, elected in 1992, revised Article 27 to allow for the selling of *ejidal* landholdings and for privatization purposes. Those who could not produce enough to meet the demands of the new neoliberal system that required mass production, including those communities who owned *ejido* land, would have the chance to sell their holdings and engage in non-agricultural work (DeWalt, Rees, and Murphey 1994, as cited in Hamilton, 2002). Through other factors that have produced massive challenges to the Mexican market, such as the North American Free Trade Agreement (NAFTA), the International Monetary Fund (IMF), and other government regulations aimed at free trade and neoliberalization, the Mexican agricultural industry and its farmers and workers have had to face severe adjustments . Less reliance on the state, the selling of nearly 27,470 *ejidos,* and direct competition with the larger, richer, and more powerful U.S. market have made the Mexican agricultural market plummet. With the U.S. providing many more agricultural subsidies to large-scale farming operations, the Mexican lifestyle and market of subsistence farming cannot

[2] *Ejido* refers to a "specific community-like institutional form" (Bouquet, 2009). When the state reallocated land following the 1992 reforms, they did so on the premise of providing better security on land tenure and transfers, while a prime motivating factor was to generate individualized wealth and investment (Bouquet, 2009).

compete with the American market and industry. When the price of food soars and industry relies heavily on government compensation, the results are fewer agricultural workers and more Mexican immigrants to the United States (Eakin, 2005; Hamilton, 2002).

Article 27 led to indigenous rights and communal landholdings titles. A revision to the article in 1927 first mentioned gender when discussing *ejido* members and heads of households. It states that only men, single women, and widows could be classified as a household head. A 1971 legislation known as the *Ley de Reforma Agraria* revised previous statements to include both men and women as *ejido* members without concern for who claimed to be household head. Also, inheritance rights benefited the majority of women, who were not household heads, by willing "right of the first buyer" to women and children. Women and children had the first access in buying the land. Progress seems evident by the law, but the numbers showed only a slight rise in female-headed households; and since each household could put forth only one representative of the *ejido* plot, most *ejidos* were represented by men. Laws of the counterreform of 1992 eliminated the few rights women had by stating that women as spouses of *ejido* members could not participate in discussion of selling of *ejido* land. Also, the practice of "right of the first buyer" traditionally belonging to women and children of the *ejido* owner was now abolished, as anyone could buy the land. This individualization and privatization reform excluded women from any inheritance rights that they could have claimed to land, propelling male leadership and dominance because of the majority of male household heads in the neoliberal era (Hamilton, 2002; Deere and León, 2001).

With job loss in agriculture over the past decades, immigration occurs not only to Mexican cities, but to the U.S. Around twelve million undocumented workers reside in the U.S. because of a lack of jobs in Mexico and Latin America, many resulting from losses in the

agricultural industry (El Nasser, 2009). Many men migrate to the U.S. for work, leaving wives and children behind. When conditions deteriorate sufficiently that women enter the workplace, they often travel to the Mexican border, home to the *maquiladoras*, dismal wages, and horrendous working conditions, leaving others behind (Wright, 2006). The economic system creates gender and land ownership issues not experienced before in Mexico, changing many traditional roles.

CHAPTER 3
METHODS

The data presented in this thesis are part of a larger study of *S. stellatus* which compares cultivation practices of the species and associated genetic effects in wild, managed, and home garden settings. Both qualitative and quantitative methods were utilized for data collection in the overall project. This thesis summarizes results from interviews conducted to determine cultivation practices and their socio-economic context. It also presents a preliminary analysis of gender-related differences in cultivation practices among the indigenous cultures occurring in the study area. Field research was conducted in the following cities in the states of Puebla and Oaxaca: Ajalpan, Camotlan, Chazumba, Chinango, El Espinal, Huajuapan de Leon, Metzontla, Tehuacan, and Zapotitlan (Figure 1).

From 2006 to 2008 data were collected in both home garden and market interviews. Altogether 8 households were interviewed in 2006, 39 households in 2007, and 8 households in July 2008. Interviews were conducted with individuals present at the home garden at the time of data collection and included both males and females from various occupations, ages, and ethnic groups. Although a detailed questionnaire acted as a guide (see Appendix), the interviews remained largely informal, as each interviewee had the opportunity to answer and explain in a broader, engaging, and dialogic form. Different individuals conducted the interviews every year. Those individuals selected to be interviewed were first identified through a type of town council, or older male individuals who represented the town and its interests. Many of these town chiefs directed what households and individuals were to be interviewed. In some instances, households

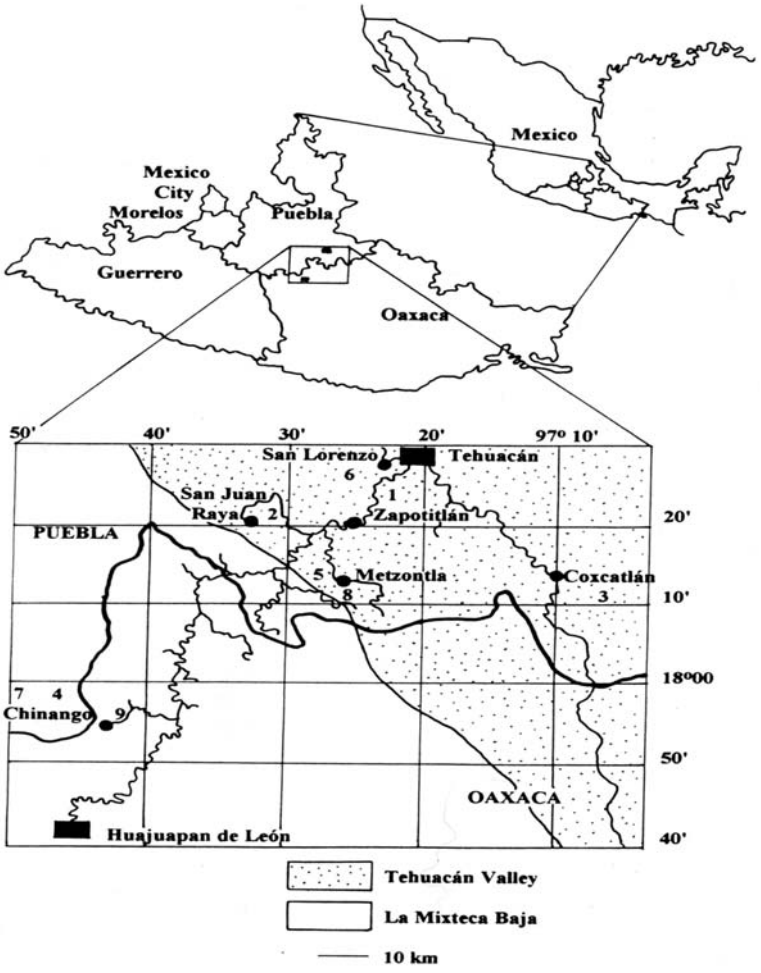

Figure 1: Study area including the Tehuacán Valley and La Mixteca Baja

with large *S. stellatus* populations were included because of direction given by the town leaders; in other cases, households were targeted by the research group in a more haphazard manner. Therefore, households for the overall sample were selected through a combination of directed and haphazard sampling. Appreciation of tradition and the role of each researcher as a guest in the community guided decisions on selection of individuals to be interviewed. I conducted all interviews made in 2008. All of those interviews were second or third interviews collected from

people interviewed in previous years. Within the first two years, 2006 and 2007, most sites were visited once and not visited again in the following years. No market interviews were conducted in 2008 because the fruit was not in season (hence not in markets) during the period of data collection. I used both the data that I collected and the data collected in the previous years by five different interviewers of both Mexican and United States nationalities. Data were recorded both as field notes by each interviewer and in questionnaires that contained the interview protocol and questions. The interviews were intended to provide information concerning management and cultivation practices of *S. stellatus*, preferences for fruit and its characteristics, use of fruit (sell, trade, subsistence), and importance to the individual and the family, among other concerns.

Responses to the questions were tallied quantitatively and are presented tabularly in the results section. Additional information from field notes and questionnaires was summarized qualitatively and has been synthesized in the interpretation of interview results.

CHAPTER 4
RESULTS

Common uses and preferences of S. stellatus

Based on 58 people interviewed, 29.3% male and 70.7% female, many commonalities were noted among the uses of *S. stellatus* and the role that the plant played in the everyday life of each individual (Table 1). Most of the individuals interviewed ate the fruit and sold the fruit in town. Market fruit was sold locally because long distance selling had high costs for transportation and market space, which usually exceeded the imagined profit. When asked how much *xoconochtli* or *pitaya* contributed to monetary income or in what manner *xoconochtli* or *pitaya* contributed to subsistence needs, almost all respondents said none to very little. Some individuals continued to call the fruit *pitaya* instead of *xoconochtli*, although they could identify both terms and equated the terms to the same meaning. In this study, I will continue to call the fruit *xoconochtli* until discussing reasons for the distinction between the two names. Those participants who sold fruit usually stated that *xoconochtli* fruit was the cheapest among all goods sold. When participants in home gardens said they sold the fruit, some stated that they sold it by buckets or kilos from around five to twenty Mexican pesos.[3] When interviewers visited markets, many vendors directed them to temporary stalls outside of the main market to find *xoconochtli* or *pitaya* sellers, as most other produce was sold inside the more permanent market. *Xoconochtli* sellers usually came to market only during season and were not in as high a demand as the other vendors selling *pitaya de mayo*, chiles, dragon fruit, nopales (prickly pear cactus fruit), limes, mangos, pomegranates, radish, corn, and other produce.

[3] At the time this thesis was written, the Mexican peso to U.S. dollar exchange rate would have made 20 Mexican pesos, equivalent to 1.5304 U.S. dollars (http://finance.yahoo.com/currency-converter, 2009).

Table 1: Percentage of respondents using xoconochtli fruit for different purposes

Use of fruit	Percentage
Eat	53.4%
Market in town	51.7%
Exchange with other farmers	8.6%
Market in distant town	6.9%
Exchange in town	1.7%

Most individuals reported having eaten *xoconochtli* since they were children, describing how their parents, grandparents, and all other family members have also eaten the fruit. Many gardens have cacti planted from older generations, with stalks taken from a wild or managed site nearby and transplanted to the home garden. Of the participants interviewed, 44.8 percent said they get stock from branches or cuttings, while only 3.4 percent, or two participants, said they obtained stock from seed. The trait that most individuals selected in order to grow *S. stellatus* in their home garden was large plant size. A total of 13.8 percent, or 8 of 58 of people interviewed, based their selection of planting stock on large plant size. Four of 58, or 6.9 percent, stated that they based their selection on the number of branches and branch size. A majority of those interviewed stated that they did not select the plants that were currently in their garden or on their property, as the plants has been on property for generations (Table 2). Most also wished to teach their children or younger relatives to cultivate *xoconochtli*. Some individuals described in great detail how important it is for younger generations to continue growing and harvesting the cacti and eating their fruit. Also, a few individuals stated the importance of the fruit in medical treatments, especially for diabetes.

Most of those interviewed feel that *xoconochtli* has been so common to the area that everyone eats it, grows it, or knows someone who does; therefore, it cannot generate much

income. Everyone interviewed grew *xoconochtli* and could count back the generations of family members who ate the fruit. Those interviewed could readily name and describe their favorite fruit colors, what characteristics give the best quality fruit, and what to look for in *xoconochtli* fruit. A wide range of answers followed the interview question, "How to you define the best fruit?" Five options were included for as traits important for selection: fruit taste, fruit color, size of fruit, size of plant, and peel thickness. Most respondents chose more than one trait and many added a sixth or seventh category, smell of fruit or texture of fruit (Figure 2). When asked about the variety of the fruit, respondents identified varieties based on color. Several major colors surfaced throughout the interviews and conversations as the primary varieties, including: red, white, pink, yellow, and purple. These varieties were commonly found both in home garden settings and in markets. Red fruits predominated in wild populations.

Table 2: Family members responsible for planting S. stellatus in home gardens

Person who planted *S. stellatus* in garden	Percentage
Other (brother, husband, uncle, aunt)	34.5 %
Self	24.1%
Grandparent	8.6%
Parent	5.2%

Figure 2: Xoconochtli fruit colors (photograph shows pulp and seeds)
Photography by Kathleen C. Parker

Characteristics of those interviewed

Occupations of the respondents varied. Most individuals interviewed reported to staying at home or being a merchant or a vendor while many did not answer this interview question. Other occupations included a few teachers, one doctor, and three identified town chiefs, or individuals who served as representatives of the town. Only two women, one shop owner and one teacher's aide, were included in the other occupation category. Each town chief or representative was male. All respondents interviewed who identified their occupation as staying at home were women. All respondents who identified as merchants were women and only one of the respondents who identified as a vendor was male. Of the six merchants interviewed, 20.7 percent stated that they do travel either to neighboring villages, larger cities in the state such as

Tehuacán, or to Mexico City. In terms of trade, 27.6 percent of all respondents said that they do not trade with other farmers while 8.6 percent did trade with other farmers. The remaining percentage did not answer the question concerning trade.

Table 3: Occupation of those interviewed

Occupation	Percentage
Unanswered	36.2%
Other	20.7%
Stayed at home	19.0%
Vendor	13.8%
Merchant	10.3%

Of the 58 individuals interviewed, 19.0 percent claimed Mixtec heritage. These individuals lived mostly in the Oaxaca region. Although a larger percentage of individuals interviewed did not answer the question about their "cultural group," some individuals identified themselves as belonging to one of the three indigenous groups previously mentioned: Mixtec, Nahua, or Popoloca. In one interview, the individual identified himself as Mixtec and said that everyone in the surrounding community was Mixtec. Therefore, the community where the individuals live generally had people of similar ethnic groups. In 2008, during interviews in the town of Los Reyes Metzontla in the state of Puebla, several individuals identified themselves as Popoloca with the ability to speak Popoloca. These older individuals spoke both Spanish and Popoloca, stating that they learned Popoloca before Spanish. They briefly noted that many of the schools in the region were trying to include local languages in the studies, as many of the younger generations do not speak Popoloca. Other interviewers from 2007 recorded that few individuals identified themselves as Nahua with the ability to speak Nahuatl. Since all interviews were conducted in Spanish, all individuals interviewed spoke Spanish.

At markets, interviewers explored questions concerning cultivation and gender by asking interviewees, “Who is better at harvesting the fruit?” and “Who harvested the fruit?” Of the twelve vendors interviewed, eleven were female and one was male. As shown in Table 4, females were noted to be both better at harvesting the fruit and the primary group that harvested the fruit. This was the only question explicitly addressing gender that was posed during the interviews, and these questions were only asked in market interviews in 2007 and not in home garden interviews.

Table 4: Market interviews and gender relations
(12 market vendors interviewed)

Interview questions	Percentage of responses in each category			
Which gender is considered to be superior at harvesting the fruit?	Male harvesters: 25.0%	Female harvesters: 50.0%	Both genders: 16.7%	Unsure: 8.3%
Who harvested fruit that you are selling?	Male harvesters: 16.7%	Female harvesters: 41.7%	Both genders: 16.7%	Unsure: 25.0%

CHAPTER 5
ANALYSIS AND DISCUSSION

From the preliminary samples obtained from 2006, 2007, and 2008, I can analyze several aspects of my original hypothesis. My primary hypothesis stated that based on the ethnic, geographic, social, and economic conditions of the Nahua, Popoloca, and Mixtec, gender roles differ among the groups in concern to cultivation practices and the selling of *xoconochtli*, with greater differences existing among the Popoloca group due to their smaller population. I also proposed that due to increased migration to the United States, more women than men participate in selling *xoconochtli* fruit while continuing to be the primary caretakers of the home gardens. Based on my observation in towns in the state of Puebla and the state of Oaxaca, I cannot clearly determine whether greater differences existed between Popoloca women and women of other groups. However, the data suggest that among two of the groups, Popoloca and Mixtec, women are more likely to continue cultivation of *xoconochtli* and to sell it or trade it with neighbors or at local markets. Preliminary data also support the hypothesis that migration has changed the dynamics of gender relations in terms of *xoconochtli* cultivation in the region. Because women stayed in Mexico while men migrated to find work either in Mexico or the United States, more women were available to be interviewed and sometimes served as the only primary wage earner in the household. Interview responses suggested that traditional gender roles still exist, with women staying at home and attending the home garden while men work outside of the home or travel elsewhere for work. I also observed through my own interviews that women as well as men take part in collecting branches from the wild *S. stellatus* populations. Because I do not have a more extensive history on who traditionally collected samples or ate the fruit from wild or

managed populations, I cannot determine if the changes in *ejido* land policy provided more or fewer opportunities for women in collection of branches. Although in the town of Santa María Camotlán, former *ejido* land that supported a managed *S. stellatus* population had become privatized and sold, with the cactus population replaced by homes, field data demonstrated that *ejido* lands did still exist in the region, as many managed and wild populations were considered a part of this type of land. In this sense, *xoconochtli* and its cultivation can be seen as part of the entire community and community property meant to be shared among all its members.

Gender roles and migration

I cannot conclusively determine whether distinctions among the three groups existed regarding gender roles. From all interview data, the only observable ethnic differences in practices and gender roles exist between two ethnic groups: Popoloca and Mixtec. Although Nahuahtl is one of the most common indigenous languages in Mexico, few individuals identified themselves as Nahua with the ability to speak the language in my study. Nahua as an indigenous group was not prevalent in towns studied in 2008 and individuals constituted a very small number in the data from previous years. When prompted, individuals in the region studied identified themselves as either belonging to the Popoloca or Mixtec group. In 2008, the only language heard from those interviewed other than Spanish was Popoloca, although many individuals identified themselves as Mixtec, with the ability to speak the language.

In both Santa María Camotlán in Oaxaca and Los Reyes Metzontla in Puebla, where a majority of interviews took place in 2008, women seemed to have an equal, if not more important, role in cultivation of *xoconochtli*. In one interview in Puebla, a woman described how her husband's first wife planted the *xoconochtli* and that she continued the cultivation after the

first wife's death and their subsequent marriage. In Oaxaca, several women described how they went to wild populations to collect branches or trade with their neighbors. Men also participated in this process, but as the men I interviewed were significantly older, over the age of seventy-five, it was difficult to determine if the women helped cultivate because of equal gender roles or because of the men's old age and lack of mobility. In Puebla, one man participated in cultivation with his daughters, as no wife or female partner was present. This particular household seemed very male–dominated, as an older adult woman was not present. In both Santa María Camotlán and Los Reyes Metzontla, several houses had only female primary caregivers. In one instance, a woman of age 52 lived alone and farmed an extensive amount of property. The *xoconochtli* in her yard were immense, both tall and wide, with numerous branches. Another woman lived alone with her smaller children, ages nine and eight, and her ninety-eight year old mother. She never mentioned a husband or partner but said all of her other children had migrated to the U.S. She had been growing *xoconochtli* for thirty years. In both ethnic groups, women were primarily the group that provided most information and answered interview questions in the home garden settings. They also were the majority of those selling *xoconochtli* in the market. A woman selling in the market perhaps demonstrates how local selling can supplement some of the income needed for the household. Because women are the primary caretakers of the home gardens and cultivators of fruit, they are the ones selling the fruit at market while husbands, sons, brothers, and other male relatives earn money through manners other than agriculture. The few men I interviewed were either too young or too old to work. In addition, men who were present for interviews seemed to earn enough farming or had another well-paying job in the region, such as being a teacher or doctor, so that they did not need to migrate.

From these observations, I propose that women are now the primary caretakers of the home garden and cultivators of *S. stellatus* fruit in both regions of study. They were the majority interviewed, 70.7 percent, in both home garden and market settings. As also stated by the market interviews, they are known to be the main harvesters and also the better harvesters of the fruit. Some individuals interviewed also suggested that it was a woman's job to do the harvesting while others suggested that it was once a role for both males and females, but now, females harvest more. Because home gardens are generally located behind the house, adjacent to the house, or in the courtyard of the house, cultivation can be seen as a job performed by women because of traditional notion of the home being a woman's sphere. However, among the women I interviewed, the home being a woman's sphere and migration are both causing women to be the main cultivators. *Xoconochtli* does not generate a significant amount of income and is sold for less than many other products such as *pitaya de mayo*. Many individuals interviewed said that if they sold *xoconochtli*, it would be for less than other products. Many also said that they do not bother selling the fruit because it does not generate enough money to make it worth the effort or transportation costs. They simply eat what they grow when it is available from stocks in their own yard. Thus, women can be the primary cultivators because it does not require much time, energy, or costs. Men can venture to find job opportunities and leave women to watch the household, sending remittances home to provide for their families.

Ethnic differences

One major ethnic difference pertained to naming the fruit. The diverse names used to describe *S. stellatus* fruit, as evidenced by Casas, et al (1997), did appear in interviews. Some individuals called fruit *xoconochtli* and others *pitaya*, but all groups were discussing the same

fruit. In my interviews, residents of Oaxaca used *pitaya* more than *xoconochtli* and in Puebla, the opposite was true. In some instances, individuals used both terms in both regions. Also, names for colors were also noted to be different for the two ethnic groups. In 2007, interviewers noted that the term *sulferino* referred to a pink or hot pink color. This term was used in markets in both Tehuacán and Ajalpan. The term *morado,* referring to a purple color, was used in Santa María Camotlán in Oaxaca. *Sulferino* was not heard in any of the home gardens in this area. Both the names used to describe the fruits and preference in fruit color varied among ethnic groups and regions.

Ejido land use

The absence of knowledge about *ejido* land use in this particular region complicates determining whether gender differences existed in terms of accessing or controlling the land. *Ejido* lands do exist in the region and these are the sites where individuals collect *S. stellatus* branches to plant on their own private property or to eat. It remains unclear if the majority of the fruit sold into market comes from home gardens or private property, or if any fruit is taken from the *ejido* lands. I propose that fruit sold or traded comes from an individual plot as that individual generates profit from fruit sold. The branches planted, however, and original pieces used to propagate the home garden, more than likely came from *ejido* land or from a wild population.

Two town leaders who acted as ambassadors of the town Los Reyes Metzontla to the research team discussed one large plot of land used outside of the town. These men said that several men owned the land. In their discussion, they did not refer to it as *ejido* land. They described how certain individuals planted *S. stellatus* in rows to prevent soil erosion and also to

act as a type of fence for the land. Besides using the plant for its physical structure, they mentioned that many people came and cut branches and took the fruit.

Other interviewees described traveling to regions far away to collect *xoconochtli* and its branches. Whether these regions contained lands that were or are *ejido* lands was not determined. Other nearby populations of *S. stellatus*, outside of Santa María Camotlán, for instance, grew along the road and seemed to have many individuals picking fruit and cutting branches in the area. The term *ejido* land was never specifically mentioned, but as evidenced by interviews and witnessing individuals on the land, this land seems to be a communal type land.

Whether the term *ejido* was used, communal land did persist in the region. Nevertheless, individuals considered their private property and own farm land and home gardens as their source of pride. They traveled, traded, bought, and sold to obtain their produce and livestock on their land. Almost all of those interviewed took a great amount of pride in their land and *S. stellaus* plants. In numerous gardens, a vast number of plants were present and plants typically had many branches, indicating their extensive history in the region. The widespread removal of *ejido* land in Mexico has likely affected *S. stellatus* and decisions people have made about growing the cactus, along with other aspects of their livelihood. As *ejido* land was lost in some locales, decisions had to be made as to whether farming should continue or jobs should be sought elsewhere. To find jobs outside the community, many men travel to distant towns in Mexico or the U.S., or they commute from the job site to home, leaving women to take care of children and the home. Perhaps as *ejido* land and wild populations have been lost, people have planted additional *S. stellatus* in their home gardens to ensure a source of the plant, which is easy to grow and has traditional value and use.

S. stellatus and the community

Xoconochtli is one aspect that people in this region have in common. *Xoconochtli* is known in the streets of Tehuacán and Mexico City, and even among those Mexicans living in the United States. As evidenced by its extensive history and endemic distribution in the region, *xoconochtli* has been a long-lasting and integral part of the lives of many Mexicans. Although individuals may not generate much income from the fruit as they would with *pitaya de mayo* or other produce, they enjoy its taste, availability, and ease of cultivation. After branches are planted, plants begin to grow quickly. While growing, not much water is needed and the plant requires little in terms of care. Most individuals interviewed said they remove weeds around the cactus and try to keep insects and other pests away as part of their maintenance of the plant. The plant is one vital aspect in the community culture, with one town erecting a statue to commemorate its importance (Figure 3).

In 2006 and 2007, several individuals noted that poorer residents had access to the fruit by either picking it in the fields or obtaining it from their neighbors. *Xoconochtli* is something to be shared and a product that all have access to, either through their own home gardens or generous neighbors and friends.

Figure 3: Cactus Monument in the Town Square of Zapotitlan
Photography by Kathleen C. Parker

Interviewing discrepancy and power relations

Because of both the quantitative and qualitative nature of this study, some aspects of the interviews may have been informed by power relations between the interviewers and those interviewed. In both 2006 and 2007, Mexican women participated in the interviewing process. With similar nationalities, culture, and language, those Mexican women may have received different information than the Anglo American interviewers. As described by Best (2003), "research is defined as a socially organized experience" (p. 895). Certain power relations may

exist between the researcher and those interview participants because of race, age, class, gender, nationality, and sexuality differences that may arise during the interview process or later analysis of the research and research process (Best, 2003). In my own research, certain power relations, and specifically gender relations, may have helped or hindered my interviews. I felt that interviews with women were more successful than those with men, as perhaps women felt more comfortable discussing the topic with another woman. However, I felt that my position and identity as a young, American, educated woman may have made individuals apprehensive to answer questions, regardless of my gender. Another aspect of this study was the number of times individuals were interviewed. With the chance of being interviewed one, two, or three times, some individuals may have felt foolish or bothered by having to answer the same questions multiple times. During some interviews in 2008, individuals stopped answering interview questions and told me that they did not want to answer the same questions for the third time. These and other power relations may have caused discrepancies and tension in the interviews.

Final statement

This thesis contributes a unique interpretation to the widespread literature on cultivation and domestication of *S. stellatus* in the Tehuacán Valley and La Mixteca Baja regions of Mexico (Figure 4). With research on the subject by many individuals on a diversity of topics, gender and migration issues have not been explored previously. By writing this thesis, I hope to learn from previous research and expand the topic. Although this one study cannot generalize the patterns of what occurs around the world or in Mexico in terms or domestication and migration, I wish to provide a starting point for more exploration on the subject.

Figure 4: S. stellatus in Puebla, Mexico
Photography by Kathleen C. Parker

APPENDIX A
INTERVIEW QUESTIONS

Interview Questions: Home Gardens and Markets

GPS Coordinates: GPS Unit: `
Date & Time of day:
Age:
Location – Garden, Market, Town, Restaurant
Profession:
Weather:
Cultural Group:

- Show pictures to facilitate identification
- Keep individual data sheets in notebook for each interview
- Be prepared to give gift to participant

PART 1 – Home Garden Interviews

1. What do you do with your fruit?
   -eat
   -exchange in town
   -exchange with other farmers/gardeners
   -market within town
   -market distant town

2. In what way does *Stenocereus stellatus* meet your subsistence needs?

3. How important is *Stenocereus stellatus* to your yearly income?

4. How long have you been...
   -growing
   -selling
   -eating

5. Where did you get your stock?
   -cuttings
   -branch
   -seed

6. Do you trade stock with other farmers/gardeners

7. How much do you travel in a year's time?

8. For fruit that is sold...
    -Price or barter value?
    -Description, characterization (Use pictures)?

9. What is the size of your garden?
    - Number of *Stenocereus stellatus* in garden?

10. What other things are grown in your garden to...

    -eat
    -exchange in town
    -exchange with other farmers/gardeners
    -market within town
    -market in distant town

11. Why did you choose to grow *Stenocereus stellatus*?

12. How many (perceived) varieties of *Stenocereus stellatus* are there?
    -How many different cacti make fruit?
    -How many of the different varieties do you put in your garden?

13. What pests have you observed in your garden & how do you control for these?

14. Have you observed any bats in your garden pollinating your cacti?

15. How do you feed, water, fertilize & otherwise care for your plants?

16. How do you choose which plant is the best to grow? (produces the best fruit?)
    -biggest plants
    -biggest flowers

17. How you define the "best fruit"?
    -fruit taste
    -fruit color
    -size of fruit
    -size of plant
    -peel thickness

18. Is there a difference in preferred fruit for home use vs. market?

19. How did the cacti in your garden get planted there?
    -self
    -parent

-grandparent

20. Do you participate in any type of management of *Stenocereus stellatus* in the wild?

21. Will you teach your children how to plant a garden?

PART 2 –Market Interviews

1. Did you grow the fruit yourself or buy it from someone else?

2. Where was the fruit grown?

3. Do you market other fruits/vegetables?

4. If so, what ones, and what is their source?

5. How important is *Stenocereus stellatus* relative to other fruits/vegetables you market?

6. How many varieties of *Stenocereus stellatus* are there?

7. What is your personal favorite?

8. What is the best selling fruit?

9. Are all the fruits priced the same?

10. How long is the fruit in season? (produced)
    - Is it available at the same time every year?
    - When is it obtained?

11. Who does the harvesting of this fruit?
    -Self
    -Male/Female

12. Which harvesters do a better job? (M/F)

13. What cultivation practices do you use to produce your fruit?

PART 3 –Informal Interviews

1. Are you familiar with *Stenocereus stellatus* cacti?

2. Do you happen to grow any in a home garden?

3. Why did you choose this particular cactus to grow?

4. How long have you been...
    -growing
    -selling
    -eating

5. Where did you get your stock?
    -cuttings
    -branch
    -seed

6. How do you use it?
    -eat
    -exchange in town
    -market within town
    -market distant town

7. For your own use, how to you prepare it?

8. What particular characteristics do you prefer?
    -fruit taste
    -flower color
    -peel thickness
    -size of fruit
    -size of plant

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