

Value Chain of Chile Piquin Wild Chili (*Capsicum annuum* L. var. *glabriusculum*) from Northeastern Mexico

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Article History

Manuscript No. AR1496b

Received in 26th November, 2015

Received in revised form 19th May, 2016

Accepted in final form 6th June, 2016

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Keywords

Value chain, consumer, marketing, value added, wild chili

Abstract

In Mexico, chili is one of the most important crops for high involvement in the value of the regional agricultural production, generation of income to producers and jobs in wild chili production areas. In the Northeastern of Mexico this wild chili species is strongly rooted in its typical gastronomy. The present study aims to present a model of the economic activities that promote the generation of the value of the “chile piquin” wild chili of the northeastern Mexico, thereby, on the basis of the local production it can reach the final consumer himself which can be likewise, regional, national or international. This exploratory analysis was carried out to collect information of marketing of chili and update about scientific investigations and make a comparative study of our information available and finally to create a frame of reference for future upgrades of the product chain “chile piquin” wild chili which could serve as a basis for other studies. The tool used for obtaining information with statistical validity ($p \leq 0.05$) was the method of interviews and of focal group. A flow diagram is developed of the value chain of the “chile piquin” wild chili in northeastern Mexico, which explains the processes and pathways that follows the marketing and the increase in the value added of this important product. It was concluded that prices of wild chili have been increased in accordance with the food prices and the fall in the harvested area and production quantity (supply) in Mexico.

1. Introduction

The Economic Commission for Latin America and the Caribbean, ECLAC, spoke about the challenges facing Latin America should not to be left behind in economic matter. The commission suggested that the technological revolution started and had proposed not only prioritize the links with Asia, but also there is a necessity to increase the structuring of the production in value chains, so that in Latin America there is a need of the trade of more and better intermediate goods (Rosales, 2014). It is known that there is a very important role that took the Mesoamerican cultures in the domestication of the chili *Capsicum annuum* in Mexico. Evidence of this is the great variability of cultivated forms that are used in the country and that thanks to the diversity of agro-ecological environments and from the pre-columbian cultures, we offer a wide range of shapes, colors, aromas, flavors and sizes that are a valuable contribution from Mexico to the gastronomic

world (Pozo and Ramirez, 2003).

In Mexico, the chili pepper is one of the most important crops for their high level of participation in the value of regional agricultural production, by the generation of revenue to producers and as well of jobs in the areas of production of chili pepper (Medina, 2000 and 2009; Sagarpa, 2007; Mata et al., 2009; Perez, 2009). The collection of vegetative parts and removal of fruits of wild plants is a generalized form of exploitation of plant resources and to date this system remains in many rural communities of the world, including Mexico. These traditional forms of resource extraction, also represent additional income to the family economy peasant, are also the cultural expression of a long process of human interaction with the environment (Medina et al., 2003 and 2006; Lara et al., 2009).

Currently, in the Northeastern of Mexico this wild chili species is strongly rooted in its typical gastronomy. There

exists in our culinary art a good amount of recipes that have a indigenous roots; the northern bear grass, pounded, splices, “carne asada”, among many others, and this may be accompanied by the majority of the local products such as Chili pepper; the ash, “oregano” as condiments which accentuate their typical flavor of Northeastern Mexico. The marketing of the wild chili (chile piquin) comes mainly from collections of wild populations, which can lead to a deterioration of the ecosystem and the natural banks of germplasm, coupled with the difficulty of seed germination. Due to these facts, the government has recommended to the producer to meet the existing legal rules for ensuring their sustainability (Villalon, 1992; Villalon et al., 2010; Medina et al., 2000; Lara et al., 2009).

Wild chili (piquin) shows the superiority over the other kinds of chili by its pleasant flavor and degree of pungency. This wild chili of the northeast of Mexico is a very spicy chili, but its characteristic flavor is very much appreciated by consumer and because of this it pays 30–340 times more value than commercial chilies cultivated, as the “Serrano” or “Jalapeno”. Moreover, it does not irritate the digestive system. Wild chili “piquin” has an economic potential for the rural environment and it strongly rooted in regional gastronomy and hence considered as an important species in Northeastern Mexico. The demand of the “piquin” wild chili peppers and its socio-economic importance as a natural resource, primarily in rural areas, make the species with potential for its production, becoming an alternative to *in situ* conservation *ex situ* and productive in a sustainable manner (Villalon-Mendoza et al., 2014). The “chile piquin” wild chili in the Northeast of Mexico is considered a strategic product in the rural and social development, as it represents a whole cultural tradition and consumption, due to the historical process that has undergone in the Northeast region of Mexico, performing various functions, both of nature, as food and also for the socio-economic development (Villalon et al., 2011).

The “chile piquin” wild chili is consumed in virtually all parts of the northeast (74% of the population identifies with this product) and its supply depends mainly on the climate. The consumption of “chile piquin” chili wild in the country is divided into the northern part of Mexico, where the small varieties are mostly consumed, which are collected in the northwest and northeast mainly; while a large part of “chile piquin” wild chili, is collected from more humid areas, and its demand is mostly concentrated in the central and southern zones of the country.

The current dynamic activities observed, both in production and in the marketing and consumption, as well as its strategic

importance in the economic and social development in the region are of great interest and importance to assess the situation of the chain of production-marketing-consumption and so it can be considered the best decisions on the sustainable management of this resource (Medina et al., 2006 and Villalon et al., 2011). It should be noted that the rural population make the extensive use without control of the scrub where the wild chili grows in a natural habitat, thereby there is the possibility that this will reduce its production potential and reproductive capacity and therefore, it will limit the amount and quality of the extracted products and on the other hand, its evident disappearance by elimination of useful species, which have direct impact on the population depending on these resources (Medina, 2006; Gonzalez et al., 2009). This has also impact on the ecological and socio-economic importance while discussing all the relevant aspects of the wild chili chain of northeastern Mexico.

The objective of the present study was to undertake research and to provide information on the model of the economic activities that promote the generation of the value of the chili in the Northeast of Mexico, starting from the scope of local production up to the final consumer, same as can occur also in the regional, national or international level.

2. Materials and Methods

Present study was conducted in the northeastern Mexico, to determine information to develop a model of the economic activities that promote the generation of the value of the “chile piquin” wild chili in the Northeast of Mexico, that was carried out from April, 2013 to December, 2014. For the realization of the present study a series of investigations were carried out, mainly by researchers of the Universidad Autonoma de Nuevo Leon, Universidad Autonoma de Tamaulipas, Universidad Autonoma de Aguascalientes, Universidad Autonoma Agraria Antonio Narro and Instituto Nacional de Investigaciones Forestales, Agricolas y Pecuarias during the period from 1989 to 2015. This exploratory analysis was carried out to collect information of marketing of chili and update about scientific investigations and make a comparative study of our information available and finally to create a frame of reference for future upgrades of the product chain “chile piquin” wild chili which could serve as a basis for other studies. Trips were made to field in the area of study (Coahuila, Nuevo Leon and Tamaulipas, Mexico), In order to corroborate, and identify information in a timely manner the productive activities were carried out by the producers in order, to assess problems associated with the value chain of the “chile piquin” wild chili and update information.

The tool used for obtaining information with statistical validity ($p \leq 0.05$) was the method of interviews and of focal

group; as recommended by Rojas (1998). The statistical formula used was: $n = ((p \times q)(Z^2))/E^2$; where n =number of samples needed to obtain statistical certainty, p =proportion of affirmative answers q =proportion of negative answers, Z =confidence level (95%, 1.96 in areas under the normal curve) and E =level of accuracy (0.05). In addition the role of the wild chili peppers was found in the economic market. For this is comprehensive review was carried out of the literature available in this regard, visit was undertaken to regional markets, as well as consultation with 10 experts on the subject (key informants).

3. Results and Discussion

3.1. Description of the production chain of the wild chili in northeastern Mexico

It was found that there are agents' gatherers, who visit to the collectors in field (with natural vegetation) where there are wild chili found predominantly commercial. In its analysis, the chain has been identified in two major stages of commercialization of the wild chili: wholesale trade, and retail trade.

In the two phases, are integrated multiple links and ramifications of commercialization of the "chile piquin" wild chili, among which is the more traditional channel, has greater representation in all regions of the northeast of Mexico: including the direct sale of collectors of "chile piquin" to the profiteers. (Figure 1). On the other hand, the local warehousemen of chili sell mainly the "chile piquin" wild chili to the traders of chili pepper of the major cities nearby. One part is also sold directly by the collectors of the field, bringing them to the shores of major roads and to a lesser extent to the

packinghouse and food processing industry. Also, the sale to the central market the chili peppers is undertaken to industry and exporters, mainly to the United States of America, where there is a very broad market for this product.

The second stage represents the beginning of the retail trade, where the central market, balers and industries, sell (the "chile piquin" wild chili) to the points of sale, where the value chain of the wild chili offers the product to end-consumers in Flea markets or mobile markets, street, grocery, specific shops and self-service shops.

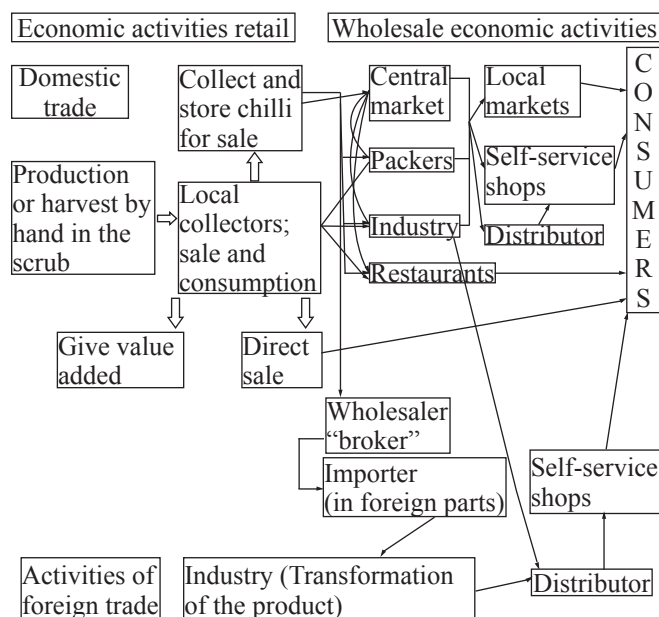
3.1.1. Local context of the market

The 60% of sale of the product by the collector is performed direct to the consumer, while 31% of the collectors use the product for its consumption, preparation of sauces, vinegar and dry to give it greater added value to the product and sell it to third parties or directly to the consumer. A 23% of the producers in the northeast of Mexico marketed its product in large towns close to the home of them; such as Monterrey, N. L., Ciudad Victoria, Tamaulipas and Saltillo, Coahuila, Mexico, where it can find several presentations of the "chile piquin" wild chili (fresh in red or green color, dry or industrialized).

This coincides with Villalon-Mendoza et al. (2014), who mention that 74% of the northeastern Mexican population consumed "chile piquin" wild chili fruit throughout the year fruits, it can be used either fresh at homes or can be stored dry, frozen, or conserve it in sauces, brine or vinegar. Among the surveyed responded, 78% of the families use d only one type of "chile piquin" wild chili present at ion in their homes while 14% of the respondent had two types of presentation. This was followed by the percentage of respondent (5%) who used three types of presentation. The questioner based on the food preparation suggested that 29% of the respondent used it at home in dehydrated "chile piquin" wild chili form while 27% respondent keeps it frozen. 44% of the respondent used it as processed products such as salsa (23%) or in brine (21%). The price that paid by respondent for "piquin" chilli is significantly higher than the other types chillies of chilli Cultivars.

3.1.2. International context of the market

With respect to relevant aspects of the international market; it is estimated that at the global level of demand for "chile piquin" wild chili is increasing every year the consumption of chilies (of all types) up to 5%. In the past 10 years, that consumption has been gradually increased to an average annual growth rate of 6.26% accumulated during the period 1992-2001 of 56.3% (Sagarpa, 2007). The chain starts with the sale of the production at the national to the international market of "chile piquin" wild chili, by the "brokers" (hoarders



of the product for export) to the international wholesalers (mainly from the United States of America).

In the international context of the market, there are two channels of distributions-

- a. Distribution of the product (chili) through the central for slaughter, who previously bought wholesale quantities.
- b. Distribution and sale of the product (wild chili) through traditional channels of marketing to the retail consumer through local markets in self-service shops (Secretaria de Economia de Mexico, 2005).

The main links in the chain of value of the “chile piquin” wild chili in Mexico make up: suppliers of inputs to large producers, groups of the “ejido”, small independent producers, agents that buy the product, national wholesalers (market of Hermosillo, Sonora, Cd. Victoria, Tamaulipas, Monterrey, Nuevo Leon and Saltillo, Coahuila, Mexico. In the Mexico City is located the main center gatherer and distributor of dry chili of all types in the country, where there are also “chile piquin” wild chili.

The chain continues at the National Retailers: institutional market (large chains of supermarkets, markets, chain restaurants, hotels, institutions, etc.), international market (United States of North America) and the final consumers (general population).

3.2. Final consumers of the product (general population)

The “chile piquin” wild chili has a huge market, both in America, Europe and Asia. In the United States of North America there is the so-called “nostalgia market” where inhabit millions of Mexicans who form a potential market distributed throughout the country. In studies conducted in 2005 by Secretaria de Economia of Mexico (SE), 2005, found a viable market potential for the “chile piquin” wild chili. Moreover, it is recommended that the promotion and dissemination of this product should be based on highlighting its origin and qualities. For this there is a necessity of a good label design to enter the biggest market in the world. There is a niche market at the international level in the United States on the basis of the increasing consumption of dried piquin chili high quality. There is enough evidence that points to the existence of a possible niche market, in addition to America, in the European Union, Japan and Singapore to the producers of chili, for example one can see the updates a day of the “chile piquin” wild chili market in: www.Quiminet.

The main exporters of “chile piquin” wild chili are Tamaulipas, Sonora and Nuevo Leon, Mexico, mainly to the United States of North America (USA), it is difficult to establish the quantities with which each of them contributes, because in the process of marketing come together the quantities with

other wild chili of the south and central Mexico.

3.3. Characteristics of response from the market

In the studies by Villalon-Mendoza et al. (2014); Ramirez-Meraz et al. (2015) is observed that the main cause that allows the buyers to pay that price for the market is for its flavor and aroma, followed by her cultural roots and by its pungency or itching, for their nutritional value and health, among others. Villalon-Mendoza et al. (2014) in their study suggested that the residents of the northeast of Mexico are ready to pay a high price for one kilogram of chili, which predominates in amounts ranging from \$3.60- \$7.10 US dollar with the 35%, in line with \$7.11 - \$10.71 US dollar with the 15%. It was also reported that people are willing to pay higher price even it was reported that some respondents used to get price up to \$85 US dollar for every kg for green fresh wild chili and up to \$180 US dollar the kg of dry red fruit. Furthermore, Secretariade Economia (2005) reported the prices of per ounce (conservation in vinegar; “escabeche”) was \$3.1 US dollar in the market of the United States of America. It was noted that the reasons for which people are willing to pay high price for the fruits of “chile piquin” wild chili are greater predominance (38% of those surveyed), pleasant flavor that presents the fruit of this product and with which are fully identified, followed by a low economy that people have with a 14% (referring to pay a low price by lack of economic resources, but aware of what is worth much more to them the fruit of chili). Similar result was reported by Villalon-Mendoza et al. (2014), where the preference of chili used was the taste. Then it turned out that pay more than the “chile piquin” wild chili peppers (12%), for the work that harvesting costs, including the risk of going to the field to harvest, this coincides with what was mentioned by Villalon et al. (2013), those who claim that this species has very small fruits, making it difficult harvest and quantity of fruit harvested by hand per hour. With equal proportion (10%), it was noted the quality of the product and by supply and demand. By its characteristic itch the mentioned the 9% of the respondents and by considering it very healthy (more than the other commercial chillies; serrano” and “jalapeño”) mentioned the 8%. It is worth mentioning that the 7% of the population of northeastern Mexico appreciates it and pays for being a regional product. Finally other causes are advantage of the excellent market that presents this product and resell to retail, buying wholesale and selling retail (4%) and to give a value added (in making sauces, preserves, etc.) in 2%.

3.4. Regulations tariff and non-tariff

As a result of the negotiations of the Free Trade Agreement (NAFTA) in 1994; it made a scheme of tariff-quota for chili in general. This must be consulted at the time of the export product.

3.5. The behavior of the demand and prices

Only the National Chamber of the restaurant industry and spicy foods, Chapter Nuevo Leon, requires an average of 28 tons of green “chile piquin” wild chili monthly. To date the entire production can be sold at great prices locally, ranging from 15 to 77 dollars kg⁻¹ of “chile piquin” wild chili green, depending on the season of the year.

4. Conclusion

The largest importer of “chile piquin” wild chili is United States of America and there is enough evidence that points to the existence of a market niche in the European Union, Japan and Singapore. In the northeast of Mexico in the last 3 years, the price of the “chile piquin” wild chili has been increased by 350-400%. The economic and social importance of the “chile piquin” wild chili is maintained thanks to its taste and cultural roots.

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