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Evaluation of four commercial products that promote growth in strawberry farming in macrotunnel

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Abstract

This research was carried out in the community of Hermosillo, belonging to the municipality of Santiago Maravatio, Guanajuato, during January-September 2016. Four commercial products were evaluated: Fitobolic, Kelpak, Xtra-alga y Algamar, that have a direct impact on the quality of strawberry fruits (*Fragaria vesca* L). An experimental design was established in randomized comparative strips, with twelve treatments and three replicates, the experimental unit were beds of 1,000 plants, evaluating ten plants per repetition. It was analyzed polar and equatorial diameter of the fruits, root length, number of flowers per plant, number of fruits, plant height and production per bed. According to the results obtained and to the statistical analysis in the Xtra-alga treatment at 2 L / ha, a difference was obtained between polar diameter, equatorial and number of small fruits. Fitobolic at 2 L / ha affected the height of the plant and number of flowers surpassing the other treatments; While Xtra-algae at 1 L / ha stood out in the production of number of red and large fruits. Kelpak at 3 L / ha showed an increase in root length. Xtra-alga treatment at 2 L / ha was higher in production, obtaining 9.9 kg/m² and a shelf life of 6 days.

Growth regulators, amino acids, algae

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Introduction

The strawberry is the strawberry of greater production and export in Mexico. Strawberry exports increased by 21.2 percent at the end of 2016, compared to 2015, which represented revenues of 650.8 million dollars, which represents an average annual growth rate of 11.7 percent, as well as an average sales for 524.7 million dollars (SAGARPA, 2017).

Strawberry cultivation in the country is very important due to the quantity of labor that it demands, which translates into job creation. Generally the strawberry has a production period of five months and between 40 to 50 tons are obtained, obtaining the best selling prices during the months of December to February (SIAP, 2013). However, to obtain 80 tons per hectare in macro-tunnel or 120 tons / ha in the greenhouse, a large amount of synthetic fertilizers is required. However, the excessive use of chemical fertilizers in the production of strawberries and the misuse of manures derived from livestock activities, has generated a series of environmental problems worldwide, contaminating surface and groundwater due to the effect of Elements such as nitrogen, in the form of nitrate, phosphorus as phosphate, as well as potassium (K +) and magnesium (Mg ++) cations that waterproof and impoverish agricultural soils generate the loss of organic matter and the reduction of soil biota (Romero- Romano et al., 2011).

In strawberry fruits, the most important factors to ensure their quality start from the field with the selection of cultivars, which vary in quality, defined mainly by the firmness, sugar content and acidity of the fruits; as well as the susceptibility of them to diseases. Other factors that influence the quality of strawberry fruits, because they have a very short shelf life, are: meteorological factors, as well as management and storage conditions such as temperature and humidity.

The main aspects considered to determine the quality of the strawberry are the appearance, firmness, flavor, degree of maturity, brightness and absence of damage in the fruits (Martínez-Bolaños et al., 2008).

The physical and morphological resistance of a plant is a determining factor to achieve good yields and quality of harvested products. These characteristics will depend, among other factors, on the nutrients and hormones that are applied to the plant (Romero-Romano et al., 2012).

In the last ten years, the use of biostimulants of natural origin enriched with amino acids, growth regulators, seaweed extracts and micronutrients has increased, which induces defense mechanisms in strawberry, activating their physiological functions, promoting the development of healthy plants, facilitate the absorption of nutrients and generate more vigorous plants (Hernández, 2014).

Justification

Strawberry cultivation is highly profitable for producers who mostly export their products to the United States and Canada; In addition to having a social impact, by generating more than 500 jobs in the southern region of the state of Guanajuato derived from cultural practices that are made to the crop during its different phenological stages. This research is aimed at supporting producers in the municipality of Santiago Maravatio to reduce losses in production and post-harvest handling, through the correct use of growth regulators and crop nutrition.

Problem

The strawberry is one of the crops most susceptible to the attack of postharvest pathogens that limit its shelf life, which is directly related to the nutrition applied in the different phenological stages of the crop. In addition, markets such as the United States and Canada are more demanding in their quality and safety policies with very high standards for the marketing of fresh fruits.

Hypotesis

In the market there are products that are regulators of growth, however, not all have the same effect on the fruits, some may affect the development of the plants, the size of the fruits and others may lengthen the shelf life of the strawberries by increasing its turgor.

Objectives

General objectives

Evaluate four commercial products used as growth regulators on yield, fruit quality with respect to shelf life.

Specific objectives

Identify the product with the highest performance and the optimum dose of application.

To evaluate the quality of the fruit based on the established scales of the total content of soluble solids, pH, titratable acidity, firmness, colorimetry and size of the fruits.

Theoretical framework

The strawberry is cultivated in practically all the world, reaches a production of 2.5 million tons; of which Mexico contributes 228,900 T that place it as the fourth producer.

One of the main agronomic management problems that it faces is nutrition, so evaluating the total nutrient demand of the plants and their absorption dynamics is important to determine the fertilization plans that allow the synchronization between the supply and demand of the crop. culture (Avitia et al., 2014).

The genetic expression of any species to grow vegetables or fruit trees, as well as the growth and development of these are controlled especially by the hormones that are synthesized in the interior of plants. Plant hormones are compounds that are synthesized by plants in micro-molar or lower concentrations, which cause specific physiological responses either locally or are translocated to other regions of the plant to modify their growth and development (Yáñez, 2002).

Hormones can also be considered essential in plant physiology because if these are not produced, in balance between these and / or used appropriately in the corresponding site of action, causes the plant to unbalance in its growth and development causing alterations in the phenology of the crops, as well as drastic changes in the production, quality of the same, as well as in the possibility of preserving the species (Salisbury, 1994).

According to their physiological structure and function, the hormones have been classified into several groups that include auxins, cytokinins (CK), abscisic acid (ABA), gibberellins (GA), ethylene, jasmonates (JA), salicylic acid (SA), brassinosteroids, polyamines (According to Cruz et al, 2010).

Among the technologies used to improve the quality and increase the size of the fruit are the use of growth regulators such as gibberellins and cytokinins. Gibberellins (AG) promote cell growth because they increase the hydrolysis of starch, fructans and sucrose, causing fructose and glucose.

These hexoses contribute to the formation of the cell wall and decrease the water potential of the cell, which favors the entry of water and causes cell expansion (Salisbury and Ross, 2000). In this regard, some positive effects of the applications of gibberellic acid (AG3) on strawberry production are reported, among which the shortening of the period between sowing and the first fruiting, the increase in the number of fruits and the duration of the harvest period, although this gibberellin can also reduce the mass of the fruit (Tehranifar and Battey, 1997).

Methodology

Establishment of the experiment. The project was carried out in facilities of the Sociedad de Productores Agrícolas of Santiago Maravatio SPR de RL, located in the community of Hermosillo belonging to the municipality of Santiago Maravatio, Guanajuato.

The surface planted with strawberry was 1.9 hectares in macrotúnel with mulch and with a drip irrigation system. The transplant was performed on August 21, 2016, with a planting density of 75,000 plants per hectare.

Experimental design. An experimental design was established in random comparative bands, with twelve treatments and three repetitions. Ten plants were evaluated per repetition. The data was analyzed in the statistical Statistic Analytic System (SAS, 1990).

Treatments 12 treatments were established and an absolute control, three repetitions were made. For each repetition 10 plants were sampled.

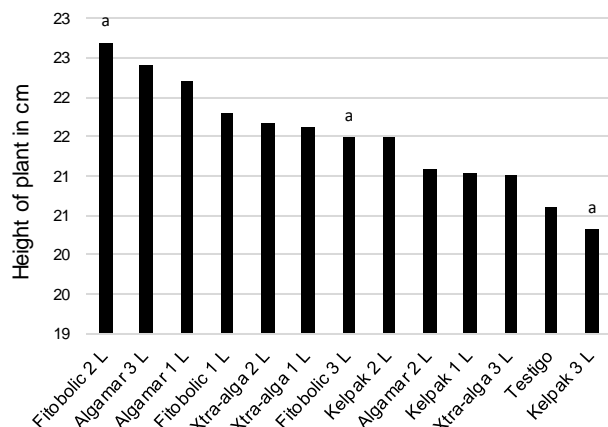
Variables to be evaluated. The variables were: plant height, number of flowers, number of fruits, equatorial and polar diameter of the fruit, size of the root, Production (kg per m²) and determination of soluble solids.

A vernier was used for fruit measurements, while a 30 cm transparent rule was used for plant height and root size. The weight of the fruits was quantified in an electronic scale. Ten strawberry plants were measured, in each treatment and repetition. The shelf life was determined by leaving fruits cut in clams for 10 days.

Agronomic management. Soil sampling was carried out at the beginning of the crop cycle to define the nutrient content and fertility of the same and thus design the fertilization demanded by the crop. The analyzes were sent to the soil fertility laboratory at INIFAP Bajío. Irrigation and fertilization and were applied according to the water and nutritional demands of the crop. Relieving tensiometers, recording daily temperatures and nutritional requirements in each phenological stage of the crop. The control of pests and diseases present in the crop was done manually with the application of chemical and organic products, as well as through cultural management.

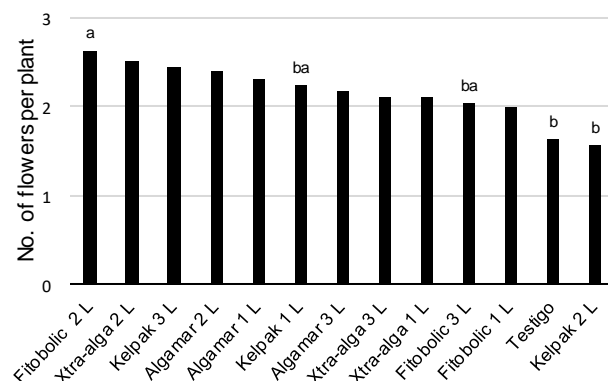
Results

Phenological variables. According to the statistical analysis and the Tukey P test ≤ 0.05 of the results obtained, for the height variable, no differences were found between the treatments (Graph 1).

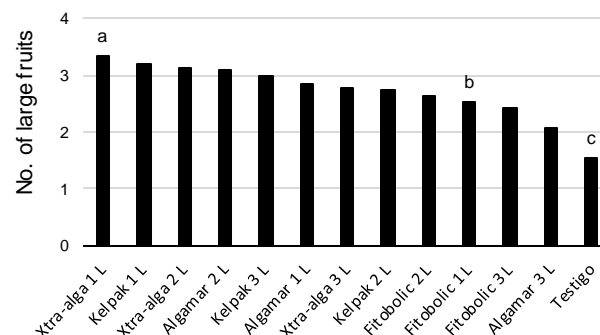


Graph 1 Behavior of the plant height variable.

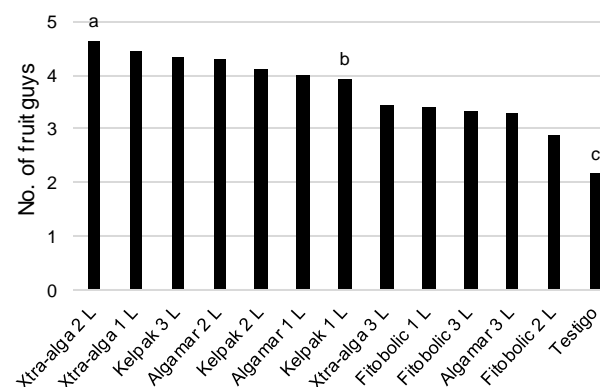
For the variables of the number of flowers, the treatment that stood out was Fitobolic at 2 L (Graph 2). Xtra-alga 1 L and Xtra-alga at 2 L affected the variables for large and small fruits (Graph 3 and 4). With respect to the polar and equatorial diameter, it was Xtra-alga 2 L (Graphics 5).



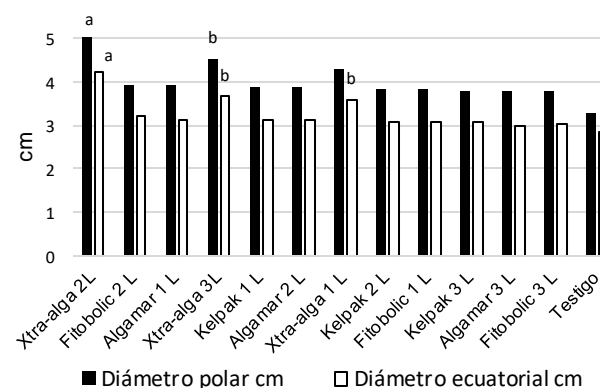
Graph 2 Comparison of means with respect to the number of flowers.



Graph 3 Comparison of means of the number of large fruits.

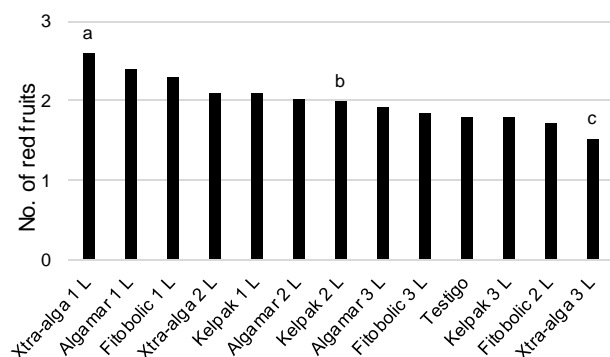


Graph 4 Comparison of means of number of small fruits.



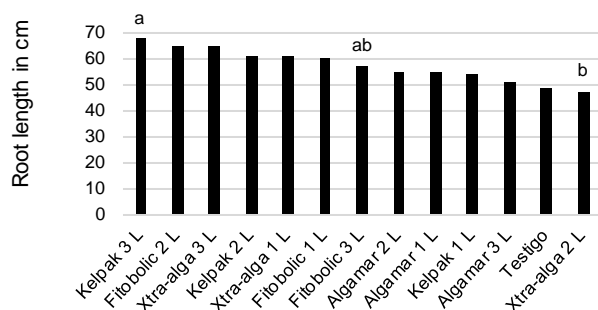
Graph 5 Polar and equatorial diameters of strawberry fruits.

For red fruits, the product that affected this quality parameter was Xtra-alga at 1 L, while Xtra-alga at 3 L was the one with the lowest number of red fruits (Figure 6).



Graph 6 Polar and equatorial diameters of strawberry fruits.

With regard to root length in the Tukey test ($P \leq 0.05$), differences are shown where Kelpak at 3 L reached a higher development than the other treatments (Graph 7).

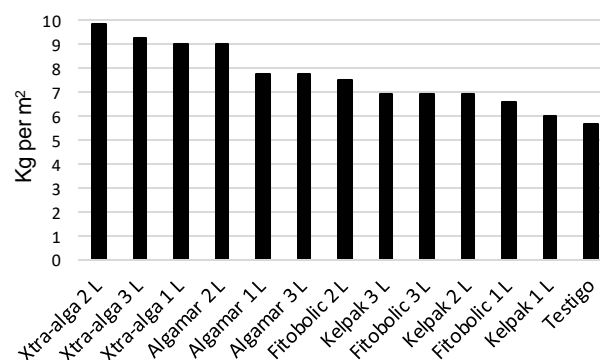


Graph 7 Polar and equatorial diameters of strawberry fruits.

It is probable that edaphoclimatic factors influence the assimilation and translocation of nutrients towards the demanding parts of the strawberry plant directly affecting the height variable in the plant in which no differences were found between the treatments ($P \leq 0.05$) the average more high was 22.7 and the lowest was 20.3.

The products evaluated in this study contain gibberellins, auxins and cytokinins, which are plant growth promoters that modify the normal growth characteristics of plants which caused various physiological responses in flowering and root proliferation (Ackerman and Hamemik, 1996). The results obtained in this study determined that the product that affected the number of flowers was Fitobolic at 2L / ha. However, there are reports that marine algae also induce physiological responses of plants, increasing the production of crops such as strawberry and blueberries because they contain a wide variety of plant growth promoting substances such as auxins, cytokinins, betaines, gibberellins and organic substances such as amino acids, macronutrients and trace elements that improve the yield and quality of crops, which was proven with the Xtra-alga product (Sathya et al., 2010).

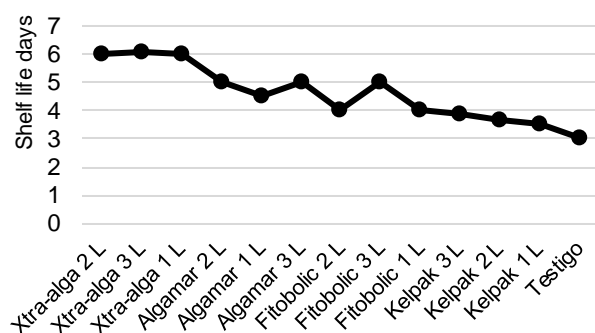
Harvest. The total kilograms harvested per treatment is shown in the following chart.



Graph 8 Harvest yields by treatment.

The highest yield was obtained with Xtra-alga at 2 L, achieving a production of 9.9 kg / m². This is consistent with what was reported by (Hernández-Herrera et al. (2014) mentioning that the application of seaweed to the soil and foliage induces greater absorption of nutrients, increases the chlorophyll content, the size of the leaves, which result in greater yield and quality of crops.

Fruit shelf life. There were no differences between the doses of Xtra-alga in the shelf life of the fruits, which reached an average of six days, while the treatment with a shorter time was three days.



Graph 9 Shelf life of fruits stored at room temperature.

Regarding the flavor and coloration of the fruits, there were no differences between treatments, but the Xtra-alga fruits were the sweetest on the palate, but not due to the determination of Brix degrees.

Aknowledgement

To the Higher Technological Institute of Salvatierra for the facilities provided for the development of this project and the Society of Producers of Santiago Maravatio SPR de RL.

Conclusions

The use of growth regulators based on marine algae in strawberry production is a success that should be practiced by the producers of macro-tunnels. The commercial product recommended to lengthen the shelf life and preserve the quality characteristics is Xtra-alga at 2 L / ha.

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Predation of agrillo seed (*Rhus trilobata*) in the highlands region of Jalisco

QUINTANA-CAMARGO, Martín*†, CRUZ-GUTIERREZ, Esmeralda Judith, HERNÁNDEZ-VALENZUELA, Sergio Nizael y AVENDAÑO-LÓPEZ, Adriana Natividad

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Abstract

Seed, a basic reproductive unit for the great majority of plant species, is a nutritional source in the first instance for the establishment of a new generation, however some herbivores take advantage of this state of fragility and alimentary concentration to develop its biological cycle to the interior of fruits like in agrillo (*Rhus trilobata*), a perennial shrub of the Anacardiaceae family, of which in recent years the presence of an insect of the order hymenoptera, parasitizing the seed has been reported, so the objective of the present work was to study the herbivory between the insect and the seed of agrillo for which, fruits collected and diagnosed with the presence of the aggressor by means of an X-ray equipment, were incubated in laboratory for the identification of the insect, which turned out to be of the Genus *Eurytoma*. Likewise, some patterns of behavior of the aggressor agent were identified, which are discussed.

Herbivory, *Eurytoma*, seed

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Introduction

The seed as the basic unit of reproduction of most plant species is a concentrated food source, in the first instance for the establishment of a new generation; this condition has been exploited by certain herbivores which parasitize the seed of several species among which is the fruit of the agrillo (*Rhus trilobata*, Anacardiaceae), a species appreciated in the highlands of Jalisco, particularly in the municipality of Arandas, place where its inhabitants have been collecting it for decades for the production of refreshing drinks, ice cream and confectionery; however, it is reported potential use of gardening, restoration of degraded ecosystems, traditional herbalism and the production of plant pigments or active ingredients.

Justification

The growing demand for products made from agrillo together with the loss of their natural habitat as a result of the change in land use in the Jalisco highlands, has led to interest in their domestication, conservation and chemical characterization.

Problem

In the municipality of Arandas, Jalisco, in the year of 2016 a herbivore was reported parasitizing the seed of the agrillo. Wasp larvae and pupae (genus hymenoptera), were discovered by means of an X-ray equipment, which caused 38% on seed quality.

Hypothesis

It is possible to identify the aggressor seed aggressor agent by artificial incubation of the parasitized fruits.

Objectives

General objective

Estudiar la herbivoría entre el insecto reportado y la semilla de agrillo.

Specific objectives

- Identify the insect that parasitizes the seed of agrillo, reported in previous studies.
- Study the behavior patterns of the aggressor insect.
- Estimate the damages caused at the seed level by the herbivore.

Theoretical framework

The guidelines were established to identify the herbivore aggressor of seeds of agrillo. Plants established in the open field were parasitized by the aggressor agent naturally. The mature fruits were collected and incubated to obtain the adult phase of the insect, then proceeded to its identification.

Research Methodology

The work was carried out in the Orthodox Seeds Laboratory of the National Center for Genetic Resources (CNRG) of INIFAP, from agricultural plants established in the ARRG arboretum, in Tepatitlán de Morelos, Jalisco (Fig. 1a). The harvest of the fruits was carried out in the month of May 2017.

The collected fruits were examined for the detection of the different stages of development of the insect, by means of an X-ray machine, Faxitron brand model MX20. The biological cycle of the insect was divided into: egg, larva and pupa, likewise, for those fruits without the presence of the insect, but with the evident perforation at the seed coat level, those that remained intact were considered as damaged seeds and undamaged seeds.

Percentages were calculated for each category and subsequently, the fruits were incubated in a bioclimatic chamber with conditions of 25 ° C constant and 16 light for 8 of darkness for the capture and identification of the insect in adult stage (Fig. 1b).



Figure 1 Photographs of: a) Agrillo plants established in the CNRG arboretum, and b) incubation of the fruits of agrillo.

Theoretical Methods

Figure 2 shows graphically the categories considered for the evaluation by X-rays: a) fruit without damage, b) fruit with egg, which is deposited near the peduncle (base of the fruit) in the mesocarp region by means of the ovipositor apparatus of the females, c) developing larva, d) pupal stage.

Likewise, in Fig. 3, photographic images of the stages are presented: a) egg, b) larva, c) pupa and d) adult female.

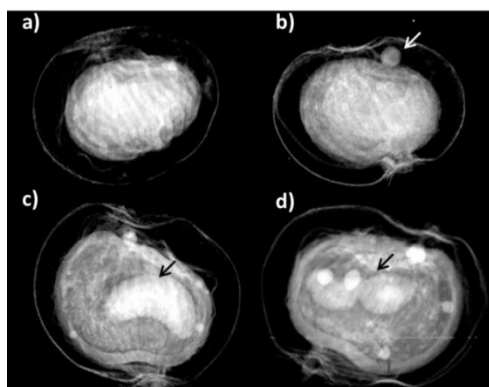


Figure 2 Radiographic images of agrillo fruits: a) fruit without damage, b) fruit with egg, c) fruit with larva and d) fruit with pupa.

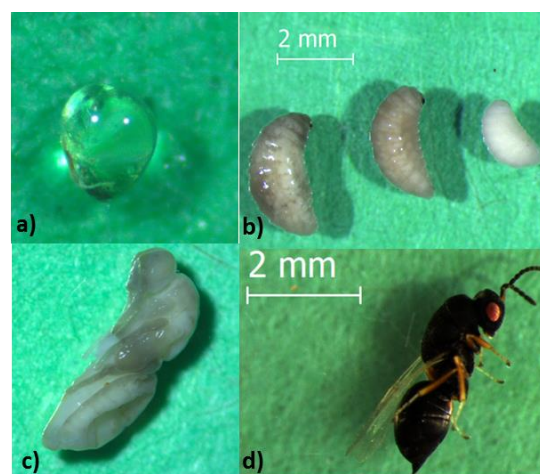


Figure 3 Photographs of the biological cycle of the herbivore identified in agrillo seeds: a) egg, b) larva, c) pupa and d) adult female.

Results

After making the diagnosis with the X-ray equipment and incubating the different immature stages of the herbivore, it was found that the insect that parasitizes the fruits of the agrillo and specifically the seed, corresponds to the genus *Eurytoma* (Figure 3d). This genus belongs to the family Eurytomidae which exhibits a wide range of food habits, however, most of the larvae of this family are endophytes, of which stand out: seed borers, galls formers or even insect parasitoids. In the case of the agrillo, the fruit is parasitized in the maturation phase. The egg is deposited in the mesocarp region by means of the ovipositor apparatus of the females, regularly near the base of the fruit or peduncle (Fig. 2b), inside the mesocarp the egg hatches and the larva migrates to the interior of the seed in which develops and completes its metamorphosis while consuming the seed completely.

The results obtained from this evaluation are presented in Table 1, which shows that the highest values were for the seed free of damage with 54.52%, as well as for the empty seed with 21.29%, these two values seem logical for wait, considering that the harvest of the fruit begins in late March and early April, which is why the percentage of empty seeds was increased, which means that the insect completed its metamorphosis together with the complete consumption of the seed, which it is revealed by the X-ray image (Fig. 2d) and the perforation when leaving (Fig. 4b).

Stadium	Percentage (%)
Egg	4.83
Larva	15.63
Pupa	3.73
Seed with damage (empty)	21.29
Seed free of damage	54.52

Table 1 Percentages of the different stages of the herbivore *Eurytoma* sp. in seed of agrillo, detected by means of X-rays.

It is important to point out that a little more than 50% of the seeds did not suffer damage, so the percentage of regeneration for the species could not be strongly affected by the herbivore; likewise, only the presence of one larva per fruit was found in cases where the presence of immature stages was detected, which could be an indication of the high specialization in the herbivory that occurs between parasite and host, since the seed of agrillo is small and could only reach to complete the development and metamorphosis of one insect per fruit at a time, for which the emission of certain hormones has been reported as an indication that a fruit has been previously parasitized.

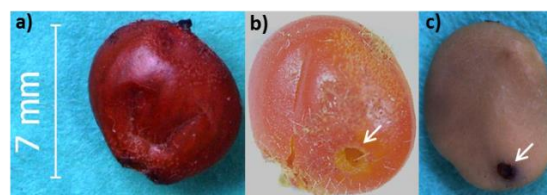


Figure 4 Photographic images of: a) fruit of a healthy tree, b) Fruit of a tree with the typical perforation once the insect completes its metamorphosis and migrates as an adult, c) seed damaged by the herbivore.

In this sense, it has been established that seed predators can have important and often variable effects on the population dynamics of plants and, together with other biotic and / or abiotic factors, on the evolution of traits or characters of a species.

Conclusions

The herbivorous insect that parasitizes the seed of an agrillo is of the genus *Eurytoma*.

Only the presence of one larva per fruit (seed) indicative of the high specialization that exists between host-parasite was detected.

More than 50% of seeds were not damaged, so the herbivore could have a minimal effect on the preservation of the species.

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Perspectives of the competitive environment to the coffee sector. Case studies of the value chain in Chiapas, Oaxaca y Guerrero

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Abstract

The coffee cultivation, in Mexico is an activity very valuable for the producers and the economy of the country in various scales, not just for the revenue that they obtain from the production, but because the coffee growing is considered an activity that's represent cultural, social and political aspects linked to elementary and traditional forms of common life.

The productive chain of coffee is a process that have several phases which is where intervene different elements (society, producers, universities, government and enterprises), with a specific roles that their assignment it's to take the product to the consumer home. This process, in its dynamics tends to be inequitable: because the largest beneficiaries are the big transnational marketers and regularly the producers are the actor whose obtain less earnings for their own activity; despite of hard work of the coffee cultivation not improve their life conditions. The present work has the intention to give a different perspective to the competitive environment that include to the coffee sector in some municipalities of Chiapas, Oaxaca y Guerrero; entities considered as the main coffee producers in its different varieties.

Productive chain, competitive environment, coffee

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Introduction

The cultivation of coffee in Mexico has a high economic and social value, most of the production is generated by small peasant and indigenous units who see the cultivation of this aromatic as an ancestral activity, rooted in their culture and way of life. These are connected to the international market through local collectors, marketers and transnational companies. Various activities are carried out within the coffee production chain and some agents intervene; It is said that all of them must join efforts to meet the needs that arise along each link, as well as boost the competitiveness and economic development of the aromatic (Flores 2015).

Coffee production in the country has been affected by factors such as climate change, pests and the instability of prices in international markets, problems that caused declines in production and that caused Mexico to go from fourth to eleventh place as the main producer internationally. (OIC, S / A).

Chiapas, Oaxaca and Guerrero are the main coffee producing states, contributing large quantities for national production. However, in practice, they are uncompetitive states; in them a high degree of poverty prevails, marginalization, social backwardness and even insecurity: the latter as is the case of Guerrero. These aspects contribute to the fact that they are entities that have little impact on social development within their populations, but economically they have an important representation at the regional and national levels. What is contradictory for the living conditions presented by the people who work with this product.

The general and specific objective of the research was established with the intention of understanding the regional environment that surrounds the coffee sector, since it is thought that the competitiveness and productivity of coffee is linked to daily aspects of the population of these states, related to issues cultural, political and ideological, which have a direct impact on the production chain of this product.

The study focuses on knowing the regional characteristics in some areas of the states, through coffee production and the interaction that arises between the actors involved in the activities related to the cultivation and placement of coffee in the market, to have a overview of the activity of agents in these regions.

From each state a municipality was chosen for its study, the selection was considered taking into account some indicators in the coffee production and, at the same time, aspects related to the social welfare in the coffee zones, such as; degree of social backwardness, poverty, marginalization, etc. In the state of Chiapas, the municipality of La Concordia was chosen, in Oaxaca, San Juan Guichicovi and in Guerrero, Atoyac de Álvarez. Emblematic places where the production of coffee has reached an important representation.

The methodology used in the present work was descriptive qualitative, from a social perspective: secondary data were explored, a literature review was carried out on internet sites, books, newspapers, etc., on the coffee environment in each state, specifically in the study municipalities. In addition, some demographic, productive, economic and social characteristics were considered.

Justification

In the global context, coffee is grown in more than 70 countries, which have favorable climatic conditions for its production (AMECAFE, 2012). Brazil, the main producer of coffee, produced 2,594,100 kg in 2015, accounting for 30.16% of world production (infocafe., 2015). In 1990 Mexico was in the fourth position, however, during the period 2015/2016 it obtained the eleventh position internationally, producing 2,800 bags of 60 kilograms, according to the International Coffee Organization, (OIC, S / A). It is worth mentioning that as far as the production of organic coffee is concerned, the country ranks second in the world with a production of 350 thousand bags of 60 kilos of green coffee (SAGARPA, 2015). In addition, coffee is the second largest exported product in the country (COMCAFE, 2013-2018), its cultivation is an activity on which the income of thousands of people depends. This is cultivated in 14 states, being the most important according to their level of production Chiapas, Veracruz, Puebla, Oaxaca, Hidalgo and Guerrero (SIAP, 2016).

On the other hand, speaking of the producers, who represent the first link in the productive chain, 64% of them have areas smaller than one hectare and only 2.6% have areas larger than 5 hectares. Likewise, 80% of production is concentrated in marginal areas and it is estimated that more than half of the coffee farmers are indigenous (AMECAFE, 2012).

In this way, from the production of coffee, until the product reaches consumers, the distribution of value during the production chain is distinguished by being inequitable (Figueroa, Pérez and Godínez, 2015); since the actors that participate as intermediaries have a very significant influence and power in contradiction with the producers themselves and the people who live in the regions where they are produced. The latter have a high level of marginalization and poverty.

The exporters, concerned about taking into account the quality demands of international consumers (European and North American), have had to influence the production practices of local producers (Henderson, 2016). In this sense, employees have to implement specific methods to achieve certifications that guarantee the quality of coffee, making the product more attractive and reliable for marketers and consumers.

For all the above, the importance of the study arises from the idea of exploring and knowing, in a practical way, the competitive environment of the coffee sector; considering the dilemma that exists in the context of real interactions, the common world. On this scenario we can see that the local actors, who make up part of the production link, are usually the most vulnerable, an example of this is the situation of the municipalities that were selected for the study: La Concordia in the state of Chiapas, San Juan Guichicovi in Oaxaca and Atoyac de Álvarez in Guerrero. Although these municipalities present, geographically and economically, the highest coffee production in each region, there is little socio-economic development of the populations, due to their high and medium social lag, poverty and marginalization. Due to the above, the research is interesting because, being areas with high coffee production, they do not reflect significant development for their communities.

Problem

Coffee, after oil, is the largest exported product in Mexico (COMCAFE, 2013-2018). Currently about 500 thousand producers are engaged in the cultivation of coffee and employ more than 2 million people (SAGARPA, 2015). It is grown in 14 states; Chiapas, Veracruz, Puebla, Tabasco, San Luis Potosi, Colima, Queretaro, Jalisco, Morelos, Guerrero, Nayarit, Hidalgo, Mexico and Oaxaca. (SIAP, 2016).

The state of Chiapas is positioned as the main producer and together with Veracruz, Puebla, Oaxaca and Guerrero represent almost 96% of the country's total production (CDI, 2016). Guerrero, Oaxaca and Chiapas, although they are entities recognized for the quantities of coffee they produce, have little impact on social and economic development, since they present a vulnerable area characterized by inequality in their population (and geographical location). social and extreme poverty (CONEVAL, 2014), ranking among the last 5 places in competitiveness at the national level (IMCO, 2016).

In addition to the above, coffee production has shown a decreasing competitive development in recent years; pests have reduced the harvest by 40%, lower prices in international markets, as well as climate change are some important problems that affect producers in these regions (CONACYT and CIATEJ 2015, with reference to the State Government of Oaxaca, 2015).

According to García (2016), the most influential factors in the stagnation of the coffee sector refer to the absence of the management of public policies aimed at improving it, sources of financing aimed at supporting the producer with capital for the purchase of technological equipment and infrastructure that will Allow to improve your processes. It also considers the lack of interaction that producers have with academic institutions or research centers that aim to take advantage of resources, generating innovative and competitive strategies in the integral use of the product.

Therefore, this research is oriented to observe the environment that surrounds the coffee sector, within the study municipalities, to explore the characteristics of these zones and the current situation of this sector, for example; the main economic, political, social and cultural problems faced by the coffee producing regions.

The observation of this problem can be perceptible through the social welfare that exists in the communities and coffee producing areas.

Hypotesis

Alternative

The competitive environment of the coffee sector is similar in each region where the coffee activity performs.

Null

The competitive environment of the coffee sector is different in each region where the coffee activity is carried out.

Objectives

General objectives

Analyze the characteristics of the competitive environment of the coffee sector, to have a perspective that can contribute to improve the productive chain of coffee, in Chiapas, Oaxaca and Guerrero.

Specific objectives

- Explore the competitive environment that surrounds the coffee sector in the municipalities of La Concordia in the state of Chiapas, San Juan Guichicovi in Oaxaca and Atoyac de Álvarez in Guerrero.
- Analyze some of the characteristics under a comparative perspective; social, economic and production of each municipality of study.

Theoretical framework

In business terms, competitiveness is the degree of profitability that companies have within the markets (Lundy et al., 2007).

In order for the organization to remain within the market, it must overcome its competitors by creating sustainable competitive advantages, which are created from technological investments, innovation capacity or specialized factors, with the intention of differentiating the product and / or service and obtaining greater utilities (Mas, et al., 2007).

Because the interest of this research is linked to the territory it is necessary to speak of competitiveness in regional terms, making reference to the concept of "regional competitiveness", which is defined by Márquez, Jurado, Pazos, (2016) (With reference to Carnagni, 2002), as the capacity of the territories to provide a competitive environment for companies linked with the processes of accumulation of knowledge.

In this sense, a competitive environment is understood as all the factors extrinsic to the company that depend on the sector in which an organization competes and that can generate an important occurrence on its results (Iborra, Dasí, Dolz, Ferrer, 2014, p. 100). The competitive environment creates dynamic differentiated advantages, through networking among all the agents that participate in the territory to establish the systemic competitive exercise of the region (Feria, 2005).

Productive chain and value chain:

A productive chain is understood as the different stages and interactions that arise between all those involved in an economic activity, from production to the inclusion of the product in the market (Lundy et al., 2004). For Gottret and Lundy (2007) this consists of several stages, which integrate productive processes and the economic relationships that are propitiated from the initial supply to the final demand.

As can be seen, all the agents that intervene in the productive chain are interrelated, each with specific roles, which are generated from production to consumption (Van der Heyden, et al., 2004).

When a company or chain seeks a differentiation strategy by innovating in its products or processes, it charges an additional value (Lundy et al., 2004). In this way the productive chain takes a value chain approach, which is defined by Gottret and Lundy (2007, P., 31), as the union of efforts between several organisms within a productive chain.

Also, it could be said that the productive chain is constituted by all the actors that intervene in an economic activity from production until that product reaches the consumer. When all these agents decide to work in a network, looking for strategic competitive advantages, adding value to that product or process in each of the links of the same, it is said that it takes a value chain address.

Overview of the agents within the coffee production chain.

Waridel 2001, in his book *Un Café por la Causa*, exposes based on his study the actors involved during the cultivation and placement of coffee within the market, in the chain that she calls conventional, explaining in a general way some of the characteristics of these actors.

1. **Coffee producers:** it is the lowest link in the chain, generally the majority has around 5 hectares. They are supported to produce quality coffee and can be exported, context that limits them to diversify their crops and attend your dietary needs
2. **Local intermediary:** in some countries they are called coyotes, they appear in some of the stages.

3. **Processor:** these actors take the coffee to a stage that is known as profit, for this specific machinery is required.
4. **Exporter:** the role played by this actor in the production chain is to place the coffee in the foreign market, making sure that the requested grain is sent to the planned place and in the established time.
5. **Broker-dealer:** Brokers influence the purchase and sale of coffee and are regularly employed by international traders and transnational agroindustries.
6. **Transnational companies (distributors and toasters):** the distributors store very high quantities of coffee, then sell it to toasters, which are the industries that generally sell coffee in supermarkets.
7. **Retail:** are consumers who buy most of the time coffee in supermarkets.
8. **Consumers:** it is made up of all the people who buy and like to drink coffee, it is regularly consumed more in the northern countries. This is an actor that, according to his preferences, has influence in the market.

In addition, the same author states that there is another type of chain, which she calls an alternative chain in which some intermediaries are eliminated through fair trade; allows the producer to have a more direct deal with the consumer, obtain better profits, as well as contribute to sustainable development in terms of health, education and environmental care.

Based on the perception of the value chain; in which all agents work in a network, seeking competitive advantages with a win-win vision; the chain of coffee based on fair trade is seen as a chain of greater value, because the coffee producing organizations communicate to democratically support each other, improving their practices to offer a better product, and increase their authority within of the chain. This allows them to boost the production and marketing of their coffee, as well as helping to improve their living conditions. An example of this is the situation of the members of the union of indigenous communities in the region of the Isthmus of Tehuantepec in Oaxaca (UCIRI); in which all its members work as a team as an organized system facing the problems of cultivation and commercialization to boost the coffee sector in this area. The stages of this alternative chain are shaped according to Waridel (2001) as follows:

1. Peasant family
2. Social organization
3. Fair trade organization
4. Retail seller or restaurant (Fair coffee)
5. Consumer

Research Methodology

Kind of investigation

In the present work the methodology was descriptive qualitative, according to secondary data, a review of literature was made on internet sites, books, newspapers, etc., on some demographic, productive, economic, social and cultural characteristics of the surrounding environment. to the coffee sector in each state, specifically in the municipalities of La Concordia in the state of Chiapas, San Juan Guichicovi in Oaxaca and Atoyac de Álvarez in Guerrero.

For the selection of study areas and their exploration the following steps were followed:

Secondary source consulted	Information Obtained
INAFED	Demographic information by municipality
SIAP	Statistical data on coffee production by municipality
CONAPO	Marginalization index
INEGI	Data on some characteristics of the population in each municipality
Coffee agrifood panorama	Data of the municipality of Atoyac de Álvarez
PDM	Data of the municipalities
SEDESOL	Degree of social backwardness and some shortcomings of the population of each municipality
Official portal of the state of Guerrero	Guerrero demographics
SAGARPA	Data on coffee production in Guerrero
CDI	Data on indigenous coffee producers
Ministry of economy	Oaxaca economic and state information

Table 1

Source: Own elaboration based on data from the SIAP, INAFED, CONAPO, INEGI, PDM, SEDESOL, SAGARPA, CDI, agri-food Panorama, Official Portal of the State of Guerrero and Ministry of Economy.

1. For the selection of the study municipality, the five most coffee producing municipalities were analyzed from the frailesca region in Chiapas, the 5 most producers in the isthmus zone in Oaxaca and the 5 that generate the highest coffee production in Guerrero. The municipalities were chosen taking into consideration data related to coffee production (area planted, area harvested, production in tons, yield and value of production) and social aspects (degree of social lag, total population, inhabitants with poverty extreme and people over 5 years of age who speak some indigenous language), reaching the selection of the municipalities of La Concordia, San Juan Guichicovi and Atoyac de Álvarez.

2. Subsequently, to explore some characteristics of the coffee sector environment, each literature municipality reviewed literature in newspapers, magazines, books and Internet sites such as the National Institute for Federalism and Municipal Development (INAFED), Agri-Food Information Service and Pesquera (SIAP), National Population Council (CONAPO), National Institute of Statistics and Geography (INEGI), National Council for the Evaluation of Social Development Policy (CONEVAL), Municipal Development Plan (PDM), Ministry of Social Development (SEDESOL), Official Portal of the State of Guerrero, Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA), National Commission for the Development of Indigenous Peoples (CDI), as shown in the following table:

Investigation Development

The Concord:

The concord is located in the central depression of the region IV Frailesca, adjacent to the municipalities of Pijijiapan, Socoltenango, Venustiano Carranza, Chicomuselo, Villa del Corzo, Angel Albino Corzo and Mapastepec. Its territorial extension is 2,582.01km², occupying 13.38% of the surface of the region, 1.47% of the surface of the state (INAFED, S / A).

According to the last Population and Housing Census, the municipality of La Concordia has 44,082 inhabitants, with a total of 22,120 men and 21,962 women, the median age of the population being twenty-two years. There are also 2,614 inhabitants over 5 years old, who communicate through an indigenous language (INEGI, S / A).

According to the report corresponding to the social backlog and poverty situation 2017, the degree of social backwardness in the municipality is high. Data from 2015 reveal that 38.40% of the population had educational lag. Some of the deficiencies that the inhabitants have are; health services (11.9%), flooring material in the home (14%), wall material in the home (2.10%), roof coverings in the home (1.40%), overcrowding in the home (37.30%), access to piped water (11%), drainage service (12%) and electricity service (3.20%) (SEDESOL, 2017).

In concord the agricultural and livestock sector are important drivers of the economy of the entity (PDM, 2011-2012). In the municipality, speaking of the coffee production, for the year 2016 8,414.00 hectares were planted and 7,457.00 were harvested, generating a production of 7,893.00 tons, with a yield of 1.06 tons per hectare, obtaining a production value of 55,599.40 (SIAP, 2016).

Based on the last 10 years (2006-2016), the year in which the highest production was generated was in 2006 with 29,859.90 tons; also had a higher yield compared to other years, this was 3.54 tons per hectare. The year in which a higher production value was obtained was in 2012 with 185,060.19 thousand pesos, in this year the production was 21, 898.80 tons with a yield of 2.64 (SIAP, 2016).

The year 2016 has been the least profitable, the harvested area, as well as the yield and the value of production, were the lowest with respect to other years.

Regarding the study, it could be said that the coffee sector in La Concordia has had a downward development that can be a consequence of several factors or agents that participate or intervene during the development of the chain of this sector.

San Juan Guichicovi

San Juan Guichicovi is located in the southeast region of the Isthmus of Tehuantepec in the state of Oaxaca. Occupying a territorial extension of 738.45 km². The climate in this municipality is usually warm with rain in summer and autumn (INAFED, S / A).

Based on the data provided by INEGI 2010, San Juan Guichicovi has around 28,142 inhabitants, distributed among 13,221 men and 14,921 women, with a median age of twenty-seven years. There are also 19,465 people over 5 years of age who speak an indigenous language (INEGI, 2010).

According to the Annual Report on the situation of poverty and social backwardness 2017, the degree of social backwardness in the municipality is high.

In relation to 2015 data, 41.90% of the population has educational lag. Some of the population gaps that the inhabitants have are: in health services (14.2%), flooring material in the home (5.10%), wall material in the home (2.30%), roofs in the home (1.00%), overcrowding in housing (32.40%), access to piped water (25.00%), drainage service (15.00%) and electricity service in housing (3.70%) (SEDESOL, 2017).

The base of the economy of the municipality is the agriculture, cattle ranch and forestry, one of the objectives of the municipal government of San Juan Guichicovi is to support the economic progress with the sustainable development of the units of production, as well as to stimulate the generation of self-employment.

In the municipality the producers do not resort much to the use of technology, their production methods are distinguished by being traditional and their crops basically for self-consumption (General Coordination of the State Committee for Planning for the Development of Oaxaca, 2010-2016). As for coffee production, in San Juan Guichicovi, for the year 2016, 2,386.50 hectares were planted and 2,385.00 were harvested, generating a production of 1,955.70 tons, with a yield of 0.82 tons per hectare planted, obtaining a value of the production of \$ 8,637.27 (SIAP, 2016).

With respect to the last 10 years (2006-2016), the years in which the highest coffee production was generated were during 2006 and 2007, with an area sown and harvested of 4,385.00 hectares, a production of 10,962.50 tons and a yield of 2.5 tons per hectare sown, obtaining a production value of 32,887.50 thousand pesos. The year 2016 has been the least profitable, in terms of production and yield per hectare, also, the value of production that was generated was not as significant and was lower compared to other years.

Based on the study, it can be said that the coffee sector in San Juan Guichicovi has had a decreasing development, which may be a consequence of several factors or agents that participate or intervene during the development of the value chain of this sector.

Atoyac de Álvarez.

Atoyac de Álvarez has a territorial extension of 1688.4 km², which represent 2.5 percent of the total area of the state, belonging to the Costa Grande and bordering to the north with Heliodoro Castillo and San Miguel Totolapan, to the east with Coyuca de Benítez, to the south with Benito Juárez and to the west with Tecpan de Galeana (Official Portal of the Government of the State of Guerrero, 2015-2021).

Regarding the 2010 population and housing census, the municipality of Atoyac de Álvarez has 61,316 inhabitants, distributed in 30, 113 men and 31, 203 women, with the median age being the population of 24 years of age. There are also 785 people over 5 years old, who also speak an indigenous language (INEGI, 2010).

According to the annual report on the situation of poverty and social backwardness 2017, the degree of social backwardness in the municipality is medium, according to data from 2015, 22.80% of the population has educational lag, and some of the shortcomings inhabitants are: health services (10.5%), by material of floors in the house (15.00%), walls in the house (6.60%), by material of roofs in the house (16.00%), by overcrowding in the house (28.20%), piped water (5.20%), drainage service (14.00%) and lack of electricity service (2.80%) (SEDESOL, 2017).

Atoyac de Álvarez is among the 10 municipalities that provide the largest coffee production nationwide (21%) (Directorate of Research and Economic and Sector Evaluation, 2015).

At the state level, it is the municipality that provides the greatest production, for the year 2016 25,525.00 hectares were planted and 23,965.00 were harvested, with a yield of 1.15 tons per hectare planted, generating a production of 27, 582.75 tons, with production value equivalent to \$ 207,688.73 (SIAP, 2016).

Atoyac de Álvarez is one of the municipalities that shows a great advance in the control of pests, since during the period of 2006-2010 some of the coffee producers received training to carry out preventive actions for the control of pests by SAGARPA- SEDER.

These actions contributed to the Costa Grande (region to which the municipality belongs) winning the national quality award in 2010 and positioning Guerrero as a state in which high quality coffee is grown (SAGARPA, 2011).

Also, in 2016, the national commission for the development of indigenous peoples (CDI) together with SAGARPA and the government of Guerrero supported more than 30 thousand producers in the municipality, as a strategy for productivity and competitiveness of coffee in regions indigenous people of the country, providing plants resistant to rust (fungus that affects the coffee plant), training for new production techniques to indigenous communities such as cultivation in greenhouses, technological packages of coffee, resources for productive projects in the field, etc. The support is more inclined to support indigenous producers, since as mentioned by the general director of the CDI: the coffee produced by indigenous producers is recognized for its high quality that has allowed for some achievements such as the creation of the brand of Indigenous Hands of Mexican Quality with which it competes before international markets (CDI, 2016, para. 12).

In addition, in Atoyac de Álvarez some producers produce organic coffee, a decision they made at a certain moment with the prospect of accessing consumer markets with monetary capacity. The coffee farmers have had to change their traditional practices to join certifications and fair trade, they have the experience to produce and market in sustainable areas, they have instruments and support with international bodies (López, Morales and Barroso, S / A).

According to the 2006-2016 period, in the years 2006, 2007, 2008 and 2011 coffee production was equal to 32,693.80 tons in each period, these being the ones that presented the highest production in the last 10 years.

They were very stable years, since the planted area was the same as the harvested one, however unlike in 2006, 2007 and 2008 in 2011 a higher yield of 1.28 tons per hectare was achieved.

The year 2016 remained profitable compared to other years, the production was 27,582.75 and the yield of tons per hectare was 1.15. Based on the study it can be said, in general, that the coffee sector in Atoyac de Álvarez has had a stable development, since its production has not decreased much nor the yield per hectare.

Results

According to the analysis, Chiapas, Oaxaca and Guerrero are the main producers of coffee, thanks to some productive practices carried out by coffee farmers. The type of species they grow, is recognized for its quality in international markets. Based on the study, the coffee sector environment in the three states presents similar characteristics; social, economic and production which are described below:

The three study municipalities are populations that do not exceed 65,000 inhabitants; the median age of the population ranges between 22 and 27 years of age, as well as areas where there are indigenous communities dedicated to growing coffee, this being one of their economic activities. Municipalities are also characterized as areas with poverty and social backwardness; high and medium, also present deficiencies in terms of health and housing services.

Coffee production in the three municipalities, for the most part, is a smallholder activity. For the year 2016, in La Concordia, a production of 7,893.00 tons was obtained, in San Juan Guichicovi it was 1,955.70, while in Atoyac de Álvarez it was 27,582.75.

According to data from the last 10 years (2006-2016), as shown in the following table, the municipality in which production has remained more stable and has not presented much reduction is Atoyac de Álvarez; since in 2006 it was 32, 693.80 and, based on data from 2016, as already mentioned, it was 27, 582.75.

Municipio	Producción (Ton)	
	2006	2016
La Concordia	29,859.90	7,893.00
San Juan Guichicovi	10,962.50	1,955.70
Atoyac de Álvarez	32,693.80	27,582.75

Table 2 Coffee production 2006-2016 in the municipalities.

Source: own elaboration with SIAP data, 2006-2016.

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Conclusions

Coffee growing at the state level has organizations and institutions that can help to counteract some of their problems and boost their competitiveness. That is to say: two fields are observed in the production with different senses of life, on the one hand, one can read the economic contribution and the social benefits that the production of coffee leaves. But, as if we spoke different worlds the communities that produce it, the producers and concrete actors in the rural area live in precariousness; some populations are in the National Crusade against Hunger (SAGARPA, S / N) have very high rates of marginality and poverty, thus proving the alternative hypothesis of the investigation since the three study municipalities share similar characteristics and the null hypothesis is rejected. In this case, a greater organization of all the stakeholders that interact in the coffee production chain and the municipal, state and national environment is necessary.

In recent years the production of coffee has presented important losses, some of the reasons are pests and the economic situation of coffee farmers, because although they receive government support they can not cover all their production needs. It is worth mentioning that the competitive environment of coffee deserves a reading from below, on foot, where one can observe the needs (in different areas) of the common life of the producers: in it it would be possible to illustrate how their relations with various public organizations are, private and governmental. In that sense, the data production numbers and concepts (which allude to the partition and integration through public policies and in another order) would have to look for a fairer and more democratic way to integrate the producers, real and materially, in the profits that derive from production.

How would the impact of coffee production on the populations we observe be observed? Lower marginalization rate, less hunger, improvement in social infrastructure, higher quality of life, more education, communities as poles of social and economic development, etc.

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Problems of commercialization of agricultural products in the municipality of Angostura, Sinaloa

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Abstract

In the development of the investigation several problems of commercialization of agricultural products have been found in Angostura, Sinaloa; Are similar to those in the country, low prices per ton, no support to the field, lack of training in the marketing process and the behavior of product markets, excessive number of intermediaries in buying and selling, ignorance of The processes of export, null linking of producers with entrepreneurs, government and universities, among.

It requires a program of rural extension, where the producer is attended and trained in the production process, inputs to be applied and especially in the behavior of markets and marketing.

The situation of the field is very critical, the producers no longer believe in the government and every time they sow they consider that they do not have good results, it is for that reason that much has been given the rentismo of the plots and are a few producers who symbolize because Have the economic resources.

Automation, processes, competitiveness, MiPyMes

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Introduction

The commercialization allows the organization and distribution of a merchandise to a certain place, with the purpose of its sale. Agricultural marketing is the process by which other regions, states and countries is distributed agricultural products from a producer, this by intermediaries who are responsible for the process of agricultural marketing.

For many years already he began to emerge marketing, giving first as a way to carry out the purchase and sale of agricultural products in the region to become a very important for the country's economy economic source through exports . The free trade agreement makes this process possible by eliminating or reducing most tariffs on agricultural products, allowing goods to be distributed more freely among the countries of the North.

The problem of commercialization lies in the disadvantages that producers have, because they are constantly paid per tonne an unfair price, receive scarcely government support and production costs are very high, which is why this is a factor that limits the commercialization, since sometimes the producers realize seedlings with the purpose of facing the commercializing companies of the region and they refuse to sell their agricultural products to these.

Sinaloa is now one of the largest agricultural producers in the country and also makes exports to the United States, Japan, China and Spain mostly, just as marketing and exporting agricultural products such as corn, beans, chickpeas and sorghum mainly.

Justification

The problems presented by the agricultural producers of the Municipality of Angostura, Sinaloa; in the sector, they are the prices per ton of the product, the high cost of production, the excessive number of intermediaries in the commercialization, the substitution of the workers for more efficient machinery and the importation of agricultural products from other countries; they affect more and more the producers and the economy of the region in general, these are only some limiting factors that damage the economic stability of the agricultural sector nowadays. It is thought interesting with this investigation to know those problems that limit the commercialization of agricultural products because it is the greatest source of economy and work of the people in the municipality.

The present investigation is made with the purpose of identifying the problematic that exists with respect to the commercialization of the agricultural products of the region, and in this way to make the farmers aware of the future facing the agricultural sector and thus be able to provide solutions to the problem in conjunction with the government. In the same way it is sought that with this information the farmers prepare better, and look for trained personnel to advise them in the commercialization process, especially when a foreign market is served that there are product specifications and export process before the customs. It is for this reason that this research is carried out, so that producers seek support of logistics and advice regarding marketing strategies by reducing intermediaries and transport costs.

Problem

The main problem of the commercialization of agricultural products is the number of intermediaries involved in this process, as well as the low prices per ton of the products, the high production costs caused by payments of water, insecticides, seeds, fertilizers, fuels, transport and harvest, among others, that make the final product have a high price and does not coincide with the low price offered per ton, even when the producers have increased the volume of production using improved seeds and quality.

The government indicates that it is supporting the field with the PROAGRO Productivo program, which has gradually reduced support, because there is a minimum of what is provided in some agricultural products and in others there is no support, this has allowed many of the ejidatarios they have decided to rent their plots because the sowing has not been profitable, since they have been left in debt because of the problems previously exposed.

Hypotesis

H1: There are limiting factors in the commercialization process of agricultural products that affect the economy of producers and their families in the municipality of Angostura, Sinaloa.

H2: The excessive number of intermediaries and the cost of transport in the commercialization process means that the price of a ton of agricultural products is very low.

Objectives

General objectives

Determine the limiting factors of the commercialization process of agricultural products that affect the economy of families in the municipality of Angostura, Sinaloa.

Specific objectives

- Identify the distribution channels of agricultural products in the commercialization process.
- Present the real problems of the commercialization process of agricultural products in the municipality of Angostura, Sinaloa.
- Formulate strategies and / or recommendations to producers to reduce marketing problems.

Theoretical framework

Agricultural marketing has a process that starts from the harvest of the products, distribution, market, policies until reaching the final consumer who will pay a fair price for the product, this becomes a complex process due to the difficulties of moving in very distant regions. that producers are not organized and face difficulties, as indicated Rincón, Segovia, Aguilera, López, Zavarce and Leal (2004): "Agricultural marketing is a process that allows products to reach consumers located in areas urban areas distant from agricultural exploitation areas, in such a way that, the number of operations and functions that are carried out, determine the degree of complexity of the process. Thus, it can be said that commercialization is the set of processes or stages that the products must overcome in the transfer flow from the producer to the final consumer ... The participation of the producers in the marketing of their products, is perhaps one of the most delayed, dispersed and disorganized, not only of the national economy but also of Latin America. It is for this reason that it is necessary to reduce the stages of commercialization, that is, to make delivery more direct and to organize agricultural producers for the process.

Small producers must stick to commercial globalization and information and communication technologies (ICTs) that are becoming stronger, and they become a constant problem for producers due to the process of adaptation and their resistance to change. The dilemma in such globalization is that producers, even if they have little experience, must take a more dynamic and flexible role in the marketing process. Therefore, it is necessary to generate competitive sectors in the market and an efficient business management, indicated by Barrantes (2006) "In the recent past, most of the efforts have been made for the development of agricultural activity, with capital intensity and with a view to a non-traditional market and in the hands of large and organized entrepreneurs. Today we have to face the new dilemma of commercial globalization where the producer must assume a more dynamic role in the process of linking production with commercialization. In this process of globalization the question arises about the participation of small producers and their way of facing the process. This additional problem for the farmer about the new process of globalization of economies and the emergence of economic blocs to secure markets and reduce trade risks, requires competitive sectors, efficient business management in the process". These problems are faced by small Mexican producers, who have not been trained to adapt to the changes and continue to work their land traditionally and want to sell their crops to the first marketing agent, who offers a low price and no guarantee of timely payment.

In relation to the problems presented in the commercialization of the products of the agricultural sector, it has established some forms of support for the trade of grains, one of them was presented in the year 2001 by proposal of the President in turn Lic. Vicente Fox Quezada, who presented an initiative to support the field, where he proposed agriculture by contract, where the farmer made his purchase contract with the buyer and sold the product before the harvest, as noted by Echánove Huacuja (2009) "In 2001, the The government announces its intention to support the commercialization of basic and oleaginous grains that is carried out under the contract farming scheme, which it defines as "the operation by which the producer sells to the buyer before harvesting his product, through the celebration of forward purchase agreements, under specific conditions of volume, quality, time, place of delivery, price (or formula for determining of this) and payment terms. The objective of this scheme was to reduce the uncertainty in the commercialization process, both for producers and for purchasing companies, as well as to promote the substitution of white corn for yellow ". This strategy that is presented to agricultural producers in Mexico, had much to be desired, because there are many older producers who work under the traditional scheme and could not achieve commercialization under contract and today continue with the same problem, because they are people who do not have studies and are unaware of the signing of contracts and forms of negotiation, and those who tried to do so, the trading companies, especially foreigners, abused the peasants in the negotiation, because they were not trained or advised by expert personnel who will support the process.

In Mexico there are some marketing problems, such as the link between companies, buyers and the Government, as well as the exchange rate of the Mexican peso in relation to the US dollar, which is where the price of products on the Chicago Stock Exchange is determined. There are also problems of technological innovation and the products to be sold in the market lack quality, according to the requirements established by the buyer, among other problems pointed out by the Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA) (2014) "High levels of risks in agricultural and fishing activity, derived from a low link between buyers and producers, costly transaction mechanism, little or no incentive for commercial promotion, an overvalued exchange rate, distorted international prices and the presence of an oligopolistic market of inputs.

Limited access to the market mainly due to the low quality of agri-food products due to limited technological innovation and low levels of public and private investment derived in part from the presence of a weak institutional framework; low quality standards market due to the low incorporation of good practices; weak integration of the productive chain and low development of technical-productive and business capabilities ". The situation of commercialization in Mexico is highly debated due to the problems presented by the almost null public and private investment, as well as the weak government structure that does not address the problems of the countryside and is followed by errors in the way of buying and selling crops.

In Mexico, policies and programs have been established to support the commercialization of agricultural products, which have had their advances such as the case of the National Company of Popular Subsistence (CONASUPO), which was responsible for serving the markets for basic products such as corn, wheat, beans and rice; the population of the rural sectors and the low-income population were burned, because they were selling products at low cost in each of the stores that were in the towns, this was a great progress for the inhabitants, but in the case of the peasants did not have good results because, as always, the guarantee prices that existed for these products were taken advantage of by those people who turned into renting agents and landowners for planting, among other problems pointed out by Maximiliano Martínez, Rivera Herrejón, Franco Malvaíz and Soria Ruiz (2011) who quotes De Ita, (2003: 43) "the fundamental objectives were regulation and protection. The regulation focused on the basic subsistence markets produced and consumed by the majority of the population in Mexico: corn, wheat, beans and rice. The protection was aimed at farmers belonging to the area of subsistence agriculture and low-income consumers. However, the real benefit that Conasupo provided to corn producers was questioned for several reasons:

1. The guarantee prices only benefited the producers with surpluses that sold corn, but not the poorest peasants who had to buy grain.
2. The excessive procedures and regulations for the purchase of corn by Conasupo caused many producers to be excluded from the program.
3. The dates of purchase were limited to certain months of the year, so that the rest was open to the operation of merchants, often unscrupulous speculators.
4. Corruption and inefficiency of the parastatal.

Despite its shortcomings, Conasupo had acquired considerable influence in rural corn markets.

Thus, the disappearance of the state company in 1999, caused a disorder in the grain market that the Mexican government has not been able to resolve. Currently the distribution and marketing of basic food for the population, in the case of corn, is in the hands of large companies, which condition the supply and marketing to obtain state subsidies. The case of CONASUPO, came to support the distribution and commercialization of the products, but at the same time caused problems in the grain markets because in Mexico there was a subsidium to certain products considered as a guarantee price, which no longer exists, disappears and determine a new program called PROCAMPO, which came to support the registered ejidatarios with marketing support, which little by little has been reduced to the degree of being less registered producers and the resource has gone down a lot.

On the other hand, it is important to point out that there are other types of problems that influence marketing, such as low productivity, low or no support for those products that truly are a comparative advantage with the United States, among others noted by Sánchez Cano (2014) "The low productivity of the campomexicano is due to multiple reasons: the low productivity of the agricultural and rural activity; a weak investment; the fragmentation of production that prevents capture economies of scale; supports that are not linked to productivity; little economic orientation in agricultural production (inputs whose price does not reflect their true opportunity costs and guarantee prices that subsidize inefficient production).

Corporatist approach to channeling resources; communal properties in which there is no individual responsibility for efficient use, and uses and customs that are not oriented to the optimal economic development of individuals. In addition, the low growth of agricultural productivity is concentrated in the crops that have been the most "intervened" by agricultural public policies (for example, corn and beans), which contrasts with the little governmental support to other crops with which Mexico It has comparative advantages, and has attracted enough investment, reaching productivities that can dominate the US market. Mexico is a large producer of grains and vegetables that should be exploited considering that it has a great competitive advantage with other markets of ceran countries, but the Mexican government will have to pay close attention and establish public policies for the commercialization of these products, because there are two periods of government that have no interest in serving the agricultural sector, a situation that makes it vulnerable to any problem.

Research Methodology

The nature and scope of this research is qualitative in nature, as it interacts directly with the owners of companies in the agricultural sector and producers in the municipality of Angostura, Sinaloa; By means of a focus group (focus group) to 8 grain commercialization companies and interviews to 20 agricultural producers of the municipality, which allowed to describe the characteristics of the companies and the opinion of the producers of the municipality. Carrying out a typology of unilateral character, because it is done in a determined period of time that covers the time in which the data or real facts of the companies are taken, period of March of 2016 to March of the year 2017.

The qualitative investigation according to Mendoza Palacios (2006) says that: "the qualitative methodology, as indicated by its own name, has as its objective the description of the qualities of a phenomenon.

Look for a concept that can encompass a part of reality. It is not about testing or measuring to what degree a certain quality is found in a certain given event, but discovering as many qualities as possible. In qualitative research we should talk about understanding in depth instead of accuracy: it is about getting an understanding as deep as possible. "

It is for this reason that the qualitative method is used for this research, because one of the techniques that is the focus group and the interview is applied.

The materials used in the methodology to conduct the research are a focus group with entrepreneurs and agricultural producers and also used the interview as an instrument that was applied under a structured questions guide to entrepreneurs and producers in the agricultural sector of the municipality of Angostura, Sinaloa; which sought the opinion of the problems presented in the process of commercialization of agricultural products produced in the region.

Results

In the municipality of Angostura, Sinaloa, grain trading companies are established, such as Grains of Sinaloa S.A. de C.V., Jova Graneros S.A de C.V., Comercializadora de Granos Patrón S.A de C.V., Graco Granos S.A. and National and International Grains of Sinaloa, S.A. (GRANISSA), among others of equal importance, same that are responsible for making the collection of agricultural crops in the region and for distribution to the final consumer have their own transports of excellent quality and also provide financing and sale of inputs to the producer .

In the development of the Focus - Group that was carried out with entrepreneurs, it was pointed out that the companies approach the field, that is to say the producer so that he does not have problems in going to look for markets, that is why they are in the agricultural area of the municipality , also have trained personnel to offer the necessary products for the care and management of the plantings that the same company sells them, as well as financial credits for the producer; They also indicated that they are committed to the agricultural sector.

The problems of commercialization, indicate the entrepreneurs that are minimal because the producer is paid according to the volume or tons delivered, agreeing to make the payment once the company makes the sale of the product with other companies in Mexico or abroad, Because they export to the United States, Spain, Japan, China and Israel depending on the product.

The companies indicate that the agricultural producers do not have any problem in the commercialization of their products, because the company receives the grain, stores it, commercializes it and pays the producer, that is to say, they avoid the market negotiation process, reason why they consider that there are no problems.

On the other hand, interviews were conducted with agricultural producers who indicated that there are several problems in the commercialization of the products, starting with the price that is very low, starting with the price of corn that last year was paid to us \$ 4200.00 per ton and this year they want to pay us \$ 3600.00.

Where we are going to arrive, said the producer, if in addition the inputs for planting corn have increased their prices a lot like fertilizer, seed, insecticides, herbicides and not say the diesel that the price is sky high; the cost of production per hectare is very high and that is why it does not reach the price that they want to give us, we do not have profits and notice that Don Marcos did not have a yield in his harvest, he will remain indebted because will not reach to pay, that's the truth of everything, said a producer of corn in the region.

In the same way it was found that there are actually grain trading companies, and that they support the producer, but for their own benefit, because they offer financing at high interest rates and the payment of the harvest is very slow, sometimes they last for months in which they are pay the beans and of course the interests continue to run day by day increasing the amount that is owed to the company.

It was also found in information provided by the producers that the companies offer them the credit, but they also commit them to buy the inputs like seeds, insecticides and fertilizers in the same company, this causes the managers to sell the insecticides to the producer without occupying them, or well apply large amounts of fertilizer without the land occupying them, as one engineer said: "to apply a ton and a half of fertilizer to the corn when it is being born, it does not occupy as much, it must be dosed according to each stage and especially when in the third phenological stage so that it begins to glean and have strength so that of elotes ", this indicated that it does not occupy much fertilizer and the truth some producers if they paid attention to it and had a reduction of production costs and a very good harvest, so Both the trading company only wants to sell their products at a good price.

The main problem has been the price paid per ton and it has always been said that it is regulated by the Chicago Grain Exchange, but the case of corn, said bag defines the price of yellow corn that is used as livestock feed. , but in the case of Sinaloa only white corn is produced that is for human consumption and therefore should not be established the same price, should consider the price of the Kansas Stock Exchange who does define the price for white corn and is a fairer price for the producer.

Another problem that occurs in commercialization is the excessive number of intermediaries as is the case of the famous coyotes, who go to the plot to compromise the delivery of the product at a lower price, arguing that it will be paid immediately and the producer You do not have to wait up to three months for the trading company to pay for your harvest. It is a good opportunity, say the ejidatarios, but the price is not fair, because they will sell it at a better price to obtain profits.

In the case of vegetables there are also marketing problems, because the price is not adequate in the market, there are many products that are lost as is the case of the onion here in the region, which the producer wants to pay 50 cents per kilo and the price in the companies is up to \$ 30.00 per kilo, which is incongruous the payment, it is for this reason that the ejidatarios choose to trace their plots and incorporate them into the soil. As well as this product can be observed the case of tomato, tomato bag, chili and melon among others.

Conclusions

The existing problem in Mexico in relation to commercialization has been very specific in the State of Sinaloa, since it is considered one of the States with the highest grain production, where producers often express themselves by the low prices per ton of corn, beans, safflower and vegetables among other products of equal importance, reflected by the lack of support from the public administration.

A serious problem that was found is that the government is allowing the grain trading companies to become financial also, who are subject to the producers with high interest rates and sometimes last up to 3 to 6 months after having delivered their production. to pay for their products, time that the interests continue to run day by day.

There is no rural extension program, where the producer is attended to and trained in the production process, inputs to be applied and, above all, in the behavior of markets and commercialization, this is where the Ministry of Agriculture should put great interest in addressing the problems create training modules or assist the ejidos to offer extension services.

It is necessary that in the municipality of Angostura the producers organize themselves and ask for support from the public administration, the Ministry of Agriculture or from the Polytechnic University of Valle del Évora, which is the only university in the municipality, in terms of training processes marketing, market behavior and extension. This will allow producers to not sow their products blindly to see if they can sell their crop and if there will be a price, but go more safely according to the behavior of the markets. This will allow a marketing with fewer problems.

Regarding distribution and marketing channels, it is important that producers consider eliminating coyotaging and deliver directly to the marketer as the final consumer, as in the case of the company Graco Granos SA, who is in charge of buying the grains from the producers and they they pack them by kilos or 50 kilos sacks for direct sale to the consumer and it is a company that started in the municipality and that began in the State of Sinaloa since 1960, and nowadays it is offering its services of grain collection and considered as a good marketing alternative for the Angostura region.

The situation of the field is very critical, the producers no longer grow in the government and every time they sow they consider that they do not have good results, it is for this reason that there has been a lot of rent for the plots and they are a few producers that have the sufficient resources to plant those who are simply called "rentadores" or "ricos"; indicating the ejido owner of 11 hectares that is not profitable the sowing of his plot that is more what they spend than what they earn; However, the growers plant up to 100, 200 or 300 hectares and they buy the inputs wholesale and they are cheaper, thus reducing production costs.

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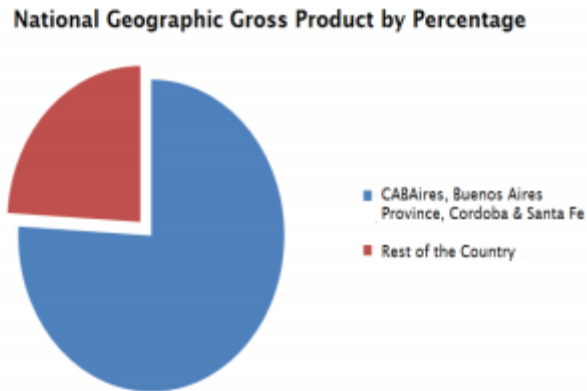
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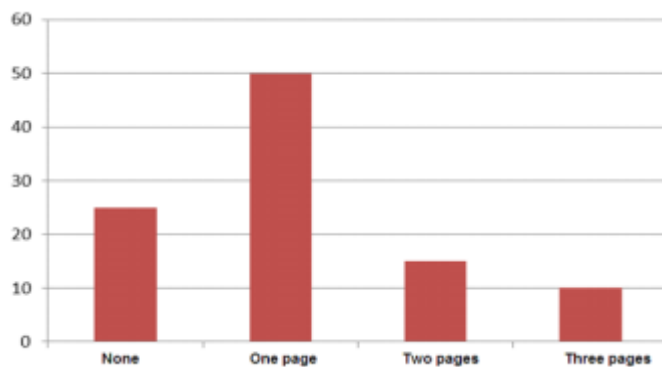


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