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## **Presentation of the Content**

In the first chapter we present, *Management of strategies and technologies in profile training and entrepreneurship culture, development for regional*, by VALDEZ-GUERRERO, Raquel. ROBLES-ARIAS, Isela Margarita and RÍOS-CALDERÓN, Graciela Guadalupe, with adscription in the, Instituto Tecnológico De La Paz, in the nex chapter we present, *Phenology and nurse plant of *Sotoa confusa* (Garay) Salazar (Orchidaceae) in the Southern Potosino Zacatecano Highlands*, by MUÑOZ-URIAS, Alejandro, URIBE-MÚ, Claudia Aurora, HUERTA-MARTINEZ, Francisco Martín and NERI-LUNA, Cecilia, with adscription in the, Universidad de Guadalajara, as the following article we present, *Physical Characterization-Chemistry of Essential Oil of Oregano in 6 Communities of the Municipality of Rodeo, Dgo.*, by MARÍN-TINOCO R. I., SILVA-MARRUFO. O and GONZALES-GÜERECÁ M. C., with adscription in the Universidad Tecnológica de Rodeo, as the following article we present, *Proposal of MSMEs to alleviate poverty in the community of Tres Palos, municipality of Acapulco, Guerrero*, by CORTÉS, Elisa, MATA, Eloy, LÓPEZ, Maricela and HERNÁNDEZ, Leonel, with adscription in the Instituto Tecnológico de Acapulco.

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## Management of strategies and technologies in profile training and entrepreneurship culture, development for regional

### Gestión de estrategias y tecnologías en la formación de perfil y cultura de emprendimiento, el desarrollo para regional

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#### Abstract

Baja California Sur has areas of opportunity promote alternative tourism given the orographic conditions and characteristics of the environment, there are differentiated and distinctive attractions in rural areas such as the South Micro Region of La Paz, however, these attractions have not been taken advantage of. as development strategies and for the benefit of residents, there is little influx of local, national or foreign tourism, this negatively impacts regional development, given that the tourism that is practiced today is organized and carried out by people who do not inhabit the place, they take tourists for a while and the benefit does not permeate the population. Business strategies such as the formation of the tourism cluster, encourages the active participation of residents as their own beneficiaries, the formation of profile and culture of entrepreneurship is important and enables the participation of local businessmen. Thus, we see that the objective is to design a proposal for the formation of entrepreneurship profile and culture in the settlers, including aspects related to relevant information on the profile and culture of entrepreneurship, as well as information related to organizational culture, methodological aspects: collection instruments, processing and analysis of information, closes with proposal, conclusions and recommendations.

**Cluster of alternative tourism, Technologies for regional development, Profile and culture of entrepreneurship**

#### Resumen

Baja California Sur tiene áreas de oportunidad para promover turismo alternativo dadas las condiciones orográficas y características del entorno, existen atractivos diferenciados y distintivos en zonas rurales como es el caso de la Microrregión sureste de La Paz, sin embargo estos atractivos no se han aprovechado como estrategias de desarrollo y en beneficio para pobladores, existe poca afluencia del turismo local, nacional o extranjero, esto impacta negativamente al desarrollo regional, dado que el turismo que se práctica hoy en día es organizado y realizado por personas que no habitan el lugar, llevan a los turistas por un rato y el beneficio no permea a la población. Estrategias de negocios como la formación del clúster turístico, propicia la participación activa de pobladores como propios beneficiarios, la formación de perfil y cultura de emprendimiento es importante y posibilita la participación de empresarios locales. Así vemos que el objetivo es diseñar propuesta para la formación del perfil y cultura de emprendimiento en los pobladores se incluyen aspectos relacionados con información relevante de perfil y cultura de emprendimiento, así como, información relacionada con cultura organizacional, aspectos metodológicos: instrumentos de recolección, procesamiento y análisis de la información, cierra con propuesta, conclusiones y recomendaciones.

**Clúster de turismo alternativo, Tecnologías para el Desarrollo regional, Perfil y cultura de emprendimiento**

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## Introduction

The birth of the tourist poles in Mexico, dates from the 60's, throughout this time and until today, these infrastructures have grown in Mexico and in the world as economic environments change. An important influence that has determined and diversified this market is the component and behaviour of the supply and demand of services. The set of these potentials and the geographical nature and disposition of their resources and from them the figure of the cluster has been created to name and determine a set of organizations whose development and growth is determined by the similarity of the goods or services they provide to the market.

Baja California Sur, has two tourist poles of global dimension, and its specialty is the offer of tourist services, from this main activity, other complementary services are released where there are specialized companies to provide these services such as: sport fishing services, travel agencies, real estate (real status), guided tours, diving, snorkelling, yacht trips, etc., considering an empirical analysis, these companies work according to their local or chain regulations, where this research comes from, implies the creation of an administrative unit that coordinates the activities of a whole productive chain of tourist services offered in the region and that functions as a control unit of activities to unite companies, coordinate and manage before instances and the companies themselves. market needs and the detonation of their potentials in an orderly and systematized manner.

At present, some populations such as El Triunfo lack productive activities that allow maintaining a sustainable economic dynamic, the young population begins to leave the population of origin looking for better economic conditions in more urbanized regions, first for reasons of studies and then for positions labour. The previous mining activity in the town, El Triunfo left as a legacy an extensive treasure in historical monuments, such as original musical instruments, constructions with unique styles, three pantheons where the architecture and history of English, Chinese and Mexican are, represent the culture and urbanism imported from England and China respectively.

The possibility of promoting economic activity from this legacy is to create a business model under the Tourism Cluster scheme for this microregion; it is contemplated to integrate the potential of the region in the modality of alternative tourism that makes possible the development of this region.



Figure 1 Site Map Google Earth font

A challenge is the design of strategies that, integrated into a plan, are the opportunity to trigger the development of this region, as it is: to provide information and training for entrepreneurs, thereby encouraging the motivation of the innovative spirit, formation of the business profile and culture entrepreneurship in order to encourage the participation of residents and therefore the reactivation of the town impacting the market and economic flow with the participation in the opening of new businesses and sources of self-employment.

The inhabitants of the region in group interviews have expressed interest in the creation of business units using the traditions and opportunities that exist in the context of the region but recognize that they lack methodological and technical knowledge to achieve success in their futures ventures.

In the first part, the project incorporates a diagnosis to determine tourist attractions that the area has, products and services that are feasible to offer, knowledge of the endemic flora and fauna of the place, a study. In the second phase, a self-assessment was applied in order to obtain information on the level of development of the profile and culture of entrepreneurship in inhabitants of the region. In the third phase the proposal of strategies in plan integrated in a set of actions is presented.

### The Cluster as a business strategy

Every company that competes in an industry must have a competitive strategy, (Porter, 2008), either explicitly or implicitly within the activities specified in each of its functional departments of the organization, knowledge the essential dimensions of the industry are a specific guide for formulating strategies in that environment. The main characteristics that govern all economic activities are structural changes and transformations in the organization and operation of capitalism with globalization, interdependence and uncertainty about changes, the new economy is determined by three fundamental drivers:

1. The transition from the industrial era to the new era of knowledge, intellectual capital.
2. The continuous, fast and simultaneous change.
3. The globalization of markets: production, finance, agreements and commercial management and regional integration, information and knowledge flows.

The new technological support has led companies to define the new name of the game, which is the global hyper competence in local markets, where intellectual capital is the strategic factor of the sustainable competitive advantage of companies with attributes that today it is called as an IFA organization (Intelligent in organization, flexible in production, agile in marketing) equipped with capacity and speed of response.

(Villareal, 2015) The drivers of the new economy are supported by the technological revolution in information, telecommunications and computer-aided manufacturing, the accelerated march of the third technological revolution (with major transformations in computer science, microelectronics, new materials, biotechnology, nanotechnology and telecommunications), promotes and enables globalization processes of industries. Faced with these challenges, the micro-company has to venture into new strategies that allow it to be competitive in these new forums, there is no other option but to compete with the local and international market with the necessary and sufficient resources to enter the new global hyper competence game.

According to the Systemic Competitiveness Model (Villareal, 2015), there is a dynamic interaction between several systems that affects the competitive performance of companies:

- a. The system defined by the degree of economic openness and exposure to globalization.
- b. The macroeconomic system that defines the growth rate and the financing and investment conditions; the sectoral-industrial system that defines the density and solidity of the productive fabric of a country, state or region.
- c. The institutional system, defined by the rules under which markets operate and the economy as a whole operates, as does the State.
- d. The micro - business system, which is the core of competitiveness.

The operation of any of these systems affects others directly. Hence, a correct understanding of competitiveness or competitive growth is impossible without realizing that there is dynamic interaction between these systems. Villareal (2015) Defines six levels within the system and being part of these levels defines in them, ten capitals, sustained by their respective pillars of systemic competitiveness.

1. Microeconomic: Business model integrated by level of organization, production and marketing, local competition.
2. Meso-economic: Agglomeration economies, productive articulation of business organizations, sector competitiveness.
3. Macroeconomic: Competitive dynamics determined by macroeconomic variables which determines cost-prices.
4. International: With growth opening, free trade agreements, international competitiveness.
5. Institutional: Government model and its rule of law, laws, regulations and transparency.
6. Political-Social: Social capital

At the mesoeconomic level is the competitiveness consisting of:

- a. Companies: articulating the micro, small and medium business with the large one.

- b. Sectors: forming industrial and productive conglomerates (cluster).
- c. Regions: forming regional development poles

This in turn implies: Organizational competitiveness, logistics competitiveness, intellectual capital and regional innovation system. The competitiveness sustained in the Organizational Capital, this is governed by the logic of the productive articulation between companies, between productive sectors and industries (cluster) and finally between regions and countries. This articulation, when efficient, generates agglomeration economies. The productive articulation is in turn in three sub-levels, in which they incorporate specific efforts of business organization and government promotion, which are: Business chains, productive or cluster conglomerates and regional poles.

Logistic capital refers to the development of physical, transport and technological infrastructure that facilitates the reduction of transaction costs between companies, and also incorporates the infrastructure for the development of human capital and for innovation and basic technological absorption such as: roads, industrial ports, waterways, airports, energy infrastructure and telecommunications that are also efficient and internationally competitive.

Intellectual capital implies innovation and builds a sustainable competitive advantage supported by the effective use of the latest technologies. The ability to maintain a competitive advantage in research and technological development is explained by the creation and development of an optimal institutional environment, which includes elements such as:

- High rates of investment in Research and Development.
- The ability to attract the best talent from anywhere in the world.
- The ability to constantly innovate along the value chain in production processes.
- The ability to form strategic alliances between public institutions and companies.

In the new cluster approach, the individual or the company is visualized, in the search for its own benefit, but also that of the group as a system, it optimizes the competitiveness of your company and generates agglomeration economies, which you achieve through:

- Strategic alliances with: competitors, customers and suppliers
- Joint between companies; business chambers
- Chain of trust between: sectors, companies, workers and government.

In the world of globalization of markets and openness to international competition, the basic competitive advantage lies in the ability to achieve improvements in cost, quality and comprehensive customer service. The benchmark in cost and quality is the global market, as the local market is no longer isolated or protected; maintaining this perspective is a basic condition for survival. In the hypercompetence race, this type of advantage is necessary only to enter the market and nothing guarantees permanence within it.

The sustainable competitive advantage is obtained by closing the competitiveness gap with respect to the leader in the race and expanding it with respect to the competitor behind. Improvement and continuous innovation is the only way to guarantee competitiveness over time. The only way to obtain this advantage is through the development and strengthening of sustainable competitive companies IFA type: Intelligent in organization, Flexible in production and Agile in marketing. (Villareal, 2015)

The regional perspective emerges as a better way to represent current economic realities. At the base of this approach is what is called cluster analysis or productive chains.

These concentrations of companies that obtain an economic advantage derived from their interactions can be related in two ways: between “equals” through cooperation and competition or playing the role of suppliers or customers in the value chain.

Organizational competitiveness, the mainstay of productive or cluster conglomerates, resides in the ability of companies to articulate themselves competitively in groups (business chains, productive conglomerates / clusters and regional poles), taking advantage of the agglomeration economies that are a good articulation productive within the framework of an adequate territorial planning.

The empirical evidence of the last years in the cluster study, derives that it is possible to isolate elements necessary for the success in the development of dynamic regional poles favorable to the sustainable competitiveness of the cluster:

1. Recognition of the potential of knowledge-based industries by regional and local leaders.
2. Identification and support of regional and active strengths.
3. Catalytic influence of local components.
4. Need for business management and survey of business practices.
5. Availability of various sources of investment capital resources.
6. Cohesion provided by formal and informal information chains.
7. Need for research institutes for education.
8. Ability to attract and retain the best long-term human capital.

To these competitiveness criteria, the emergence of the development of the Global Value Chain is added, within which the activity of numerous industries is organized, under increasingly stringent standards and where not to participate results in the exclusion of the career competitive.

Therefore, it is relevant to determine the profile and culture of entrepreneurship that characterizes those interested in participating, as well as the training and development of skills or competencies required for entrepreneurial training to real and potential entrepreneurs that integrate the conglomerate of business units for the formation of the cluster of alternative tourism in order to motivate the development of the Micro Region South of La Paz.

### The provision of alternative tourism services

Alternative tourism is a concept that groups tourist-recreational activities and that people carry out during their trips and stays, which, despite the different themes, converge that the focal attraction around which they revolve is nature. This type of tourism emerges as a contrast to conventional tourism, because it seeks that the trips are carried out in localities with a great environmental capital, in spaces and unknown places, that stimulate the development and the personal improvement. On the other hand, practitioners of this type of tourism are willing to pay large sums of money to meet unique attractions of a natural or cultural nature.

Thus, Alternative Tourism is more than a fashion or a simple term to attract visitors, it is the name given to a well-defined market segment of great relevance in contemporary society. (2012, 2012) SECTUR defines Alternative Tourism, also called Nature Tourism, as "the trips that are intended to carry out recreational activities in direct contact with nature and the cultural expressions that surround it with an attitude and commitment to know, respect, enjoy and participate in the conservation of natural and cultural resources." Within alternative tourism there are different modalities, related to each other by using environmental capital as the axis of activities such as: Ecotourism or Ecological Tourism, Rural Tourism and Adventure Tourism.

### Inventory of Tourist Attractions

SECTUR defines it as "It is the ordered catalog of places, objects or events of tourist interest in a given area. Its preparation involves two steps: a) registration of information and, b) evaluation of tourist attractions".

Based on this, (Casal, 2002) suggests two types of inventory: the inventory of ordinances for the first point, which in turn is divided into two large groups: needs and resources; and the inventory of attractions for the second point, which is also divided into two groups: real and potential. Rural communities have much to offer to all those who are willing to face a different world from the one they know, leaving aside the exuberance of the city and entering a world where man depends directly on the natural environment that surrounds him.

What attracts the most attention to tourists are customs both in their folklore, such as dances, clothing and legends, and in the environment in which they operate to live. (Meza, 2018)

Another of the points offered by these communities is their gastronomy, since all their products are obtained directly from the natural environment, so that food has a unique process that gives them a characteristic flavor and impossible to match in an urban environment. All this together with the natural environment in which these communities are located results in a perfect place to relax and meet new things, different lifestyles and reunion with their roots.

## Method description

### Developing

Determination of opportunities for the provision of alternative tourism services The project was presented through a group interview with the authorities and inhabitants of the place and the commitments with the interested parties were established in order to begin the collection of the information and determine the tourist attractions that the area has, products and services that are feasible to offer in the region, as well as the knowledge of endemic flora and fauna of the place, for which identification cards were used, taking into consideration aspects such as:

Title
Photography
Sample Video
Interview audio
Bibliographies or queries
Notes / Observations:
Log Data
Who registered?
Registration date:

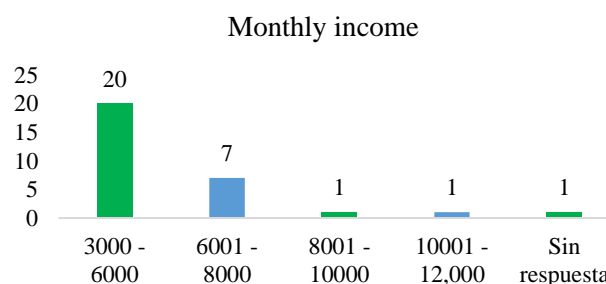
**Table 1** Identification card format  
*Own Source*

As a result of this information, the result is that there are areas of opportunity for the generation of business units for the integration of the alternative tourism cluster, with the participation of 30 entrepreneurs interested in participation in the areas of:

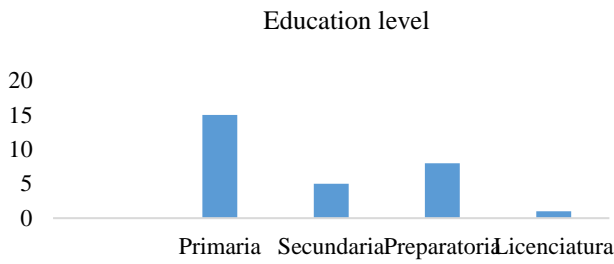
- Ecotourism: observation of nature, natural attractions of the area, observation of flora, fauna, of ecosystems, workshops to save the environment and environmental education.
- Adventure tourism: mountaineering, rappelling horseback riding and climbing
- Rural tourism: rural photography, gastronomy, natural medicine, agritourism, Eco archaeology, ethnotourism, arts workshop and mystical experiences.

Taking into consideration that these opportunities are for the generation of business units for the integration of the alternative tourism cluster, the need to apply other instruments to determine the capacities and competencies of the inhabitants of the region is estimated and specifically taken into consideration The El Triunfo population, located in the La Paz Municipality of the State of Baja California Sur Mexico and is located in the GPS coordinates: Longitude (dec): -110.106111, Latitude (dec): 23.803889, the locality is at a medium height of 500 meters above sea level and the population is 276 people, of which 148 are male and 128 female who are divided by ages into 77 minors and 199 adults, of which 35 are over 60 years old.

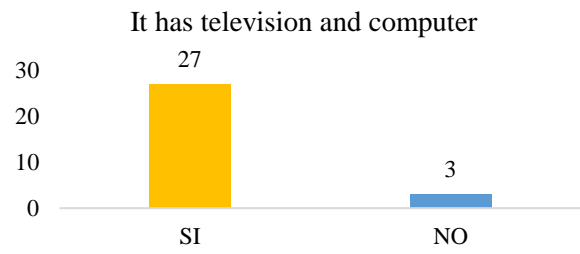
In order to carry out the data collection, a previous meeting was held and in agreement with the delegation of the place and with the participation of the inhabitants interested in the participation in the cluster with provision of services of alternative tourism or sale of products, as well A socioeconomic study applied to a total of 31 people was carried out. The study included: economic income, educational level, housing, services, savings culture among others, from which it is obtained:



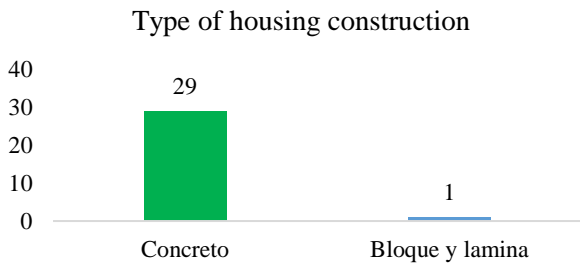
**Graphic 2** Economic income, inhabitants of the place  
*Own Source*



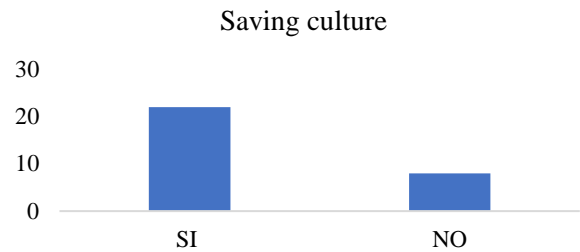
**Graphic 3** Educational level inhabitants of the place  
*Own Source*



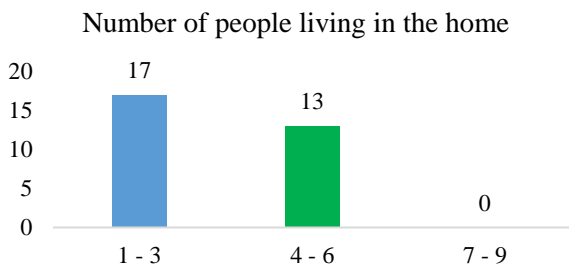
**Graphic 8** Communication systems in the homes of the locals  
*Own Source*



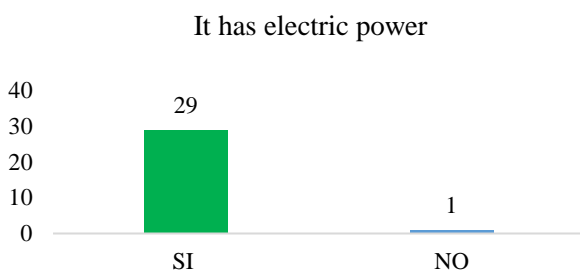
**Graphic 4** Type construction housing inhabitants of the place  
*Own Source*



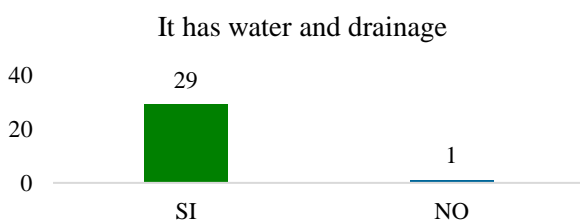
**Graphic 9** Culture of saving the inhabitants of the place  
*Own Source*



**Graphic 5** People inhabit homes the place  
*Own Source*



**Graphic 6** Services inhabitants of the place  
*Own Source*



**Graphic 7** Services inhabitants of the place  
*Source Own*

In the same way, an open questionnaire was applied to know if there is interest of the inhabitants of the region in participating in the provision of services of alterative tourism or sale of products in the community emphasizing the knowledge of tourists and their needs, the natural resources of the area, knowledge of economic activities and income where the information was obtained:

- They see potential benefits in the tourism sector
- Community with interest in focusing on tourism, but do not know how
- There are activities in the region that denote tourism increase
- There are currently more local and foreign visitors
- It has seen improvements in relation to the increase of tourism
- It is of interest to respect their traditions
- The visitors have not generated problems
- They consider that their main resources are the earth, water and nature
- They have noticed that lately there are changes with new businesses and improvements in the community
- They ignore the existence of programs of conservation of natural resources in the region.

The self-assessment was applied in order to obtain information on the level of development of the profile and culture of entrepreneurship for inhabitants of the region, this information allows: to know about strengths and weaknesses in relation to the situation of profile formation and entrepreneurship culture, and in addition to knowing the commitment of the performance of the capacities that will result in the improvement of the activities as an entrepreneur, in which the Likert valuation scale was used since it is easy to apply, it offers a graduation in the opinion of the people regarding the attitudes or willingness to react favourably or unfavourably to a stimulus, includes components: cognitive (beliefs), affective (feelings) and behavioural. It is a method in which people directly contribute data: in questionnaires and scales, they provide projective data a direct observation of behaviours is made, and it is simple to answer.

Criteria referred to by (Moya Muñoz, 2016) "Competencies for entrepreneurship" have been considered in its structure, such as those described below:

Criteria	Grouped attributes
1) Leadership	Ability to set goals, track, guide and motivate others in achieving goals, creating an environment based on mutual trust and personal / professional development
2) Uncertainty tolerance	Ability to adapt and work in different and varied changing situations
3) Resource management	Ability to organize and establish the necessary action plans to achieve objectives set with available resources: technical, economic and human.
4) Negotiation	Ability to resolve conflicts of interest by achieving satisfactory agreements for both parties, creating a collaborative environment with lasting commitments that strengthen the relationship.
5) Creativity	Ability to propose new and different solutions, resolution of real problems, analysis of requirements by customers or by activity.
6) Teamwork	Ability to foster an environment of collaboration, communication and trust between team members and with partners, encouraging them towards the achievement of common goals.
7) Risk management	Ability to function in risky and uncertain scenarios, make assertive decisions, with well-informed research attitudes, and a sense of responsibility.
8) Business vision	Ability to detect and generate opportunities, interpret variations in market trends and recognize the dangers and external forces that have an impact on the competitiveness and effectiveness of the business.
9) Need for independence	Ability to make own decisions, assume responsibility for results achieved, favorable or unfavorable without thinking of guilty or benefactors.
10) Troubleshooting	Ability to provide feasible solutions to current and predictable problems that respond to customer expectations.

11) Communication	Ability to transmit effectively: ideas, intentions, knowledge, information; ask questions, understand and actively listen to carry out a purpose
12) Learning capacity	Ability to evaluate frequently and in depth the own behavior located in the real context, unlearn and look from another perspective what was considered safe, make improvements in behavior from the analysis of previous experiences.
13) Results orientation	Predisposition to act with interest to achieve previously established objectives, with strategic goals and activities, seeking competitive performance.
14) Proactivity	Ability to act in advance, showing interest and concern for customer requirements (internal / external).

**Table 2** Self-evaluation criteria referred to the level of development of the profile and culture of entrepreneurship *Own source based on criteria proposed by (Moya Muñoz, 2016)*

### Analysis

The analysis was carried out using a Likert assessment scale, processed in Excel for graphing and with the use of the SPSS application to determine frequencies, reliability, mean, variance and standard deviation (scale statistics), to subsequently determine opportunities through the SWOT matrix, and consider for strategy design.

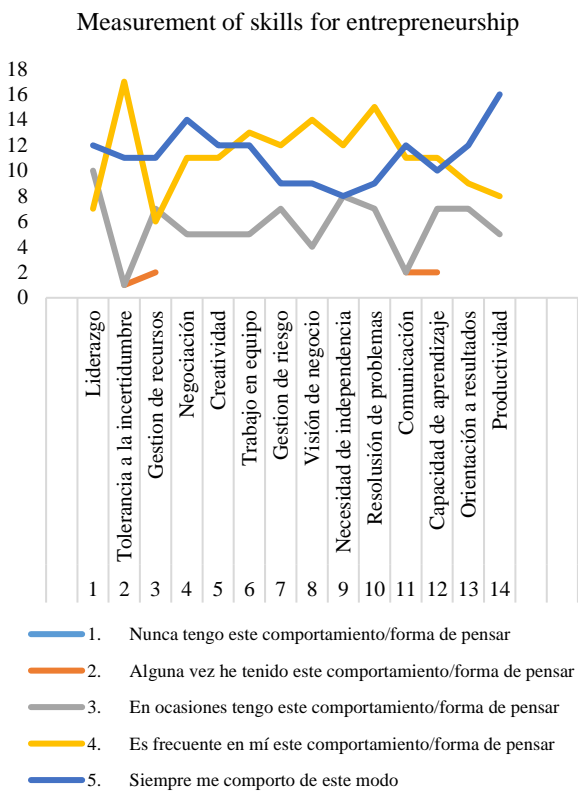
Thus the information obtained was concentrated in a matrix, to later make the graphs in Excel

Criteria	1	2	3	4	5
1 Leadership	2		10	7	12
2 Uncertainty Tolerance	1	1	1	17	11
3 Resource management	4	2	7	6	11
4 Negotiation	3		5	11	14
5 Creativity	3		5	11	12
6 Teamwork	4		5	13	12
7 Risk management	3		7	12	9
8 Business vision	4		4	14	9
9 Need for independence	3		8	12	8
10 Problem resolution			7	15	9
11 Communication	4	2	2	11	12
12 Learning capacity	2	2	7	11	10
13 Orientation to results	3		7	9	12
14 Productivity	1	1	5	8	16

**Table 3** Matrix self-evaluation of the level of development of the profile and culture of entrepreneurship for inhabitants of the region *Own Source*

The information was plotted in Excel obtaining:





**Graphic 10** Measurement of skills for entrepreneurship  
*Own source, application of the self-assessment questionnaire*

With this information, weaknesses in the development of skills and competencies are detected in: resource management, teamwork and communication aspects, in a smaller proportion there are aspects such as: negotiation, creativity, independence and work for results. In counting, it can be observed that there are strengths in the interested persons through observation in the graph and the determined criteria that compose it where the formation of the profile and culture of entrepreneurship is evidenced. See Graphic 10

SPSS application, taking:

\$ Participants frequencies				
		Answers		Percentage of cases
		N	Percentage	
Concentrated a	1	1	0.2%	3.3%
	2	16	3.0%	53.3%
	3	100	18.8%	333.3%
	4	183	34.4%	610.0%
	5	232	43.6%	773.3%
Total		532	100.0%	1773.3%
a. Group				

**Table 4** Frequencies of participants

Case Processing Summary			
		N	%
Cases	Valid	30	54.5
	Excluded a	25	45.5
	Total	55	100.0

a. Deletion by list is based on all procedure variables.

**Table 5** Summary case processing percentage

Reliability statistics	
Cronbach's alpha	N of elements
.394	18

**Table 6** Cronbach's alpha coefficient ranges from 0 to 1. The closer it is to 1, the more consistent the items will be (and vice versa), it must be taken into account that, the longer the test, the greater the alpha ( $\alpha$ ).

Mean	Variance	Standard deviation	N of elements
100.57	3712.530	60.931	18

**Table 7** Scale statistics

Application of the SWOT Matrix (Steiner, 1998), to detect opportunities for improvement, and the generation of strategies.

**Strengths**

Potential development related to the nature and sustainable development Historical and artistic monuments (Piano Museum and concert hall) and mythical for the practice of a good description.

Tourism focused on the acquisition of experiences Inhabitants Open and hospitable character Regional products (crafts, gastronomy) Orography of the destination with possibilities for alternative tourism.

"Safe" and attractive destination Good geographical location in the center of very tourist destinations. Diversity of resources to make products and services Potential entrepreneurs willing to participate Private and public sector qualified and open to new promotional trends and the use of information technologies.

**Weaknesses**

Little management in the coordination of destinations.

- Regional products few known to tourists
- Lack of identifiable signalling of the area.
- Little connection between tourist agents
- Poor communication routes (roads, schools, telephones, bathrooms.)
- Unidentified degree of user satisfaction
- Little communication of the tourist offers
- Missing formalized tourist information modules.
- Low production of regional products.
- Little awareness of the concept of "Excellence"
- Low qualification of staff in tourist service
- Low qualification in technicality in English.
- Few economic resources of the department of Tourism and government.
- Low economic resources of the inhabitants of the region.
- Lack of tourist promotion.
- Lack of a local website of the place where the tourist has access to express their experience.
- Marketing strategies are missing

### Threats

Destination Brands better positioned

Routes with better access and view.

Destinations of very direct competition with higher budgets dedicated to their tourist strategies.

### Opportunities

Manage coordination between private and public agents.

Design and implement a training and development plan of skills and competences in: production process, attention and customer service, for the inhabitants of the place in order to enable the formation of the cluster.

Design the business units that integrate the cluster.

Design the administrative unit of the cluster in order to conglomerate the business units, as well as integrate the value chain that encompasses the entire organizational system.

Strengthen the profile and culture of entrepreneurship in those interested in integrating the cluster with the intervention in an information program, knowledge of concepts and benefits, determination of objectives and strategic actions.

Use of technology to implement tourism destination marketing strategies, as well as detect opportunities and innovation and development for the cluster.

Manage necessary permits for commissioning in dependencies that apply.

Manage certifications of quality standards as applicable for the development of products and services

Basic English language courses.

Manage the promotion of the region through the Ministry of Tourism.

Once the SWOT matrix is analyzed, 5 strategies that make up the Plan are located, determining:

1. Manage coordination between private and public agents
2. Training and skills development plan in: production process, customer service and service
3. Under the Coach scheme, Design the business units that integrate the cluster. IFA Type: Smart Organization, Flexible Production and Agile Marketing
4. Design the administrative unit of the cluster in order to conglomerate the business units, as well as integrate the value chain that encompasses the entire organizational system
5. Intervention program, knowledge of concepts and benefits. to strengthen the profile and culture of entrepreneurship.

### Results

Strategic Plan for the formation of the profile and culture of entrepreneurship.

Process / Strategy	Method	Indicators	Unit of Measure
Manage coordination between private and public agents.	Communication program -Thematic content -Bitácora and agreement management	Log tracking covering 100% of content in the estimated time	%
Training plan and development of skills and competences in: production process, attention and customer service	Plan design -Content, skills to develop. - Resource planning.	Number of participants, covering 100% of content in the estimated time for the course program	%
Under the Coach scheme, Design the business units that integrate the cluster. IFA Type: -Smart Organization -Flexible production -Agile marketing	-Market study -Project engineering -Organic design -Financial analysis -Description and analysis of impacts	Number of participants in the cluster, covering 100% of the design of the business unit in the estimated time conglomerating	%
Design the administrative unit of the cluster to conglomerate business units, as well as integrate the value chain that encompasses the entire organizational system	Value chain integration: -Innovation -Manufacture -Logistics and distribution -Marketing, use of technology in order to implement marketing strategies. -Public and private management -Identification and compliance with applicable quality standards and certifications. -Training and training. -Resource management.	Business administrative unit conglomerating 100% of the Business Units in the estimated time.	%
Intervention program, knowledge of concepts and benefits. to strengthen the profile and culture of entrepreneurship.	Determination of objectives goals, strategic actions and deadlines	Number of participants in the cluster, covering 100% of the program	%

**Table 8** Proposal to strengthen the profile and culture of entrepreneurship of the inhabitants of the southeast region of the municipality of La Paz

Own Source

### Acknowledgement

This project has been financed by the National Technologist of Mexico, to which we infinitely thank the support that through the Technological Institute of Peace to which we proudly belong, since the objective is to design a proposal for the formation of the profile and culture of entrepreneurship in the residents and through the Academic Body "Organizational Process Management" this project has been authorized.

### Conclusions

The development of the regions requires the active participation of the inhabitants as their own beneficiaries, however it is very necessary to develop government programs that include aspects of profile formation and business culture to ensure their success, the use of resources from the context of the region and the implementation of good practices related to environmental care and sustainable development, are derived from implementing diagnoses of the current situation, in addition to the implementation of development plans that include very strong performance indicators.

### Recommendations

Allocate resources to trigger the development of the regions, improve communication processes and rapprochement with the communities of the region in order to enable the knowledge of the different options for government resources management by stakeholders, the development of skills and competences, the profile formation and entrepreneur culture are required to optimize and manage those resources, so important is the implementation of strategic plans for regional development.

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## Phenology and nurse plant of *Sotoa confusa* (Garay) Salazar (Orchidaceae) in the Southern Potosino Zacatecano Highlands

## Fenología y nodrizaje de *Sotoa confusa* (Garay) Salazar (Orchidaceae) en el Sur del Altiplano Potosino Zacatecano

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### Abstract

*Sotoa confusa* is a little conspicuous terrestrial orchid that is distributed in arid and semi-arid land of Mexico and south of USA, its life history is poorly known, so phenology and interaction of this species with shrubs was studied; its bloom occurs in March and fructifies in April (the driest period of the year), latter, from July to September it develops leaves, which disappear in October, so this orchid remains eight months without leaves. By other hand, *S. confusa* does not grow in areas with bare soil, so it shows preference to grow under the canopy of plants such as *Dodonaea viscosa*, *Opuntia imbricata*, *O. robusta*, *O. leucotricha* and *Pittocaulon praecox*; however, it shows a negative association with *Jatropha dioica*. The survival strategy of this plant in arid environments is to grow under the canopy of other plants that provide a favorable microclimate and develop leaves only during rainy seasons.

Nurse plant, Orchids, Semiarid lands

### Resumen

*Sotoa confusa* es una orquídea terrestre poco conspicua que se distribuye en zonas áridas y semiáridas de México y sur de Estados Unidos de Norteamérica, su historia de vida es poco conocida, por lo cual se estudió la fenología y la interacción del nodrizaje de esta especie con arbustos; florece en marzo y fructifica en abril (el periodo más seco del año), después de esta etapa, de julio a septiembre desarrolla hojas, las cuales desaparecen a partir de octubre, por lo que esta orquídea permanece ocho meses sin hojas. Por otro lado, *S. confusa* no crece en áreas con suelo desnudo por lo que muestra preferencia a crecer bajo el dosel de plantas como *Dodonaea viscosa*, *Opuntia imbricata*, *O. robusta*, *O. leucotricha* y *Pittocaulon praecox*; sin embargo, muestra una asociación negativa con *Jatropha dioica*. La estrategia de sobrevivencia de esta planta a los ambientes áridos consiste en crecer bajo el dosel de otras plantas que le proporcionan un microclima favorable y solo desarrollan hojas durante temporal de lluvias.

Nodrizaje, Orquídeas, Zonas semiáridas

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## Introduction

The Orchidaceae family is characterized by two biotic interactions in particular, pollination and mycorrhizal symbiosis, there are numerous works that describe them (Waterman and Bidartondo, 2008). The pollination of this group was first studied by Darwin; At present, there are numerous records including highly specialized interactions (Waterman and Bidartondo, 2008; Micheneau et al., 2009; Gaskett, 2011). On the other hand, the importance of mycorrhizal associations during germination or growth has been reported (Waterman and Bidartondo, 2008; Rasmussen and Rasmussen, 2009; Jacquemyn et al., 2015). Other aspects of the life history of orchids are poorly known, for example, phenology and nodrizaje (Weston et al., 2005).

Nourishment or facilitation syndrome is a frequent association in arid areas in which some plant species favor the establishment and survival of juvenile stages belonging to other plant species, through the generation of less stressful conditions under their canopy (Flñner and Shmida , nineteen eighty one). The microenvironment provides less solar radiation and greater water availability, therefore it is cooler during warm days in addition to protecting the seedlings from soft frost. The soil under the canopies is less compact, the erosion rate is lower, it can contain more nutrients and in some cases it is usually more humid (Flores and Jurado, 2003). This association has been considered of great importance to model the structure of plant communities in arid areas (Nobel, 1988).

Phenology is one of the most important characteristics in the life cycle of plants, phenological events or phenophases are influenced by climatic conditions and biotic interactions with other organisms such as the selection pressure exerted by their pollinators, their herbivores and the dispersers of its fruits and seeds (Thomson, 1980; Ratchke and Lacey, 1985). This terrestrial orchid inhabits semi-arid regions, dry pine and oak forests, juniper and oak forests, deciduous tropical forests, in various types of xerophilous shrubs, induced grasslands or degraded areas of these plant associations (Hågsater et al., 2005; Salazar et al., 2006; Peinado and Riojas 2008; Salazar, 2009). The objective of this study was to determine the noduization of the confusing *Sotoa* terrestrial orchid and to document some preliminary aspects related to its phenology.

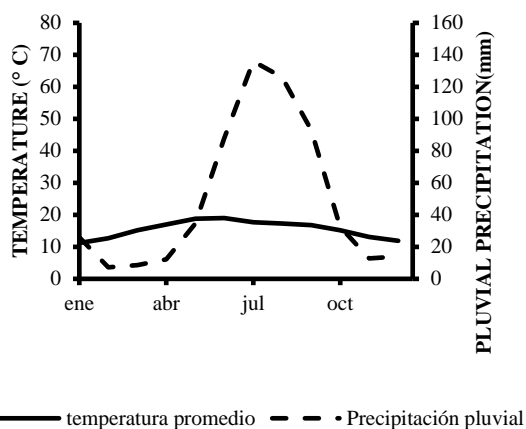
## Methodology

*Sotoa confusa* (previously described as *Deiregyne confusa* by Leslie A. Garay in 1982) (Salazar and Ballesteros-Barrera, 2010) (fig. 1), is an orchid of terrestrial habits. It is distributed in the southern United States (Texas), and in Mexico it has been registered in Coahuila, Federal District, Durango, State of Mexico, Guanajuato, Hidalgo, Jalisco, Michoacán, Nuevo León, Northern Oaxaca, Puebla and San Luis Potosí (Peinado and Riojas, 2008). The specimens from the study area were determined by specialists from the Botany Institute of the University of Guadalajara based on the descriptions of Salazar and Ballesteros-Barrera (2010). The material was deposited in the Herbarium "Luz María Villarreal de Puga" (IBUG) of the University of Guadalajara.



**Figure 1** *Sotoa confusa* in bloom

This study was carried out in the Llanos de Ojuelos region, in the semi-arid plateau of the southwest part of the Chihuahuan Desert. The annual rainfall is 542 mm, while the average annual temperature is 16.65 ° C. The climate is classified as temperate dry steppe in the Köppen system (fig. 2). The study area is a rocky outcrop, characterized by the presence of *Yucca desciapiens*, *Ferocactus histrix*, *Phytocaulon praecox*, *Asclepias linnaria*, *Opuntia robusta*, *Opuntia cantabrigiensis*, *Mimosa biuncifera* among others).



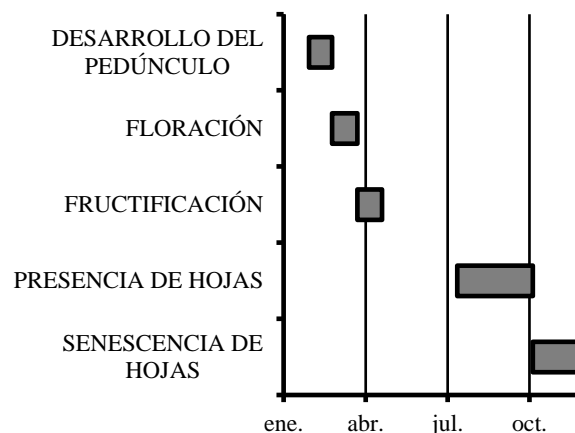
**Figure 2** Climate graph of the study area

In the town we found a confusing *Sotoa* population, in which 51 individuals were marked. The development of the peduncle, fruiting, presence and senescence of leaves was recorded every month for a year.

In order to determine the noduization relationship of *S. confusa* with other species, the relative vegetation coverage was calculated, by means of eight circular plots of 900 m<sup>2</sup>, additionally the frequency of *S. confusa* growing under each species was recorded. hypothesis that this is distributed uniformly under the canopy of the plants, weighting the relative coverage of each species, by means of a test of goodness of fit of X<sup>2</sup>, subsequently Pearson's standardized residuals were compared to identify positive associations and negatives between *S. confusa* and other species (Everitt, 1977).

## Results

The phenological record of this species shows that flowering occurs in the month of March and ends in April, during which time it develops several flowers in the spine that open asynchronously, each flower can last more than four days. The phenological record of this species showed that the leaves and flowers developed in different periods of the year. Flowering occurred during the months of March and April, during which time he developed flowers in the spine, these opened asynchronously, each flower lasted up to four days. It fructified in April. The foliar expansion was carried out in the second half of the rainy season (August to October), the leaves showed evidence of senescence and died from the month of November (fig. 3).



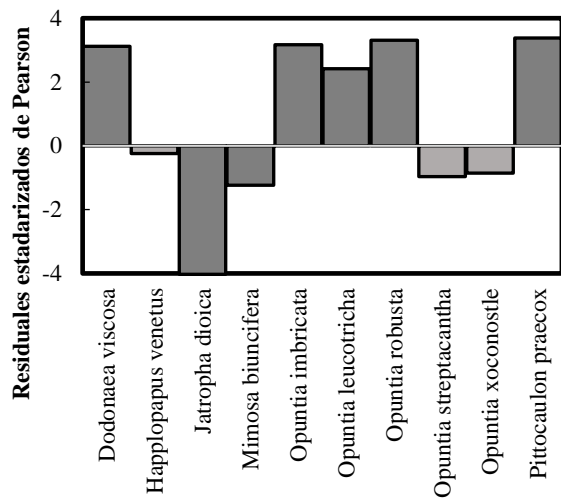
**Figure 3** *Sotoa* confused phenology in the southern portion of the Potosino-Zacatecano highlands

The vegetation samples of the rocky outcrop show 26 species of plants among which the species *Yucca decipiens*, *Ferocactus latispinus*, *Dasyilirion acrotriche* stand out, however the most abundant are listed in Table 1.

Species	Relative coverage
<i>Jatropha dioica</i>	0.370
<i>Opuntia streptacantha</i>	0.106
<i>Opuntia leucotricha</i>	0.084
Robust opuntia	0.075
<i>Happlopapus venetus</i>	0.070
<i>Mimosa Biuncifera</i>	0.066
<i>Opuntia xoconostle</i>	0.047
<i>Pittocaulon praecox</i>	0.011
<i>Opuntia imbricata</i>	0.006
<i>Dodonaea viscosa</i>	0.002

**Tabla 1** Species with greater relative coverage in rocky outcrops in the southern portion of the Potosino Zacatecano Altiplano

Four individuals of *S. confusa* per hectare were registered. Two individuals grew up in the shadow of the rocks and 49 in patches of vegetation. Of these, 40 organisms (81.6%) were under the canopy of *Opuntia imbricata*, *O. leucotricha*, *O. robusta*, *O. streptacantha* and *O. xoconostle*. The remaining nine orchids (18.4%) were located under the canopies of *Happlopapus venetus*, *Jatropha dioica*, *Mimosa biuncifera*, or *Pittocaulon praecox*; No plants were found growing in vegetation clearings exposed to direct solar radiation. We found statistically significant differences between a uniform distribution pattern weighted with coverage (X<sup>2</sup> = 1069.6, P < 0.001). The analysis of adjusted residuals showed that *S. confusa* is significantly and positively associated with *Opuntia imbricata*, *O. robusta*, *O. leucotricha* and *Pittocaulon praecox*, while the association was negative with *Jatropha dioica* (fig. 4).



**Figure 4** Analysis of Pearson's standardized residuals, (light gray bars do not show statistical significance)

## Discussion

The results showed that *S. confusa* was found preferentially in patches of vegetation under the canopy of plants and in a smaller amount under the shade of rocks, which indicates that this species may require nurses to favor its survival, as reported for other species in this environment (García-Moya and McKell, 1970; Jordan and Nobel, 1981; Valiente-Banuet and Ezcurra 1991). For the Orchidaceae family, facilitation has only been documented in the Australian species *Caladenia behrii* where there is a positive association with vegetation (wetting) when the kangaroo herbivory pressure is high (Petit and Dickson, 2005; Weston et al., 2005).

In this study, we found foliar damage in *S. confusa* caused only by invertebrates despite the fact that there are herbivorous mammals in the area, therefore, we do not have evidence that indicates the decrease in herbivory by the nodrizaje.

In the months of January to May, during the reproductive phase of *S. confusa*, most of the plants that make up the vegetation patches were devoid of leaves. However, *Opuntia* spp. and *Pittocaulon praecox* provided shade because *S. confusa* plants are located adjacent to the cladodes and succulent stems of both species without hindering the location of flowers by pollinators.

The vegetative phase of *S. confusa*, develops during the months of July to October, coincided with the rainy season, the rainfall for this period was 257 mm (42% of the annual rainfall) most of the plants that make up The patches of vegetation presented leaves, *S. confusa* could receive less solar radiation because it is under the canopy of the bushes, however, noduzaje would allow this species to reduce light stress and perform photosynthesis efficiently. Some studies that have evaluated the photosynthesis of terrestrial orchids under the canopy have shown that this group is efficient in capturing light, for example, *Arundina graminifolia* and *Spathoglottis plicata*, species with light saturation points of 200  $\mu\text{mol m}^{-2} \text{s}^{-1}$  (Hew and Yong, 2004).

Although our phenological data correspond only to one year and should be taken with caution, because they may be influenced by interannual environmental variations; The flowering pattern of *S. confusa* coincided with the descriptions made by Sahagún-Godínez (1996) for numerous species of orchids belonging to the *Spiranthinae* subtribe. This fact suggests that the phenological pattern is given by a combination of ecological and evolutionary effects, and not just environmental factors.

The Orchidaceae family is cosmopolitan, although they are more abundant in tropical and temperate environments unlike dry or semi-dry areas (Correll, 1978), where limiting factors such as lack of water and excessive solar radiation can limit their distribution; Under these conditions, the phenology and interactions such as nodrizaje attenuate these factors. This study constitutes the first record for this orchid in the state of Zacatecas and the presence of this interaction for orchids in arid areas of the Americas.

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## Physical Characterization-Chemistry of Essential Oil of Oregano in 6 Communities of the Municipality of Rodeo, Dgo.

### Caracterización Físico-Química de Aceite Esencial de Orégano en 6 Comunidades del Municipio de Rodeo, Dgo.

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#### Abstract

The municipality of Rodeo is one of the largest oregano producers in the state of Durango, reporting an average of 100 tons per year, which are used as a condiment and there is no use in its entirety. The objective of the present work was Physicochemical Characterization of Essential Oil of Oregano (AEO) in 6 communities of the municipality of Rodeo Durango, the methodology was carried out by dragging with water vapor, where quality and quantity of oil were controlled, using the leaves of The oregano plant, the density, was determined by means of a pycnometer and the index of refraction by means of a refractometer (Master Refractometer). The results obtained for the index of refraction of the oils of the 6 localities circle between 1.47-1.50 which indicates an acceptable purity in the (AEO). The density of oils circle between 0.91-0.92. The chemical components were read by gas chromatography and a Flame Ionization Detector (FID), where a higher percentage of concentration on the carvacrol compound was reported, which circulated between 60-70% while the compound Thymol was between 30-40%. A statistical analysis was performed to determine if there was a significant difference between the concentration of the analytes based on the height of the sample obtaining a significance >5, which indicates a difference between the data.

**Oregano, Oil, Pycnometer, Extraction and distillation**

#### Resumen

El municipio de Rodeo es uno de los mayores productores de orégano del Estado de Durango, reportando un promedio de 100 toneladas anuales las cuales son empleadas como condimento y no se genera un aprovechamiento en su totalidad. El objetivo del presente trabajo fue Caracterización fisicoquímica de Aceite Esencial de Orégano (AEO) en 6 comunidades del municipio de Rodeo Durango, se utilizó la metodología extracción por arrastre con vapor de agua, donde se controlaron calidad y cantidad de aceite, mediante las hojas de la planta de orégano, la densidad, se determinó por medio de un picnómetro y el índice de refracción por medio de un refractómetro (Master Refractometer). Los resultados obtenidos para el índice de refracción de los aceites de las 6 localidades circulo entre 1.47-1.50 lo cual indica una pureza aceptable en los (AEO). La densidad de los aceites circulo entre 0.91-0.92. Se realizó la lectura de los componentes químicos por medio de cromatografía de gases y un detector de Ionización de Flama (FID), donde se reportaron un mayor porcentaje de concentración sobre el compuesto carvacrol el cual circulo entre los 60-70% mientras que el compuesto timol estuvo entre los 30-40%. Se realizó un análisis estadístico para determinar si existía diferencia significativa entre la concentración de los analitos en base a la altura de la muestra obteniendo una significancia >5, lo cual indica una diferencia entre los datos.

**Orégano, Aceite, Picnómetro, Extracción y arrastre de vapor**

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## Introduction

Oregano is the common name of a condiment, applied to more than 60 species and subspecies belonging to the Lamiaceae and Verbenaceae families, of which the most important are those of the Mediterranean or European oregano (*Origanum vulgare* subsp. *Hirtum*, *O. vulgare* subsp. *gracile*) and Mexican oregano (*Lippia graveolens* and *L. palmeri*) (Ocampo-Velázquez, 2019).

This research was the extraction and characterization of oregano essential oil in 6 communities in the municipality of Rodeo, Dgo. In order to detect the level of concentration in its main components of Thymol and Carvacrol in the leaf, the collections of vegetative material were in the towns of Rodeo, Dgo; Abasolo, Borcelanas, Chonteco, Cuesta, Michoacano and Yerbabuena part in the Water Technology laboratory of the Technological University of Rodeo.

## Theoretical foundation

### Oregano

The name "Oregano" comes from the Greek: *oros* (Mountain) and *ganos* (Ornament). The beauty of the mountains. A Greek legend says that Aphrodite, goddess of love, was the first person to cultivate oregano and gave this plant the fragrance it currently possesses (Jorge, 2012).

### Plant as medicinal use

Oregano leaves are mainly used, which are oval, petiolated and covered with hairs. We can use the oregano internally by preparing it in infusion and tincture and externally by applying the infusion locally, the essential oil of oregano diluted in a base oil for massages or in water to make fumes and the oil infused with oregano (Martínez, 2011).

### Essential oils

AE have an antibacterial, antiviral, antifungal and antiparasitic capacity in different grades. AE are eubiotics, that is, enhancers of our immune system, while acting on pathogens through more than 25 active ingredients they contain (Pallash, 2018).

## Cosmetic industry

Essential oils, due to their magnificent properties, confer great value for natural cosmetics providing enormous benefits in the treatment of acne, wrinkles, cellulite, sensitive or atopic skin (Hörmann, 2016).

## Chemical composition of essential oils

As we know an essential oil is composed of hundreds of different substances. Generally, although there are exceptions, the major components are terpenic hydrocarbons (No aroma or with little distribution of global aroma) and minority (but not less important), are responsible for the characteristic aroma of the essential oil and are encompassed in different families chemical (Montes, 2010).

## Physical characteristics of essential oils

They are fat soluble and very little soluble in water, but are druggable by water vapor (Farma, 2017).

### Thymol

One of the main characteristics and properties of thymol as a phenolic compound is its bactericidal, pesticidal and fungicidal potential. Part also that once extracted, does not have an unpleasant color or taste, so it is currently part of mouthwashes, mouthwashes and toothpaste. It has a refreshing and bactericidal action (Copyright, 2019).

### Carvacrol

Several concentrations of oregano oil reported the elimination of *Listeria* bio-films on stainless steel and plastic surfaces, confirming its usefulness as a cleaning agent even in non-organic environments. (Group, 2016).

## Methodology to be developed

### Description of the study area

The present work was developed in the facilities of the Technological University of Rodeo in the municipality of Rodeo, Dgo, (Figure 1). It is located in the center of the state of Durango.

It borders to the north with the municipality of San Pedro del Gallo; to the northeast with San Luis del Cordero; to the east with Nazas; by the south San Juan del Río.

Its municipal seat is located at coordinates 25°11' north latitude and 104°34' west longitude, at a height of 1,340 meters above sea level.

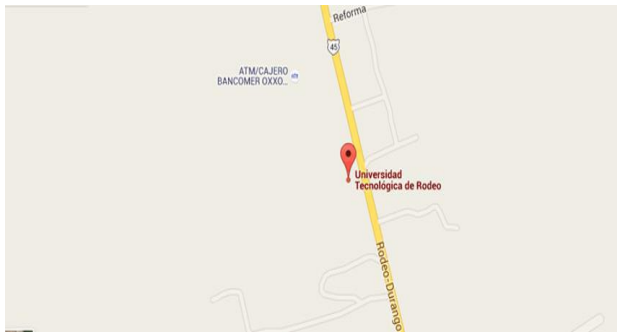


Figure 1 Location of study area Source: Silva, 2019

**Density determination of oregano essential oil**

To perform the density technique, the following methodology was developed. A 10 mL pycnometer was placed at a constant weight for 8 hrs. Subsequently, the empty pycnometer was weighed, 10 mL of oregano oil was added, the pycnometer was weighed with oregano essential oil, then the formula  $d = \frac{m}{v}$  was applied where (d) = density (m) = mass of the pycnometer with oil and (v) = volume of oil.

**Oregano essential oil refractive index**

The index of refraction of oregano essential oil, a volume of 20 micro-liters was taken in a micro pipette, then the 20 micro liters were poured into the prism of the refractometer and the index of refraction of the oil was observed through the eyepiece of the refractometer.

**Data collection**

**Characteristics of the gas chromatograph analysis**

Hydrogen with a flow of 1 mL / min was used as mobile phase, with the Detector: FID at a temperature of 250 ° C; air 400 mL / min; H2 35 ml / min; makeup 20 mL / min 3. The initial temperature was obtained with a temperature of 40 ° C; 10 ° C ramp from 40 ° C to 190 ° C. Automatic stop: 16.00 min. For Interval 1: Bipolar, 2500 mV, samples per sec.

**Results**

**Oregano essential oil refractive index**

Figure 2 shows the results obtained from the refractive oil index of the 6 communities selected to perform the physical characterization.

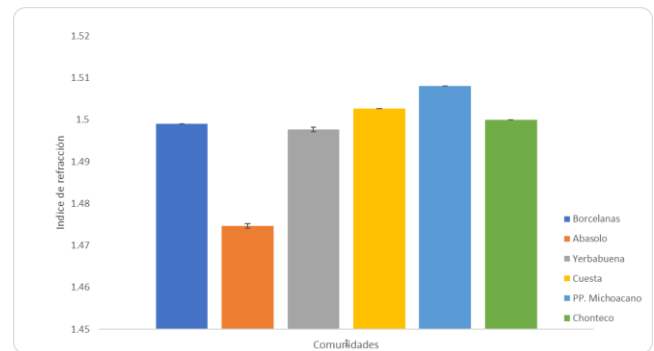


Figure 2 Refractive index Source: Marín, 2019

The following table 2 shows the statistical analysis of the refractive index of the 6 selected communities. Where it was obtained that the value of fashion was 1.4997, which indicates that if the method is repeated the possibility of the result is 1.4997 with a confidence level of 95%.

Half	1.49706667
Typical error	0.00256013
Median	1.4997
fashion	1.499
Standard deviation	0.0108617
Sample Variance	0.00011798
Kurtosis	1.22757885
Asymmetry coefficient	-1.50643399
Rank	0.034
Minimum	1.474
Maximum	1.508
Sum	26.9472
Account	18
Confidence level (95.0%)	0.0054014

Table 2 Descriptive analysis

**Obtaining the density of oregano essential oil**

The density was obtained through a pycnometer, therefore, in the yerbabuena community it obtained a large amount of density in the essential oil of oregano (Table 3).

Community	Density
Cost	0.9094
Abasolo	0.9194
Chonteco	0.9153
Michoacano	0.9173
Borcelanas	0.9256
Good herb	0.9292

Table 3 Oregano essential oil density

**Calibration curve - Standard Timol**

The analysis of the concentration of the thymol standard and its quantified response with the peak area, was determined by means of gas chromatography presenting an R2 = 0.9981400, which indicates a linear response and an acceptable relationship between the data. In Figure 3, it shows the calibration curve of the timol standard, where the quantification of the 6 towns of the municipality of Rodeo was performed.

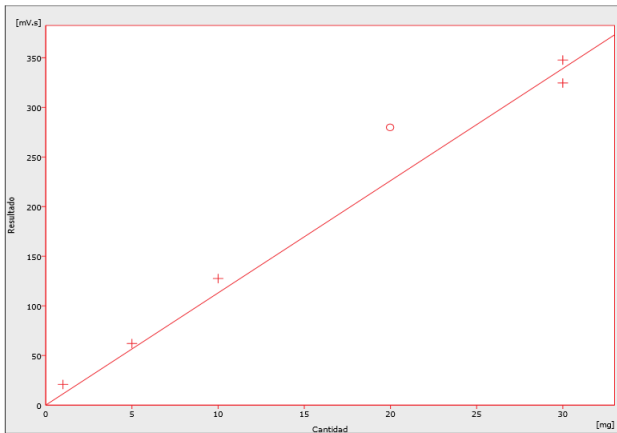


Figure 3 Standard calibration curve for the quantification of Timol in oregano oil Lippia graveolens. Source: Marín, 2019

**Carvacrol standard**

The analysis of the concentration of the standard of carvacrol and its quantified response with the peak area, was determined by means of gas chromatography presenting an R2 = 0.9974837, which indicates a linear response and an acceptable relationship between the data.

In the following Figure 4, the calibration curve of the carvacrol standard is shown with which the quantification of the 6 localities of the municipality of Rodeo was performed.

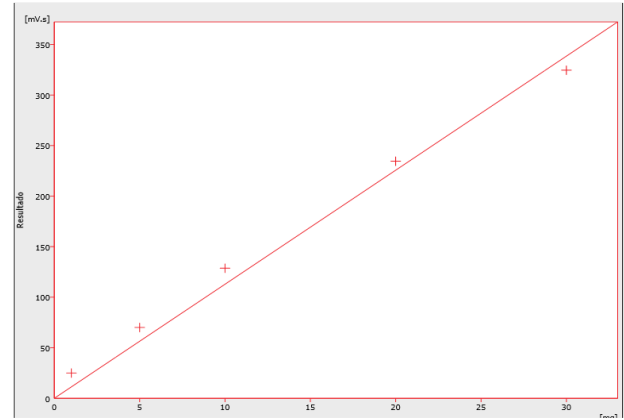


Figure 4 Standard calibration curve for the quantification of carvacrol in oregano oil Lippia graveolens. Source: Marín, 2019

**Thymol / Carvacrol concentration**

The following table shows the results obtained by gas chromatography of the thymol and carvacrol standard in (mg).

Location	Height	Conc. Thymol (mg)	Conc. Carvacrol (mg)
Abasolo	4428	2.024	6.095
Borcelanas	1439	46.746	108.853
Chonteco	4763	49.1012	1118.61
Cost	1570	70.33	153.13
Michoacano	1371	13.229	148.764
Good herb	1666	13.228	156.757

Table 4 Thymol and Carvacrol concentration

**Analysis of variance (ANOVA)**

The results obtained by means of gas chromatography in the quantification of the compounds Timol and Carvacrol of the 6 localities of the municipality of rodeo were analyzed by means of a statistical analysis (ANOVA), to determine if there is a significant difference between the composition of the compounds depending on the climatic conditions of the region.

For this, an analysis of variance (ANOVA) was performed, where STATISTICA 10 software was used, which yielded the following results for thymol.

Effect	Univariate Results for Each DV (Spreadsheet 10), Sigma-restricted parameterization Effective hypothesis decomposition				
	Dgr.of freedom	Timol H.H	Timol Ms	Timol F	Timol P
Intercept	1	8596.721	8596.721	1.226351E+10	0.00
Height	6	7162.451	1193.742	1.702912E+09	0.00
Error	5	0.000	0.000		
Total	11	7162.451			

**Table 5** Comparison of thymol based on analysis of variance (ANOVA)

Where it indicates based on  $F = 1.226351E + 10$  and  $P = 0.00$  if there is significance in the concentrations of the thymol compound based on the height at which the sample was taken.

For carvacrol the results were as follows, where an  $F = 6.004800E + 15$  and a value of  $P = 0.00$  is demonstrated, which concludes that if there is significance between the concentrations of the carvacrol compound based on the height of the localities.

Effect	Univariate Results for Each DV (Spreadsheet 10), Sigma-restricted parameterization Effective hypothesis decomposition				
	Dgr.of freedom		Dgr.of freedom		Dgr.of freedom
Intercept	1	108362.7	108362.7	1.201443E+17	0.00
Height	6	32495.7	5416.0	6.004800E+15	0.00
Error	5	0.000	0.000		
Total	11	32495.7			

**Table 6** Comparison of carvacrol based on analysis of variance (ANOVA)

## Discussion

### Refractive index

Based on the Study of the Chemical Composition of the Essential Oil of Oregano by Albado et al. (2001), the results obtained for the refractive index of oregano essential oils are within the parameter established by (Poulose and Croteau, 1978), which circulates between 1.47-1.50. as in the research by Dambolena et al. (2010), on the chemical composition of oregano leaf that establishes a refractive index of 1.49. It is also mentioned that the variation in the refractive index may be the reason for a greater or lesser concentration of phenols.

## Chromatography

Based on Montes research (2010), on the chemical characterization of oregano vulgarea it was defined that the amount of the analyte compounds (Timol and carvacrol), depend more on the species of oregano than on the geological conditions such as altitude. Based on the analysis of variance (ANOVA), a significant difference in the presence of thymol / carvacrol was demonstrated in the different sampling areas.

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The main authors thank the Technological University of Rodeo, for the facilitations in the water technology laboratory, to carry out this research.

## Conclusions

### Oil distillation

Based on the results obtained in terms of performance and quality of oil per volume of oregano leaf we can conclude that the pressure cooker distiller showed a better result compared to the process with laboratory glassware showing a yield of 16 mL per 400 g do sheet compared to glassware extraction showing a yield of 5 mL per 400 gm of sheet.

## Physicochemical analysis

Based on the physical-chemical analysis performed on the essential oil of oregano from the 6 towns of the municipality of Rodeo, it is concluded that if there is significant deference between the composition of the thymol and carvacrol analytes based on the altitude of the sample.

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## Proposal of MSMEs to alleviate poverty in the community of Tres Palos, municipality of Acapulco, Guerrero

### Propuesta de MIPYMES para mitigar la pobreza en la comunidad de Tres Palos municipio de Acapulco, Gro

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#### Abstract

Research that shows the need to seek measures to reduce poverty in the community of Tres Palos in the municipality of Acapulco de Juárez, aims to implement a business model of Micro, Small and Medium-sized Enterprises (MIPYMES) Agro. In the methodology applied, concrete answers were obtained in the phases: inquiring, demonstrative and exhibition, this thanks to the scientific method. Using mixed methodology, using questionnaires and interviews, as well as documentary research and field research. The surveys were applied to ejidatarios, specifically those engaged in agro-industrial activities within the region. The results reflected that 100% of the ejidatarios are willing to improve their quality of life and have higher incomes, 52.2% would achieve the increase by selling their products to industrial companies through a contract, and 47.8% have decided industrialize your products on your own and so you get better income and benefits for your families.

**Poverty, Human Development, MiPymes**

#### Resumen

Investigación que manifiesta la necesidad de buscar medidas con la finalidad de reducir la pobreza en la comunidad de Tres Palos del municipio de Acapulco de Juárez, se pretende la implementación de un modelo de negocio de Micro, Pequeñas y Medianas Empresas (MIPYMES) agroindustriales. En la metodología aplicada se obtuvieron respuestas concretas en las fases: indagadora, demostrativa y expositiva, esto gracias al método científico. Empleando metodología mixta, utilizando cuestionarios y entrevistas, así como la investigación documental y la investigación de campo. Las encuestas fueron aplicadas a ejidatarios, específicamente a los que se dedican a las actividades agroindustriales dentro de la región. Los resultados reflejaron que el 100% de los ejidatarios esta dispuesto a mejorar su calidad de vida y tener mayores ingresos, un 52.2% lograría el incremento vendiendo sus productos a empresas industriales por medio de un contrato, y el 47.8% tienen decidido industrializar sus productos por su cuenta y así obtener mejores ingresos y beneficios para sus familias.

**Pobreza, Desarrollo Humano, MiPymes**

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† Researcher contributing as first author.



## Introduction

It is important to note that the world is evolving day by day, there is an extraordinary advance in science and technology, however it is a substantial fact that there are more and more people in extreme poverty, this due to inequality between nations, since This is one of the main characteristics that distinguish the contemporary world. This inequality has a greater impact on the rural towns of each nation.

Poverty is defined as that situation in which the basic needs for living are not met due to lack of economic resources. In the world there are different types of poverty: that which affects only one individual or that which affects a group of people, we can also find permanent or temporary poverty. On the other hand, there are types of poverty that only affect education, health, food or services, or that, on the contrary, affect all four simultaneously.

Based on article 36 of the General Law of Social Development, the National Council for the Evaluation of Social Development Policy (CONEVAL) must establish the guidelines and criteria to define, identify and measure poverty in Mexico, considering at least the following indicators : Current income per capita; Average educational backwardness at home; Access to health services; Access to social security; Housing quality and spaces; Access to basic services in housing; Access to food; Degree of social cohesion; Degree of accessibility to paved road. This topic covers many factors that man at a certain moment considers his existence to be something natural. (Mexican Congress, 2004)

The issue of poverty alleviation in a rural community is interesting but also complicated, since the attitudes of the people who live in these communities prevent the plans or strategies to be carried out properly from being carried out, by the different levels of government. In order to establish alternative solutions, the causes must be known, why there is so much poverty and above all in rural communities where there is a clear predominance of primary activities, that is, production of raw materials to supply different industries, fundamentally the food and construction which can help people to have more income, without having to resort to other work activities.

Poverty is identified with the lack of education, health, housing, nutrition, employment, income, technology, infant mortality, and an important characteristic is the lack of stable agriculture; It has been noted that tertiary activities predominate in the Port of Acapulco, the main source of income being the provision of goods and services formed by the different branches of commerce.

For this reason, the aim is to raise awareness among the ejidatarios about the creation of a model for agroindustrial MSMEs that allows improving the quality of life of rural producers, identifying the viability of the registration processes for said model and, thereby, improving the current socioeconomic and demographic conditions, allowing an increase in the Gross Domestic Product (GDP).

The research carried out is of social interest and of utmost importance to the region. It aims to detect the factors that are impeding the economic and personal progress of the ejidatarios of the community of Tres Palos, evaluate them and thus propose a viable business model for that the activity to which they are engaged can subsist in better conditions, which would generate a higher economic income for the residents of the community, improve the quality of life and reduce poverty. The study area has enough flora and fauna for the creation of MSMEs, requiring awareness and training to clear the uncertainty that arises with the implementation of various processes.

The hypothesis that arises is: by proposing the agribusiness MSMEs business model in the community of Tres Palos, municipality of Acapulco, Gro., To contribute to the reduction of poverty in said community. It is intended to convince people who are engaged in the field to decide to create and register a business; in this way, create jobs and contribute to the country's economy. Quantitative and qualitative methodology was used with documentary and field research aimed at solving practical problems and collecting information in a physical way; Information was obtained in the community of Tres Palos, both in the municipal and ejido police stations and in the population as a whole, to determine an agro-industrial cluster according to the production of farmers capable of industrialization in order to obtain added value that allows checking the feasibility of implementing and implementing the proposal to create agro-industrial MSMEs.

The research proposed was carried out considering one of the main problems in the country, but which affects rural communities in each region, this being poverty, where the importance of mitigating this factor in the Tres Palos area is pointed out.

Finally, conclusions are presented, including the contribution of research to the regional development of the area. Adding the references, which make possible a better understanding and analysis of the information included in the research.

## Objectives

### General objective

Create an agro-industrial MSMEs scheme, to increase economic income, improving the level and quality of life of producers in the countryside of the community of Tres Palos.

### Specific objectives

Carry out a diagnosis in the study area to detect the existing problems.

Consult the information regarding similar cases in the official agencies or instances to incorporate it into the proposal.

Prepare the scheme for agro-industrial MSMEs complying with the corresponding regulations.

## Methodology to develop

To carry out the effectiveness of the study, mixed research was considered. This type of research was chosen due to the need to fully cover each variable and aspects of poverty, which is why documentary research was used on the one hand, since events, newspapers, books or magazines can be known important about poverty, as its causes, characteristics and effects; and the field research that is extremely important to collect necessary information, determine failures, provide solutions and thus suggest a strategic proposal through which the stated objective is met.

The documentary research served as support, since it gave the necessary introduction for the development of the project, thus being the use of information given by various authors, providing the certainty that the project will have good results.

In order to perform data processing efficiently, the Statistical Package for the Social Sciences (SPSS) was used, a statistical software program widely used in the applied and social sciences, as well as by companies engaged in market research; taking into account the ability it has to work with large amounts of information and databases, in addition to a simple interface that allows better analysis, and as a plus allows you to see quantitative and qualitative results.

Field research or also called direct research leads to the application of questionnaires in the community of Tres Palos, in the municipality of Acapulco, Gro, which were applied directly to the ejidatarios in the area, in figure 1 you can see the research area.



**Figure 1 Project research area**

Source: Google Maps, 2019

There is a universe population of 349 ejidatarios, questionnaires were applied to a representative sample of 126 ejidatarios to obtain relevant information for the study, the determination of the sample was calculated as follows:

$$\text{---} \quad (1)$$

$N = 349$  number of community ejidatarios.

$Z = 1.96$  confidence level

$P = 50\%$  desired acceptance of the project

$q = 50\%$  rejection for the project

$e = 7\%$  desired error

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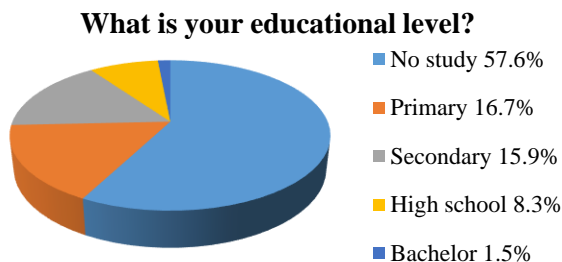
To complement the information obtained in the questionnaires, interviews were conducted with ejidatarios in the area, taking into account that the interview aims to obtain information directly and ensure that it responds as accurately as possible, to what is being investigated. (Sanchez, 2006)

Having all the necessary information, the collected data was processed, where the database was made, obtaining the graphs and tables that allow a more complete view of the results, facilitating their interpretation and analysis.

**Results**

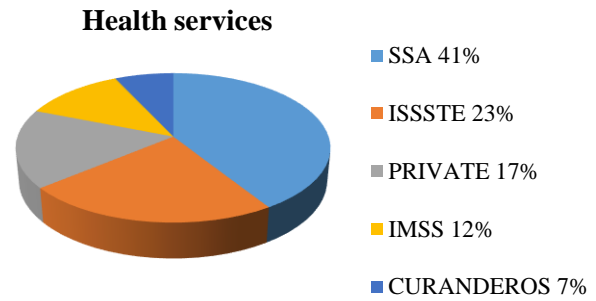
Through the application of the questionnaire and the interview, information was obtained regarding schooling, economic activity, income derived from the production and sale of agricultural products of the ejidatarios, income derived from other activities as well as information related to wanting to improve their economic situation.

Regarding the level of schooling of the total of ejidatarios surveyed, 57.6% answered that they do not have studies, 16.7% have studies at the elementary level, 15.9% study up to the secondary level, 8.3% have a preparatory level and 1.5 % have a Bachelor's level. Results that are represented in graph 1.



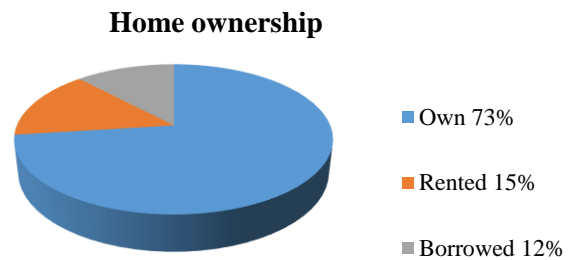
**Graph 1** Level of studies  
Source: Own Elaboration, 2019

Health is another necessary indicator to determine the standard of living; Ejido families make use of health services according to the following distribution: 41% go to the Health Center of the Ministry of Health and Assistance (SSA), 23% are attended at the Institute of Security and Social Services for Workers of the State (ISSSTE), 17% make use of the private medical service, 12% go to the Mexican Institute of Social Security (IMSS) and 7% attend to traditional healers in the region, results that are reflected in the graph 2.



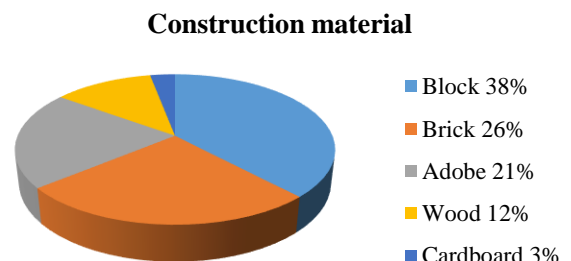
**Graph 2** Health services  
Source: Own Elaboration, 2019

With respect to home ownership, the following results were obtained: 73% of the homes are owned by its inhabitants, 15% of inhabitants rent their homes and the remaining 12% live in a house loaned either by family or friends ; situation that we can see in graph 3. The percentage of ejidatarios who have their own house is acceptable, however to complement the information the material with which the houses are built was also analyzed.



**Graph 3** Home ownership  
Source: Own Elaboration, 2019

In relation to the material from which the house is built, the following results were obtained: 38% of the houses are built of block, 26% are brick, 21% of the houses are adobe, 12% are built of wood and 3% cardboard, according to graph 4.



**Graph 4** Construction material  
Source: Own Elaboration, 2019

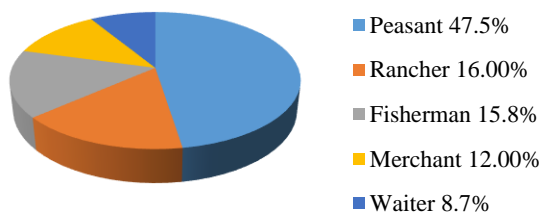
Another very important element is the consumption of food, obtaining the following results: 56% consume milk daily, 11% two or three times a week, 8% once a week and 25% do not consume milk; in relation to meat, 70% consume it two or three times a week and 30% once a week; vegetables are consumed daily by 16%, 83% consume them two or three times a week, 1% do not consume vegetables; 40% consume the fish daily, another 40% consume it two or three times a week and 20% once a week; In relation to fruits, 71% consume them daily, 21% two or three times a week and 8% once a week. These results indicate that most of the ejidatarios and their families do not have a diet. balanced (Table 1).

Food	Milk	Meat	Vegetable	Fish	fruit
Daily	56%		16%	40%	71%
2 or 3 times	11%	70%	83%	40%	21%
1 time	8%	30%		20%	8%
Does not consume	25%		1%		

**Table 1** Food consumption  
Source: Own Elaboration, 2019

With regard to employment, graph 5 shows the results obtained, in which 47.5% of the respondents have devoted themselves to the fields, 16% to livestock, 15.8% to fishing, 12% to informal trade and 8.7% have worked as waiters.

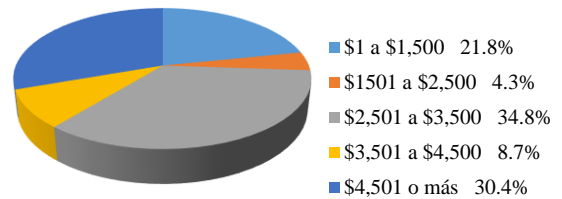
**What activities have you worked on?**



**Graph 5** Employment  
Source: Own Elaboration, 2019

Regarding the variable of how much the total income of the ejidatario's family amounts, it is observed in graph 6, that 30.4% have an income of \$ 4,501 or more, 8.7% have a total income of \$ 3,501 to \$ 4,500, 34.8% have an income of between \$ 2,501 to \$ 3,500, 4.3% of the people surveyed only have an income of between 1501 and 2,500; while 21.7% their income is around \$ 1 to \$ 1,500. It follows that the level of income per family is low.

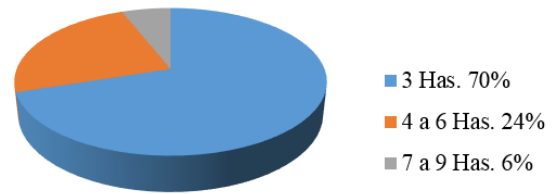
**How much does the total income of the family amount to?**



**Graph 6** Income by family  
Source: Own Elaboration, 2019

In relation to the distribution of land tenure, the following results were obtained: 70% have an average of three hectares of land, 24% have between 4 to 6 hectares and the remaining 6% have between 7 and 9 hectares in which grow and / or harvest coconut, mango, lemon, corn mainly, represented in graph 7.

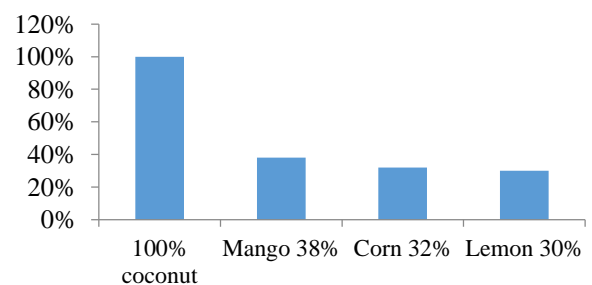
**Hectares of land per ejidatario**



**Graph 7** Land Tenure  
Source: Own Elaboration, 2019

With respect to what the ejidatarios produce, the following results were obtained: 75% of the ejidatarios work more than five hours throughout the week, 100% of the ejidatarios dedicated to work related to coconut exploitation; 38% of them also exploit mango; 32% exploit corn, 30% lemon and 13% are dedicated to livestock, fishing and floriculture. Graph 8

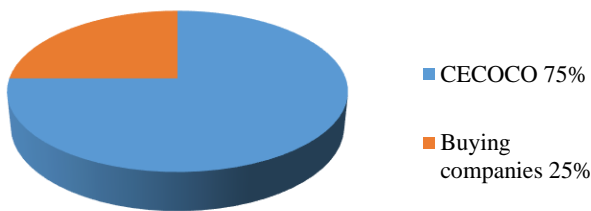
**What do they produce?**



**Gráfica 8** Community production  
Source: Own Elaboration, 2019

In relation to the sale of their products, the following results are obtained: 75% of the ejidatarios sell their coconut crops to the government through a subsidized program called the Coconut Tree State Council (CECOCO) or to intermediaries and the remaining 25% to purchasing companies. of oilseeds obtaining income that on average ranges between \$ 2,500 and \$ 3,000 pesos per month. (Graph 9)

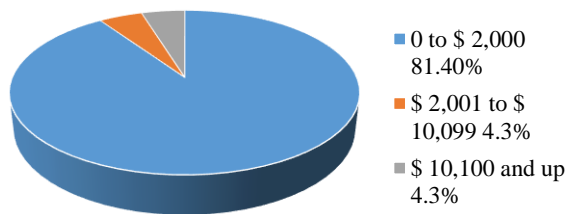
Sale of products



Graph 9 Sale of products  
Source: Own Elaboration, 2019

Regarding the variable of how much is the real average income from the sale of its products, it is observed in graph 10 that 81.4% earn less than \$ 2,000 pesos a month for that activity, 4.3% their income is from \$ 2,000 to \$ 10,099 , and of the remaining 4.3%, their monthly income is \$ 10,100 or more, highlighting that they have enough raw material to obtain better income, but they do not obtain it due to the inefficiency of their management systems and business uncertainty.

How much is the average income from the sale of your products?

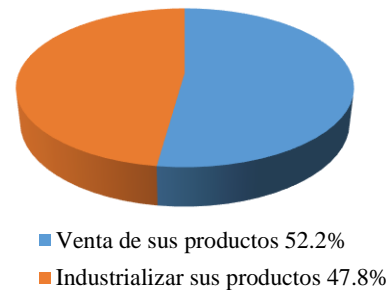


Graph 10 Income from product sales  
Source: Own Elaboration, 2019

In the following variable of how you would increase your income in figure 11, it is observed that 52.2% affirm that they would increase their income by selling their products to agro-industrial companies through the contract, while 47.8% consider that their income would increase if they industrialized their product on their own.

As can be seen, the ejidatarios share the idea of improving their income and quality of life and thus mitigate poverty by delivering their product to other companies, but also to other part of the ejidatarios who would like to industrialize their products, which would bring greater benefits, increasing their income, reducing the deficiencies in each family of the community of Tres Palos, fulfilling the objective of the research.

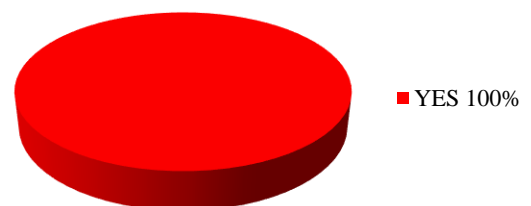
How would you increase your income?



Graph 11 How to increase your income  
Source: Own Elaboration, 2019

Graph 12 shows the results obtained from 100% of the surveyed ejidatarios, all of whom believe that the installation of a small processing plant in the region is necessary, this result may arise because most of the farmers lack tools to carry out their field activities, and with the help of a processing plant, their processes would be facilitated and would be more productive. For them it would be a great benefit, improving their income and the quality of life of their family.

Do you consider the installation of a processing company necessary?



Graph 12 Need for a processing company  
Source: Own Elaboration, 2019

Acknowledgments

The academic body of the Technological Institute of Acapulco: Sustainable Business Management thanks the National Technological Institute of Mexico (TNM) for the financial support given to carry out this research.

### Contribution

A proposal is proposed to mitigate poverty in the rural community of Tres Palos located in the municipality of Acapulco, Gro, consisting of the agro-industrial MSMEs model, which will have a favorable impact on the social environment of the region, promoting other communities rural to use a similar model to achieve effective poverty alleviation in the municipality.

A training plan was designed to expose topics of interest for the awareness of the ejidatarios who have knowledge regarding the economic activity they are engaged in, in order to increase their economic income and thus achieve poverty alleviation in their family. and the community; the training program is planned as follows:

Training plan: Improving the quality of life through the mipymes model.

### Justification

The poverty figures in the municipality of Acapulco are not favorable, being approximately half of the population in extreme poverty, this is a very strong problem, people who are engaged in field activities are those who have the However, they do not have the tools or economic resources to carry it out. The training course will be implemented due to the results obtained by the applied evaluation instruments, highlighting the ignorance of community members of the Tres Palos community in the situation of registering a business, that through their agro-industrial activities they can improve their income, having a better quality of life and with it the alleviation of poverty in the area.

### Scope

This training plan will be applied to all those committed and willing to take the course, in addition to having raw materials and field activities and residing in the community of Tres Palos, municipality of Acapulco, Gro.

### General objective

Reduce poverty in the community of Tres Palos through the agro-industrial MSMEs model, enriching it through adequate teams, creating awareness of the benefits for their families and the community.

### Specific objectives

- Provide guidance and information in terms of behavior, attitudes and values in business, highlighting the importance of these factors.
- Contribute to the development of awareness of the ejidatarios in the area.
- Modify those erroneous paradigms of ejidatarios about business, enriching their skills and reflecting on the results.

### Strategies

The strategies that will be used in the implementation are:

- Planned exhibitions establishing a reliable and enjoyable dialogue.
- The interaction between the trainer-listener will be active during the development of the topics of interest.
- Presentation of practical cases and other similar investigations where this type of business was implemented and show the assertive results.
- Gain the attention of the participants by applying group dynamics that are motivating for those involved, promoting teamwork.

### Actions to develop

The topics that will be developed throughout the training are the following:

- What is a MSME?
- Information related to the registration and creation of a MSME before the corresponding instances.
- Attitude and values in business.
- How do I contribute to poverty reduction in my community?
- Importance and benefits of micro businesses.
- Being the leader in my business.
- Success stories in other businesses.
- Influence of MSMEs in rural communities.
- Dynamics and practical simulations.
- Feedback.

### Human Resources

It is made up of all the ejidatarios to whom the training course will be given, including a representative of the community commissioner of the Tres Palos community, as well as the exhibitor and the assistants who accompany him.

### Material resources

**Infrastructure:** The activities and topics to be developed will be held in the community of Tres Palos, near the police station of said community.  
**Equipment and furniture:** It consists of tables, chairs, blackboards, down, projector, computer, HDMI cable and adequate ventilation.  
**Necessary documents:** Study material, results of the instruments made, historical documentation of Tres Palos, etc.

### Financing

The amount of this training plan, a certain part will be financed by the Technological Institute of Acapulco, and another part by the National Technological Institute of Mexico.

### Conclusions

Poverty in Mexico is one of the most heard problems in news and other media, however, instead of decreasing the numbers, they are increasing day by day. According to (CONEVAL, 2017), a person is placed in extreme poverty when their income is below the base of physical well-being and they also have three or more social deprivations. Acapulco, according to CONEVAL, is the municipality with the highest number of people in extreme poverty in the entire country.

During the investigation, it was possible to detect some reasons why the ejidatarios of the area are in this situation of poverty:

- Uncertainty about industrializing their products, the sale of their products to other companies, knowledge of businesses and micro-businesses.
- Unemployment, this due to the lack of micro-businesses in the region that allow job creation.

- The educational level of the ejidatarios is a very large barrier that it has, many of them only have a primary level, others secondary and very little preparatory, but nevertheless they have the experience of being in the field and are taught to harvest and sow. But this is not enough, this due to the lack of academic preparation that they lack.
- Technology is a factor that the community lacks, since it only has a cyber café, in addition to the lack of knowledge of useful electronic devices to run a micro business and stay connected for any type of matter.

The results indicate the expectations that the ejidatarios have to improve their standard of living, in order to achieve the desired well-being. 100% of the ejidatarios surveyed consider that the installation of micro-agribusinesses to process their agricultural products would be an alternative to achieve income that helps to redistribute wealth through the jobs they generate, and to the appropriation of the value generated by themselves, avoiding with this the sale to intermediaries.

These expectations confirm that the ejidatarios are aware that the different programs that have been implemented so far by the different governments are palliative that will not solve the crisis they are going through. It is necessary to consider within public policies, the planning of agro-industrial MSMEs that transform the objective and subjective conditions of farm workers.

Therefore, the need to create new systems or programs that are in accordance with the demands of the globalized world is raised, and in this sense, the creation of agro-industrial MSMEs is proposed, either as cooperatives or family businesses of the same inhabitants of the communities, or by foreign investors who are in solidarity with the development of said communities.

Despite the fact that there are multiple factors by which the ejidatarios of the community of Tres Palos live in poverty and are currently so, it was possible to observe the supply of raw material they have, the hectares they own, as well as the desire and passion that they dedicate to the field, are factors that influence the growth of a micro business, for this it is necessary to strengthen the attitudes of the ejidarios, this can be through training courses and frequent talks to the region to raise awareness. From the benefits of these new models that are being implemented and have given good results to ejidatarios from other developed countries, in these trainings and talks topics of interest would be implemented to mitigate the current problem and thus meet the objectives set out in the research.

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# Instructions for Scientific, Technological and Innovation Publication

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**Abstract (In English, 150-200 words)**

Objectives  
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Contribution

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\* Correspondence to Author (example@example.org)

† Researcher contributing as first author.

# Instructions for Scientific, Technological and Innovation Publication

## Introduction

Text in Times New Roman No.12, single space.

General explanation of the subject and explain why it is important.

What is your added value with respect to other techniques?

Clearly focus each of its features

Clearly explain the problem to be solved and the central hypothesis.

Explanation of sections Article.

## Development of headings and subheadings of the article with subsequent numbers

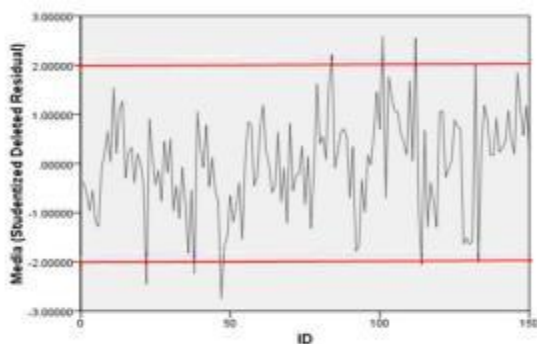
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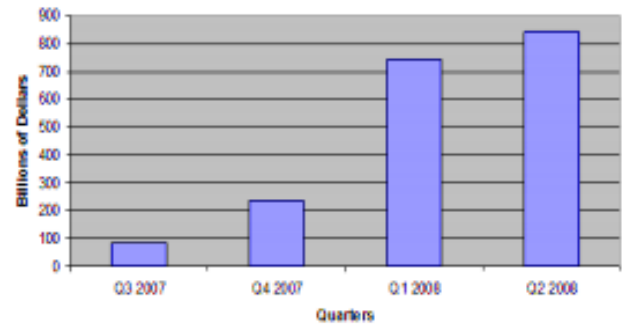
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