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Journal of Urban and Sustainable Development

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The works must be unpublished and refer to topics of Urban and sustainable development, Environmental sustainability, Social sustainability, Economic sustainability, Integrated transport systems, Urban mobility and other topics related to Humanities and Behavioral Sciences.

Presentation of Content

In the first article we present, *Hydrometeorological data analysis: a case of study of Ejido La Providencia, Saltillo, Coahuila*, by CANALES-PATIÑO, Eduardo Luis, SILVESTRE-DIAZ, Sergio Enrique, PARGA-MARRUFFO, César Joel and SOSA-FLORES, Noé Antonio, with adscription in the Universidad Tecnológica de Saltillo, as next article we present, *Organic coconut-aloe spiral made from coconut mesocarp and aloe vera*, by MARTINEZ-VALERA, Elizabeth, AQUINO-BOSQUEZ, Rufino and URQUIETA-CASIQUE, Gloria, with adscription in the Tecnológico Nacional de México, Campus Villa la Venta, as next article we present, *Impact of sustainable tourism in food and beverage establishments, a case study in Acapulco*, by SALGADO-CRUZ, Alicia, NICANOR-NICOLÁS, Rita, OZUNA-RODRÍGUEZ, Erika, DE LA SANCHA-FLORES, Isabel and ABARCA-HERNÁNDEZ, Drisdeli, with adscription in the Universidad Tecnológica de Acapulco, as next article we present, *Export of vegetables in the rural development district of Tecamachalco, Puebla, within the framework of the USMCA*, by XIMITL-ISLAS, Iván, RODRÍGUEZ-DE LA VEGA, Marisol, CABILDO-OREA, Alejandra and MACHORRO-DÍAZ, Rafael, with adscription in the Universidad Tecnológica de Tecamachalco.

Content

Article **Journal of Urban and Sustainable Development**
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Hydrometeorological data analysis: a case of study of Ejido La Providencia, Saltillo, Coahuila

Análisis de datos meteorológicos para sistemas hídricos. Caso de Estudio: Ejido La Providencia, Saltillo, Coahuila

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Abstract

In Saltillo, Coahuila de Zaragoza, there are places such as La Providencia common land county, that are considered arid or semi-arid places, where drought is a solid problem. There are water supply alternatives for domestic use such as rainwater systems and atmospheric-water collectors, however, weather conditions are variable and extreme, therefore, it is necessary to collect and to analyze meteorological data in the area. In this work, the precipitation and humidity of the area have been analyzed, finding potential on specific dates of the year to taken as departure to start with water storage systems develop.

Precipitation, Humidity, Water systems

Resumen

En Coahuila de Zaragoza, Saltillo, existen lugares como Ejido La Providencia que se consideran sitios áridos o semiáridos, donde la sequía es un problema alarmante. Existen alternativas de suministro de agua para uso doméstico como sistemas pluviales y captadores de agua por humedad, sin embargo, las condiciones climatológicas suelen ser variables y extremas, en consecuencia, se necesita recopilar y analizar los datos meteorológicos de la zona. En este trabajo se ha analizado que la precipitación y la humedad de la zona, encontrando un posible potencial en ciertos días del año, y puede ser tomada como punto de partida para aplicar sistemas de almacenamiento de agua.

Precipitación, Humedad, Sistemas Hídricos

Citation: CANALES-PATIÑO, Eduardo Luis, SILVESTRE-DIAZ, Sergio Enrique, PARGA-MARRUFFO, César Joel and SOSA-FLORES, Noé Antonio. Hydrometeorological data analysis: a case of study of Ejido La Providencia, Saltillo, Coahuila. Journal of Urban and Sustainable Development. 2023. 9-24:1-5.

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† Researcher contributing as first author

Introduction

Organizations should have a strategic management plan and they must implement technologies trying to have an impact on solving situations and keeping low expenses as well considering environmental initiatives in the community they are currently located at. However, the complexity of the technology will vary depending on the site data's analysis and also with the size of the organization, this will demonstrate and justify the technology application.

Water is scarce in many parts of the world and it is expected to continue decreasing because of global warming and inefficient consumption in industrial and commercial areas (Anchan & Shiva Prasad, 2021; Ariyani et al., 2021). Therefore, it is important to analyze this situation, and verify sites that require the implementation of technological alternatives such as rainwater systems and humidity collectors. These solutions are found in water conservation programs, to support arid areas and regions with wetlands(Teston et al., 2018; Zhou et al., 2020). Despite the fact that cities around the world already have standards and regulations for these programs, there are discrepancies between the methods, for example, when sizing the capacity of the rainwater tank, many times they do not satisfy the demand for not considering weather data (Ali et al., 2020; Alim et al., 2020).

In this context, meteorological data assumes the mantle of paramount importance for effective water management systems. Humidity and precipitation, both critical factors, underpin the efficacy of water collectors. Humidity, a linchpin for water collectors, traditionally relies on steam cooling methods with low dew point as condensation catalyst. However, this approach's heightened energy consumption presents a dichotomy between efficacy and operational cost (Heidy Gabriela & Jose Vladimir, 2022; Kim et al., 2022; Weber et al., 2023). Similarly, the operation of rainwater harvesting systems hinges on the aggregation of rainwater in targeted catchment areas, often encompassing rooftops.

Yet, weather-induced wear-and-tear, such as the degradation of waterproof layers or carpets, introduces particulate contaminants that could compromise stored water quality (Marcos et al., 2021; Mohammed et al., 2022; Saldaña-Escorcia et al., 2022).

This research represents the feasibility of obtaining water resources in the community of Providencia common land county in Saltillo, Coahuila. In addition, it aims to determine the potential to supply water with rain and humidity.

Methodology

This work was carried out with the meteorological database taken from CONAGUA agency and the ACURITE ATLAS Meteorological station (Image 1), located at Universidad Tecnològica de Saltillo, which has been operational since February 1st, 2023. Its registers can be monitored on the following platform: www.wunderground.com/dashboard/pws/ISALTI16. It is located at an approximate height of 9.5 m over the ground, and its geographic coordinates are 25.26 °N, 101.17 °W.

Figure 1 Weather station installation.

Results

The information shown in graphics 1 and 2 of San Juan de la Vaquería, is from the 1980-2018 period. The graphs show the months with the most rainfall detected, from May to September with a monthly average between of 1.07 to 2.47 mm yearly.

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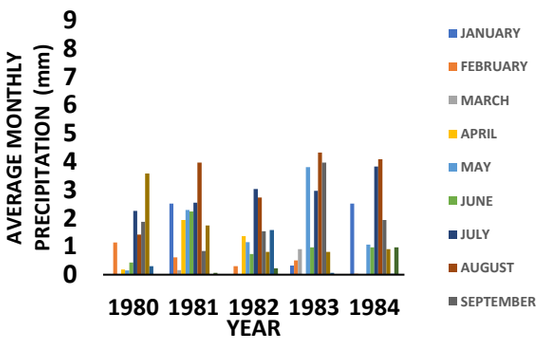
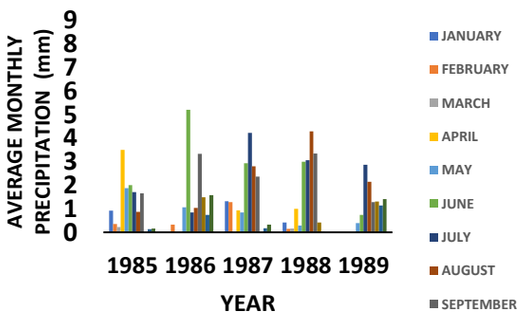
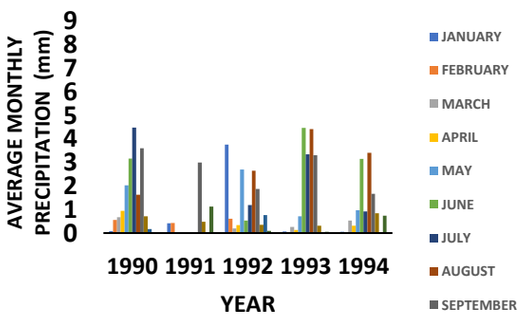
The other months have a low precipitation with less than 0.77 mm. This result indicates that it is likely to have intense and constant rains from May to September. Based on the recorded data, the months with the less of precipitation are from November to January, March and April. Regarding humidity, the data collected from February and March 2023 is shown in graphic 3. In addition, high relative humidity values from 80% to 50% are presented between 10:00 p.m. to 4:00 a.m. Additionally, Table 1 shows monthly meteorological data covering 6 months, including the total accumulation in millimeters and effective time in hours of rainfall, as well as the number of data points acquired. Each data point was recorded to the cloud from the station every 5 minutes. These records indicate a high presence of rainfall in August and June compared to data collected by CONAGUA.

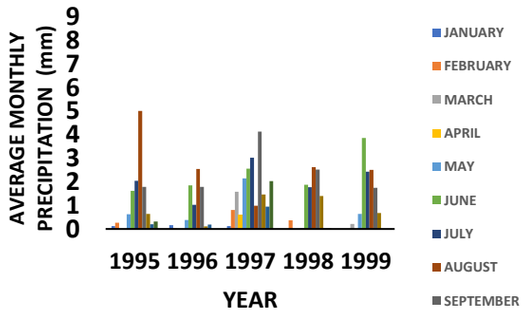
Appendix

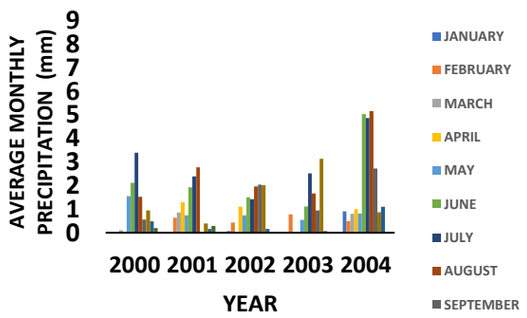


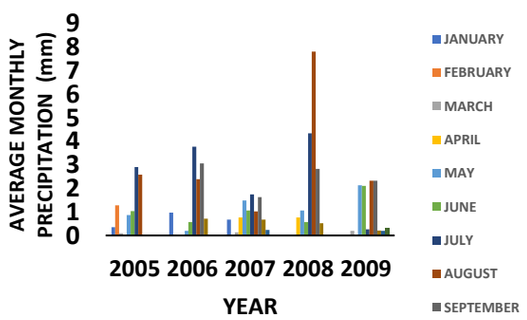


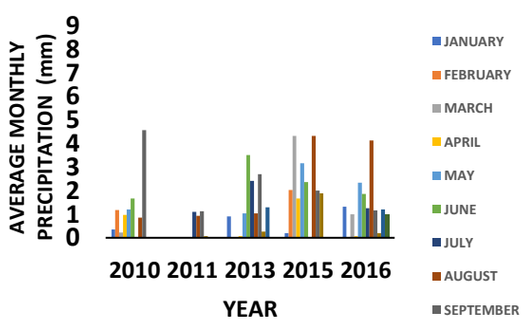


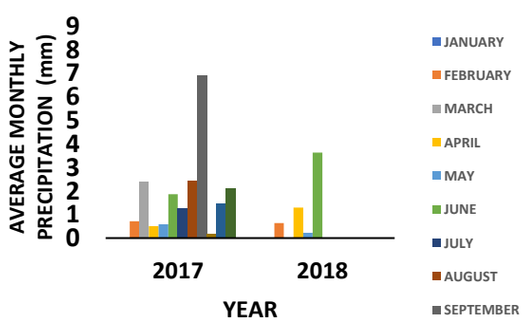
Graphic 1 San Juan de la Vaquería Statistic Information. CONAGUA (1980-1994)











Graphic 2 San Juan de la Vaquería Statistic Information. CONAGUA (1995-2018)

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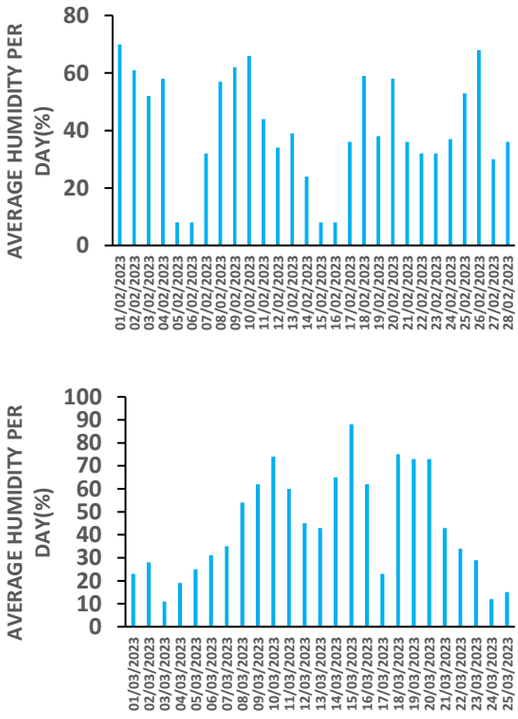
Months	Rainfall accumulated (mm)	#register	Rainfall effective time(h)
February	0	0	0
March	0.1	30	2.5
April	26.5	1013	84.42
May	44.5	1179	98.25
June	16.25	95	7.92
August	59.25	651	54.25

Table 1. Rainfall Data information from San Juan de la Vaquería. ACURITE ATLAS (2023).



Graphic 3 Humidity Statistic Information from *ACURITE ATLAS February-March (2023).*

Acknowledgment

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Financing

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Conclusions

Based on the results, the site presents an opportunity to implement a Water System pilot test to increase the residences life quality.

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Organic coconut-aloe spiral made from coconut mesocarp and aloe vera

Espiral ecológico coco- aloe a base de mesocarpio del coco y aloe vera

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Abstract

The present investigation has the purpose of making a coconut-aloe spiral with coconut tow, looking for ecological alternatives that do not affect health or the environment, one of them is the use and transformation of coconut tow giving added value to this material, being a by-product (waste or garbage), taking it to the transformation process, to incorporate it into the production and marketing methods. This research is of a mixed type, a questionnaire was developed as an instrument for data collection in the community of Ejido las Piedras Huimanguillo belonging to the state of Tabasco, for its elaboration the technique of a survey of alternative questions was considered as a construction criterion, Likewise, indicators were taken into account for the evaluation of the spiral. It is a suitable product for any human being, it controls mosquitoes in homes achieving a better benefit, where it does not contaminate or directly affect the environment and consumer health. The coconut-aloe spiral inside the homes according to the survey carried out achieves a better substitution of the common raidolith, according to the objectives that were set within the project, precision compliance is given.

Coconut, Aloe vera, Ecological, Spiral

Resumen

La presente investigación tiene la finalidad de realizar un espiral coco-aloe con estopa de coco, se buscan alternativas ecológicas que no afecten la salud ni al medio ambiente, una de ella es la utilización y transformación de la estopa de coco dándole un valor agregado a este material, siendo un subproducto (desecho o basura), llevándolos al proceso de transformación, para incorporarlos a los métodos de producción y comercialización. Esta investigación es de tipo mixta, se elaboró un cuestionario como instrumento para la recolección de datos en la comunidad del Ejido las Piedras Huimanguillo perteneciente al estado de Tabasco, para su elaboración se consideró como criterio de construcción la técnica de una encuesta de preguntas alternativas, así mismo se tomaron en cuenta indicadores para la evaluación del espiral. Es un producto adecuado para cualquier ser humano, controla los mosquitos en los hogares logrando un mejor beneficio, donde no contamina ni afecta directamente al medio ambiente y a la salud del consumidor. El espiral coco-aloe dentro de los hogares de acuerdo con la encuesta realizada logra una mejor sustitución de los raidolito comunes, de acuerdo con los objetivos que se platearon dentro del proyecto, se dan cumplimiento de precisión.

Coco, Aloe vera, Ecológico, Espiral

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† Researcher contributing as first author

Introduction

Humans are often protected from pesky disease-carrying mosquitoes by insecticides. The daily use of insecticides and pesticides in homes, gardens and farms seems to be an everyday and harmless action, but in the long run, these products have serious consequences for the health of the whole family, according to the environmental organisations Santo Tomás and Fronteras Comunes. Studies carried out in recent years have determined that the continued use and exposure to these products can cause serious health damage such as respiratory problems, hormonal alterations and various types of cancer (José Manuel Arias, member of the Santo Tomás Ecological Association (Regeneration 2014).

Some studies carried out in recent years link these substances to respiratory disorders, hormonal alterations and various types of cancer. With this research project we make some questions such as why and what is the purpose of a coco-aloe spiral? Most of the people do not know the content of this product, they are highly toxic for the environment and it is related to diseases. How are raidolites affecting the health of human beings? Some consequences or diseases such as skin irritation, intoxication, heart disease, bone marrow aplasia; a disappearance of the cells in the bone marrow responsible for blood production; can even cause death.

Taiwan's Ministry of Health and Welfare indicated that 50% of lung cancer deaths in Taiwan are not related to cigarette smoking, and Taiwanese households often burn coils to repel mosquitoes. Therefore, by surveying lung cancer patients and other controls in at-risk environments, they sought to determine whether exposure to smoke from mosquito coils is a risk for lung cancer. The researchers concluded that exposure to mosquito coil smoke may be a risk factor for the development of lung cancer.

A study in rats revealed that the use of EAM is associated with an increased risk of severe lung damage, and another study in humans showed that mosquito coil smoke may be a risk factor for the development of lung cancer. Bazalar-Palacios, J., Cjuno, J., Bazalar, J., Rodríguez, Y., & Palacios, M. (2019).

The purpose of this research is to make a coco-aloe spiral with coconut tow, ecological alternatives that do not affect health or the environment are sought, one of which is the use and transformation of coconut tow, giving added value to this material, as it is a by-product (waste or rubbish), taking them to the transformation process, to incorporate them into the methods of production and marketing. The hypothesis put forward in this research is: The coco-aloe spiral will achieve the control of mosquitoes inside the home without harming the health of the consumer. The coco-aloe spiral within households according to the survey conducted achieves a better substitution of the common raidolito, as it controls mosquitoes without harming human health.

Theoretical basis

The story goes that by 1895, summers in Japan were unbearable; a little because of the heat and humidity, but mostly because of the mosquitoes. Yuki Ueyama, the main promoter and at the same time critic of mosquito-killing incense, who found the solution after seven years of trials, succeeded in producing a coil by impregnating a long, flexible stick with the product, based on starch and pyrethrin, which he then wound into an infinite shape. The spiral was born. The first coil in history went on sale in 1902, it could last for hours on, attacking the nervous system of flies, lice and mosquitoes, annihilating them in an all-out chemical war; the same coil that almost 120 years later is still on all over the world, although with a very different formula. In 1949 Milton Schechter synthesised alethrin, the first pyrethroid that did not come from a plant, but was very similar in molecular structure to the original substance; it was the beginning of synthetic insecticides (Di Genova 2021).

People in residences are often protected from pesky disease-carrying mosquitoes by insecticides or smoke generated by burning mosquito coils. Mosquito coils are frequently burned indoors in Asia and, to a limited extent, in other parts of the world, including the United States. (WHO 2005) In 1996, a World Health Organization (WHO) report estimated the annual global consumption of mosquito coils to be approximately 29 billion pieces.

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(WHO 1998) The prevalence of families burning mosquito coils in Taiwanese is about 45%. (Yang CY, Chiu JF, Cheng MF, Lin MC. 1997) The main active ingredients of the mosquito coil are pyrethrins, which account for about 0.3-0.4% of the mass of the coil. (Lukwa N, Chandiwana SK.1998).

Globally, the dengue virus causes 390 million infections annually, with an estimated 20 000 deaths. Latin America has experienced a dramatic increase in dengue cases and deaths in recent years. This situation is causing people to try to maintain the main preventive measures against these diseases. Bazalar-Palacios, J., Cjuno, J., Bazalar, J., Rodríguez, Y., & Palacios, M. (2019).

The four main types of residential insecticide products that are widely used around the world are aerosols, mosquito coils, liquid vaporisers and vaporising mats. Practices provided by the World Health Organization include the use of mosquito coils (AMS), which are widely used by the community. However, little is said about the health risk posed by these products. EAMs are composed of pyrethroids (artificial pesticides, effective against various mosquito genera) which, when combusted, produce smoke with small particles (< 1 μm) that can enter the alveoli and cause lung problems, vomiting, diarrhoea, convulsions, paralysis, among others.

Mosquito coils can pose a serious potential health risk to children. Prolonged use has been associated with increased incidence of asthma and persistent wheezing. The active ingredients are small amounts of pyrethrins, considered to be a low toxicity insecticide, over 99% of the mass of the coil is made up of so-called "inert" ingredients, whose smoke has been shown to be composed of respirable particles, some quite small, containing polycyclic aromatic hydrocarbons (PAH) and carbonyl compounds, including formaldehyde (Hcho). Gavidia, Tania, Pronczuk, Jenny, & Sly, Peter D. (2009).

A study was conducted to characterise the emissions of four common brands of mosquito coils from China and two common brands from Malaysia. They used mass balance equations to determine the emission rates of fine particulate matter (particulate matter < 2.5 μm in diameter; PM2.5), polycyclic aromatic hydrocarbons (PAHs), aldehydes and ketones. After applying these measured emission rates to predict indoor concentrations under realistic room conditions, they found that pollutant concentrations resulting from burning mosquito coils could substantially exceed health-based air quality standards or guidelines. Under the same combustion conditions, the Malaysian mosquito coils tested generated more measured pollutants than the Chinese mosquito coils tested. They also identified a large set of volatile organic compounds, including carcinogens and suspected carcinogens, in the coil smoke. In a series of experiments conducted in one room, they examined the size distribution of particles contained in the coil smoke and found that the particles were ultrafine and fine. In this study they suggest that exposure to smoke from mosquito coils similar to those tested may pose significant acute and chronic health risks. Burning a mosquito coil would release the same amount of PM2.5 mass as burning 75 to 137 cigarettes. The formaldehyde emission from burning one coil can be as high as that released from burning 51 cigarettes.

Damage caused by mosquitoes

Mosquitoes can cause many types of damage, direct and indirect. cause, both directly and indirectly.

There are many diseases that mosquitoes can transmit. Can transmit, but it is clearly necessary for this to happen if the mosquito bites a person with the virus in the acute phase:

- Chikungunya: is an acute viral disease, caused by a togavirus (arborvirus), transmitted by a mosquito of the genus Aedes (Ae aegypti or Ae albopictus).

- Dengue: transmitted through the bite of Aedes aegypti or Aedes albopictus, infected with one of four viral serotypes (DEN-1, DEN-2, DEN-3 and DEN-4).

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Zika virus: usually spread through the bite of an infected mosquito, the bite of an infected Aedes mosquito.

Aedes. Zika virus infection during pregnancy can cause Zika virus syndrome characterised by severe brain abnormalities such as microcephaly, other birth defects or other illnesses such as miscarriage. Zika virus fever has also been associated with Guillain-Barré syndrome. Drago, A. (2019).

Coconut

The coconut is the fruit of the coconut palm and is ranked as one of the most useful fruits on the planet as it has over 360 domestic uses. It is a drupe, composed of the exocarp (husk), mesocarp (husk), endocarp (kernel), solid cellular endosperm (coconut meat, also called copra) and liquid nuclear endosperm (coconut water).

The exocarp (surface) is 0.10 mm thick, the fibrous shell (mesocarp) can vary from 1 to more than 5 cm thick, reaching 10 cm at the base of the nut (García Rodríguez & Guerrero 2003).

The main components of the fibre that make up the tow are cellulose and lignin with a high percentage of ash. The latter component is the one that provides strength and rigidity.

This fibre falls into the category of strong fibres. It has mechanical strength, stiffness, moisture resistance, low heat conductivity, is non-toxic and economical (Quintanilla, 2010).

The characteristics of coconut tow fibre make it a versatile material that can be used in different products. The longer and finer fibres are used as yarn for mats and carpets. The coarse fibres are used for the manufacture of brushes and brooms, while the short, fine fibres are used as stuffing for mattresses and furniture. These coconut wools are layered, compressed and vulcanised. This process produces durable products with excellent properties. The high quality of these products, being permeable to air and possessing adequate natural breathing properties, does not allow for allergic reactions.

It can also be used as a household fuel and fertiliser, as well as organic matter. Finally, as agrotextile it is known for its benefits for the cultivation of vegetables and other crops. It is used as a substrate for planting seedlings, for its moisture retention capacity and as potting soil (Acosta 2014 p.29).

The commercial use of this fruit has been basically oriented towards obtaining edible fats and oils by processing the soft inner part.

The industrial exploitation of the mesocarp, commonly known as stopa, is not carried out, but is thrown away as waste in an annual amount of 28,740 tonnes.

In the Pacific region, the disposal of coconut tow has become a health problem. Large quantities of this element, accumulated in the coconut groves, contribute to breeding grounds for rodents and insects, endangering the health of people and animals living in these areas.

Similarly, the tow thrown into the estuaries and the sea causes ecological damage such as sedimentation of the bays and interruption of water currents. (Vélez n.d.)

Figure 1 Coconut fibre

Aloe Vera

Aloe vera, popularly known as aloe vera, belongs to the lily family; it is an important plant used in traditional medicine for the cure of various ailments, such as skin diseases, radiation damage, eye diseases, intestinal disorders and antiviral diseases. It is characterised as one of nature's greatest cell regenerators (Roig 1988).

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The most widely used parts of this plant are the leaves, from which the fleshy part is extracted, colourless and odourless mucilage, commonly known by the name of cristal. This structure has a healing, anti-inflammatory and skin-protecting action, as well as bactericidal, laxative and detoxifying properties. This is why this plant has a wide range of therapeutic applications.

Aloe Vera is widely used in skin lesions, mainly because of its emollient and softening properties. It has been confirmed that these crystals contain vitamins A, B1, B2, B6, C, E and folic acid. It also contains minerals, essential amino acids and polysaccharides that stimulate tissue growth and cell regeneration (Rodriguez & Fuentes 2006).

Aloe vera has wide uses in the food, pharmaceutical and cosmetic industries, and the most commonly used part of the plant is the gel, due to its functional, antioxidant and therapeutic properties. An adequate use of the plant is associated with the content of its bioactive components, microstructure and the methods for preserving and stabilising the products obtained from the plant.

stabilise the products obtained from the gel. Domínguez-Fernández, R.N., Arzate-Vázquez, I., Chanona-Pérez, J. J., Welti-Chanes, J. S., Alvarado-González, J. S., Calderón-Domínguez, G., Garibay-Febles, V., & Gutiérrez-López, G. F.. (2012) From the leaves of aloe vera is extracted the fatty liquid or gel that contains a myriad of properties and benefits. This plant contains different active ingredients in the acíbar, such as aloins, aloerresins, saponins and lignin, as well as fibre, minerals (such as zinc, copper or calcium), vitamins E, C, A and amino acids, which make its properties allies of our health and wellbeing. In addition, the plant tissues of aloe vera contain mucilage, a viscous substance that can be coagulated with alcohol.

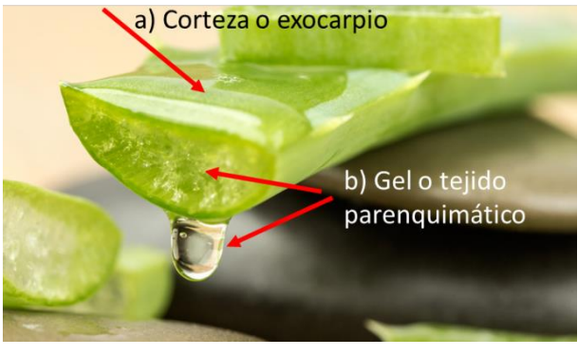

Figure 2 Aloe vera leaf structure
Source: Own elaboration

a) Bark or exocarp
b) Gel or parenchyma tissue

Composition

The gel is composed of water, mucilage and a variety of compounds. These compounds include phenols such as aloin and aloemodin; saccharides (mannose, glucose, fructose, cellulose, glucomannan, acemannan, etc.); vitamins A, C and E and B complex; enzymes such as amylase and catalase; minerals including calcium, iron and zinc; amino acids such as lysine, cysteine and glycine and fatty acids, among others.

Properties

The properties of Aloe vera are attributed to the presence of various sugars contained in the gel of the leaves, including fructose, aloeride, cellulose, neutral glucomannans, galactogalacturonans, glucogalactomannans, arabinose, mainly, and also to the presence of phenolic compounds such as aloin, aloe emodin, 4-hydroxyalkaloin, 5-hydroxyalkaloin, allanosides A and B, aloesins A and B, aloeresins A and B and 8-C-glucosyl-7-o-o-methyl-(s)aloesyl. (Bonilla 2016)

Method

This research is experimental, an ecological spiral based on coconut tow and aloe vera for the control of mosquitoes, applied in the community of ejido las piedras, Cárdenas Tabasco.

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For the formulation and development of the ecological spiral based on organic products, the following inputs and work instruments were used. It was necessary to remove the hard shell to obtain the mesocarp or coconut husk. Once the mesocarp was obtained, it was placed in the sun so that it became very dry, and then the mesocarp was scraped to obtain a coarse powder, which was then ground in a hand mill to obtain a fine powder. Three different samples are made with resins to find out which is the best option to combine with the coconut tow powder. Soap, banana resin and aloe vera, the latter being the best option for the spiral, as it is more compact and has a pleasant smell.

Once the expected results were obtained, a test was carried out at night to see if the samples repelled the mosquitoes, where it was observed that the two products did work, a strong smell was obtained, which managed to repel the mosquitoes, and even eliminate them. The decision was made that this is the essential combination to make the spiral, as the smell does not affect humans in any way, but only the mosquitoes. The following is the flow chart for the elaboration of the spiral.

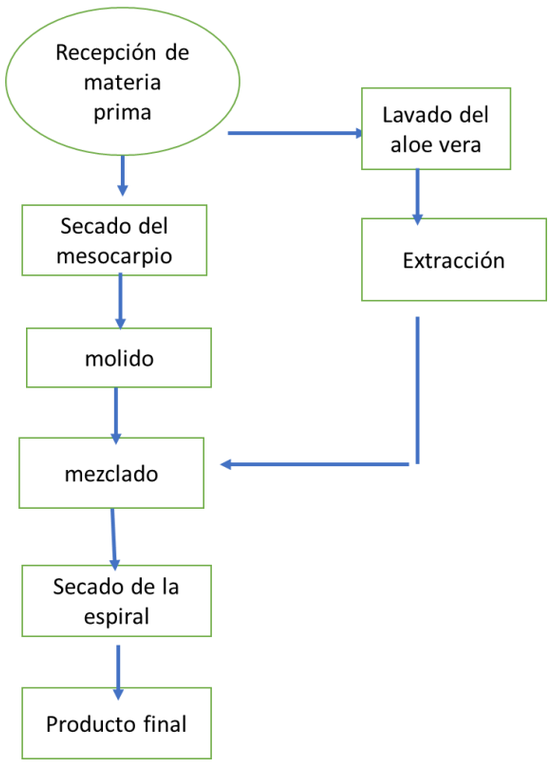

Figure 2 Flow chart
Source: Own elaboration

Figure 3 Ground coconut tow
Source: Own elaboration

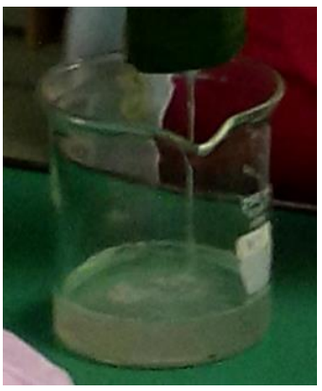

Figure 4 Aloe Pulp
Source: Own elaboration

A mould for the spiral was developed and worked on.

Source: Own elaboration

The coco-aloe spiral is made by combining coconut tow with aloe-vera, where the dosage of both is made to obtain better results, taking them to a drying process.

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Coconut mesocarp gr	Aloe Pulp gr	Required temperature ºC	Drying time min
10	20	60	80
15	40	60	80
20	60	80	60
25	80	100	45

Table 1 Dosage
Source: Own elaboration

Figure 6 Mould filling
Source: Own elaboration

Figure 7 Drying of the coco-aloe spiral
Source: Own elaboration

Operationalisation of variables

General objective

To make a coco-aloe spiral with coconut mesocarp and to know how it affects human health.

Variable	Indicator	Instrument
Mesocarp	Texture Moisture	Survey Laboratory tests
Spiral	Consistency Odour Aroma Shape type Moisture Effects	Survey Laboratory tests
Symptoms developed in the product test	Allergies: Skin Respiratory Eye irritability Pain	 Survey Laboratory tests

Table 2 Operationalisation of the variables
Source: Own elaboration

Data collection instrument

Three questionnaires were applied as an instrument for data collection in the community of Ejido las Piedras Huimanguillo belonging to the state of Tabasco, for its elaboration was considered as construction criteria the technique of a survey of multiple choice questions, likewise indicators were taken into account that conform the texture, humidity, consistency, odour, aroma, type of shape and toxicity. Consistency, Smell, Aroma, type of form and toxicity on the other hand the questionnaire was carried out to obtain information to know if they are willing to know a new product that is natural and that does not contaminate as the common spirals and to know if the spiral was liked by the people after its use, also a questionnaire was applied to make a comparative table of the common raidolites with the coco-aloe spiral.

Study population

In order to find out if there is any damage caused by the new coco-aloe spiral product, the population of Ejido las Piedras Huimanguillo, Tabasco was taken, which has a population of 230 people. Taking into account a simple random sample of 80 inhabitants to be interviewed to determine if they were interested in learning about a new product and the second sample is to know what they thought of the coco-aloe spiral after having used it in their homes, estimating the proportion of people of different ages who are in favour of this product with a standard deviation of 5 and a confidence level of the mean of 95%.

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The locality Las Piedras is located in the Municipality of Huimanguillo (in the State of Tabasco). Among all the towns in the municipality, it ranks 96th in terms of number of inhabitants. Las Piedras is 2 meters above sea level. figure 5.

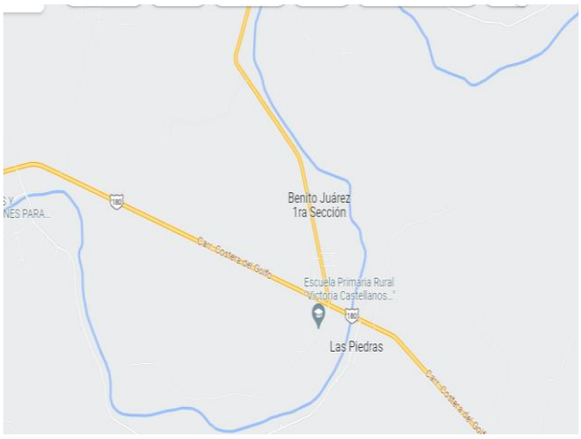

Figure 8 location ejido las piedras
Source: Google maps

Results

The coco-aloe spiral was made by combining coconut tow, making the product suitable for use.

Figure 9 Coconut aloe spiral in the mould
Source: Own elaboration

Figure 10 coco-aloe spiral
Source: Own elaboration

Tests were carried out to determine the type of smoke produced, which is white smoke, indicating a high presence of oxygen and water vapour in the air, which is generally produced by the combustion of fodder or dry grasses, vegetable products and materials with a high phosphorous content.

Figure 11 burning of coil

The test is also done to see if the coil eliminates the mosquitoes or just drives them away. The picture shows how the mosquitoes are killed.

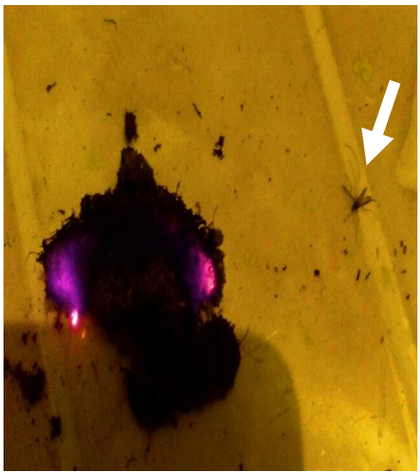

Figure 12 spiral burning
Source: Own elaboration

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The questionnaire was applied to find out if people were willing to learn about the coco-aloe spiral. The following results were obtained.

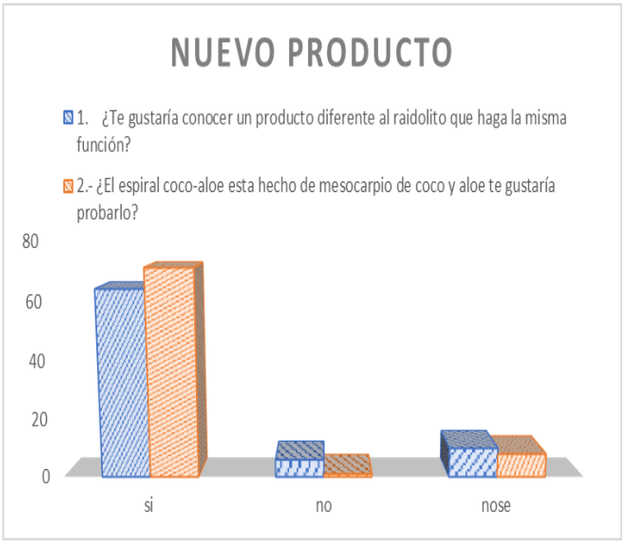

Figure 13 graphs to get to know a new product
Source: Own elaboration

According to the graph, 80% of the surveyed population would like to know a different product to the raidolito, but with the same function, and they would also like to use the coco-aloe spiral.

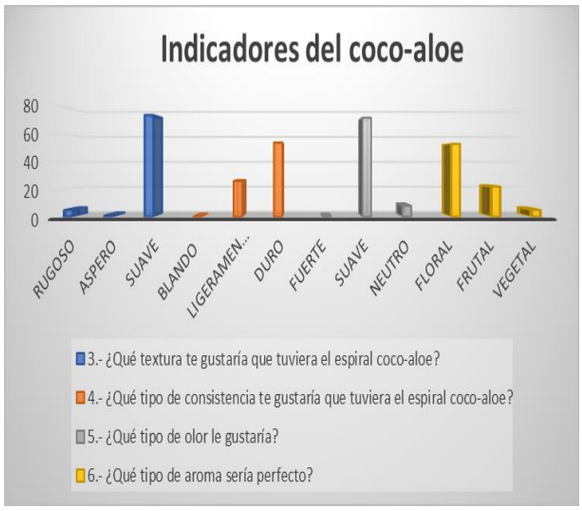

Figure 14 Graphs of the spiral indicators
Source: Own elaboration

The graph shows that 80% of people want the spiral to be soft while 60% want it to be hard with a floral aroma.

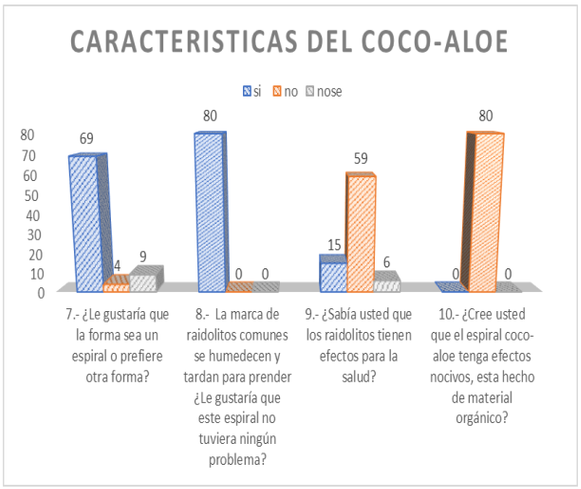

Figure 15 Coco-aloe spiral characteristics graph
Source: Own elaboration

This graph shows the highest percentages where people prefer the spiral shape, that they do not get wet, they also comment that they do not know that the raidolite has health effects.

The second evaluation was carried out after the people had been using the spiral for 2 weeks, with the following graphs as results.

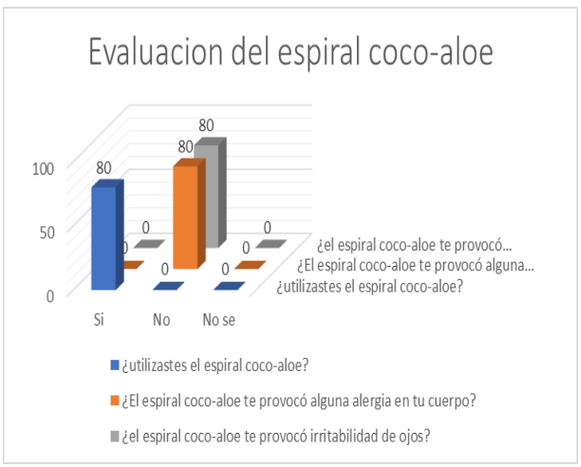

Figure 16 Graph of evaluation of the coco-aloe spiral by the people who used it
Source: Own elaboration

In this graph, 100% of those surveyed commented that they used the spiral, and that it did not cause them any type of allergy or irritability in the eyes, they liked it because of the aroma of the aloe vera.

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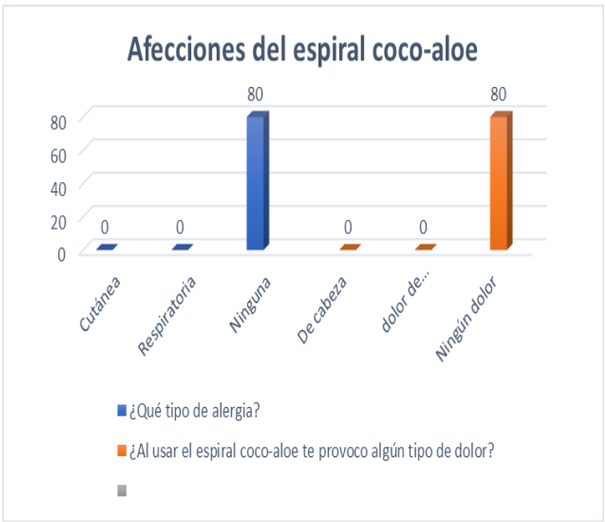

Figure 17 graph of the evaluation of conditions of the coco-aloe spiral by the people who used it
Source: Own elaboration

In this graph, 100% of those surveyed said that they did not experience any type of allergy, nor any type of pain. The people of the ejido Las Piedras were satisfied with the spiral, as it did not cause any type of harmful effects to their health and it does repel and kill mosquitoes.

In order to make a comparison with the common raidolito found on the market, a survey was also carried out among the inhabitants of Ejido Las Piedras, to find out if they have had any allergies, pain, irritability, etc. when using these raidolito. The following graphs show the results of the survey.

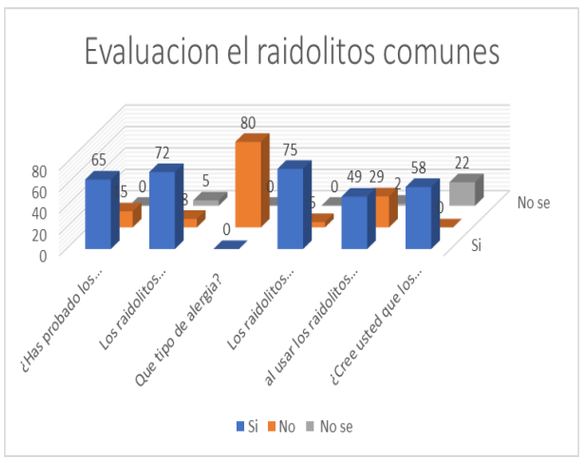

Figure 18 Evaluation graph of common raidoliths
Source: Own elaboration

In this graph we can see that 80% of those surveyed, who have used commercial raidolites, are dissatisfied because they cause health problems such as headaches, respiratory allergies, irritability in the eyes, among others, and over time can even cause serious illnesses.

According to the data obtained in the surveys that were applied in the Ejido Las Piedras, Huimanguillo Tabasco, a comparative table of the commercial raidolites with the coco-aloe spiral was made.

COMMON RAIDOLITHS	COCO-ALOE SPIRAL
Cause respiratory conditions	Does not cause respiratory disorders
Various types of allergy	Does not cause any kind of allergy
Toxic	Non-toxic
Pollute the environment	does not pollute the environment
Skin irritation	Does not irritate the skin
Cause dizziness and nausea	does not cause nausea and dizziness
Cause headaches	Does not cause headaches
Contains chemicals	Contains natural products
Irritating odours	Mild odour
Can cause illness	

Table 3 Comparative table of common raidolites versus coco-aloe spiral
Source: Own elaboration

Conclusion

Pesticides are chemical compounds that have brought benefits to humans, mainly in the field of public health and agriculture, and continue to be first choice resources in many activities in these specific areas. However, both humans and other mammals and the environment have been substantially affected by their indiscriminate, excessive and in many cases not very cautious use, as in the case of raidolites, which, according to studies carried out, are considered to affect health, resulting in skin irritation, respiratory problems, among many other consequences.

The study carried out in the population of Ejido Las Piedras belonging to the municipality of Huimanguillo, Tabasco, indicates that most people handle domestic pesticides inadequately, as they have no knowledge of the information on this product, inadequate measures for its application and storage in their homes.

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Therefore, research was carried out to develop a spiral called coco-aloe, which is made with coconut mesocarp and aloe vera, which due to their physical and chemical properties do not affect human health. In order to carry out the coco-aloe spiral, it was necessary to carry out laboratory tests based on experiments with 3 natural resins, where each of their properties was analysed and a detailed description was made, in order to know their appropriate measurements and thus evaluate with certainty the results of each resin and reach the conclusion of which is the most viable.

The biological activity of a natural compound is a function of its structure and the dose used for such purposes.

Therefore, the coconut-aloe spiral based on coconut mesocarp is a product suitable for any human being, since it controls mosquitoes in homes, achieving a better benefit, where it does not contaminate or directly affect the environment and the health of the consumer.

In these critical times it is necessary to take advantage of a proper use of natural resources and not waste them, in this case the coconut mesocarp is one of the common waste in the environment, this product can be used and become an alternative to domestic pests, as is the case of mosquitoes.

In order to make the best use of this product, it is suggested that laboratory tests for gas measurement and a bioassay be carried out to obtain better information so that it can have a better market share.

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Impact of sustainable tourism in food and beverage establishments, a case study in Acapulco

Impacto del turismo sostenible en los establecimientos de alimentos y bebidas caso Acapulco

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Abstract

The following research aims to know the perception of current tourism development in food and beverage establishments located in the three main popular tourist areas in the port of Acapulco; golden, traditional and diamond itself, which is considered the most emblematic in Guerrero and from which the largest economic benefit in the state is perceived > 19,571,000 dollars per year. (National Institute of Geography and Statistics, s.f.) The foregoing is in order to know how to preserve natural resources and the local culture that is being passed down to generations. The study carried out is in a quantitative method with a cross section, 289 surveys were applied within the "high season" for the tourism sector, directed to the visiting diners of that holiday period that has a significant tourist influx to the port. The results of the research detonate awareness and contribute to knowledge about the relevance that sustainable tourism currently has, such as economic development and heritage conservation, it is a significant finding for analysts and researchers in the area of social sciences that has an impact on a important analysis of conscience for those who enjoy a socially responsible vacation.

Tourism, Sustainability, Food, Drink Establishments

Resumen

La siguiente investigación tiene como objetivo el conocer la percepción del desarrollo turístico actual en los establecimientos de alimentos y bebidas con ubicación en las tres principales zonas turísticas populares en el puerto de Acapulco; dorada, tradicional y diamante misma que se considera la más emblemática en Guerrero y de la cual se percibe la mayor derrama económica en el estado > 19,571,000 de dolares al año. (Instituto Nacional de Geografía y Estadísticas, s.f.) Lo anterior, es con la finalidad de conocer la forma de preservar los recursos naturales y la cultura local que se está heredando a las generaciones. El estudio realizado es en método de tipo cuantitativo con corte transversal, se aplicaron 289 encuestas dentro de la “temporada alta” para el sector turismo, mismas dirigidas a los comensales visitantes de ese periodo vacacional que tiene importante afluencia turística al puerto. Los resultados de la investigacion detonan hacer consciencia y contribuir al conocimiento sobre la relevancia que actualmente posee el turismo sostenible como el desarrollo económico y la conservación del patrimonio, es un hallazgo significativo para los analistas e investigadores del área de las ciencias sociales que repercute en un importante análisis de conciencia para quienes disfrutan de unas vacaciones socialmente responsables.

Turismo, Sostenibilidad, Establecimientos de Alimentos y Bebidas

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† Researcher contributing as first author

Introduction

Tourism in Mexico, according to figures and statistics from the World Tourism Organization, occupies a privileged place within the global tourism sector (Nava, 2017), is of great relevance and has changed its position from 17th at the beginning of President López Obrador's six-year term to the ninth position worldwide in foreign exchange earnings from international visitors, according to the most recent World Tourism Barometer, reported the Ministry of Tourism (SECTUR); Tourism as an industry is a phenomenon that has achieved presence in the international economic dynamics (Salcedo & San Martín, 2012).

According to the head of SECTUR, Miguel Torruco, the economic benefit left by international visitors during 2022 was 28,016 million dollars, 41.7% more than what was registered in 2021. It is also 14% higher than in 2019, prior to the pandemic that caused border closures and confinements affecting tourism activity in the country (Cabanilla, Garrido, & Molina, 2021).

According to the World Tourism Organisation (UNWTO), tourists are expected to make more frequent short-haul trips and are increasingly looking for value for money. Sustainable tourism has become a priority issue on the global landscape, as the negative impact of conventional tourism on the environment, society and the economy is increasingly recognised. In the 21st century, tourism has experienced exponential growth, leading tourism destinations to face significant environmental, cultural and economic challenges. The concept of sustainable tourism emerges as a response to these issues, seeking a balance between economic development, the conservation of the natural and cultural environment, and the well-being of local communities. The need to address tourism from a sustainable perspective is inescapable. The negative impacts of mass tourism can be devastating, from environmental degradation, exploitation of natural and cultural resources to the loss of cultural identity of destinations and social inequality. In the face of this reality, sustainable tourism presents itself as an opportunity to transform the tourism industry and promote responsible and conscious practices.

The main objective is to ensure that tourism development is carried out in an equitable manner, preserving local resources and culture for future generations. This implies the adoption of strategies that minimise the negative impact of tourism and promote the conservation of the natural environment, the protection of cultural heritage and the well-being of host communities.

Sustainable tourism is characterised by a series of principles and practices that seek to ensure a balance between tourism development, the conservation of the natural and cultural environment as well as the well-being of local communities.

Conservation of the natural environment: Sustainable tourism is committed to protecting and preserving the environment and natural resources of tourism destinations. It seeks to minimise the negative impact of tourism on ecosystems, promoting responsible environmental management practices and encouraging biodiversity.

Respect for local culture and heritage: Sustainable tourism aims to generate economic, social and cultural benefits for local communities. It seeks to encourage the active participation of communities in tourism development, promote local entrepreneurship and ensure the equitable distribution of income generated by tourism.

Benefit for local communities: Sustainable tourism aims to generate economic, social and cultural benefits for local communities. It seeks to encourage the active participation of communities in tourism development, promote local entrepreneurship and ensure the equitable distribution of income generated by tourism.

The research contributes to knowledge and awareness of the importance of sustainable tourism as a powerful tool for achieving a balance between economic development and the conservation of natural and cultural heritage.

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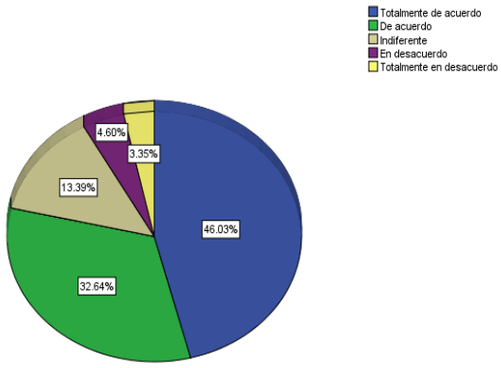
Development

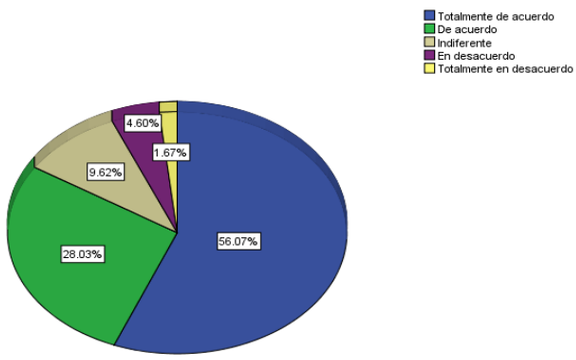
Marketing

This section analyses the "new mode" in which food and beverage establishments operate; strategies that require assertiveness, digital distribution channels, the use of technology and the impact they have had on promotional processes.

Also, outreach and sales through the use of social media during the pandemic. Investment in infrastructure and its economic revival without government support.



Graphic 1 Marketing
source: Own elaboration
Note: Almost half of the respondents (46.03%) strongly agree that marketing strategies need to be more assertive

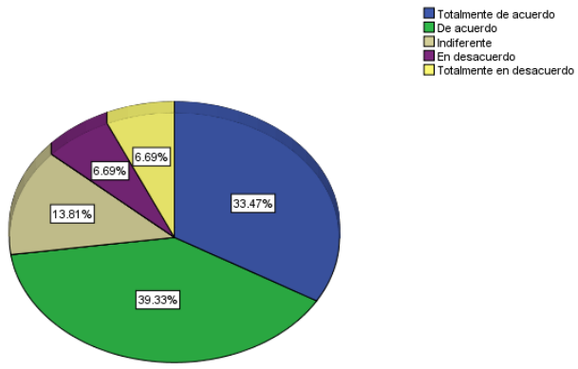


Graphic 2 Technologies and their impact on advocacy processes and strategies
Source: Own elaboration.
Note: More than half (56.07%) strongly agree that the use of technologies has had an impact on promotion processes and strategies that influence their income.

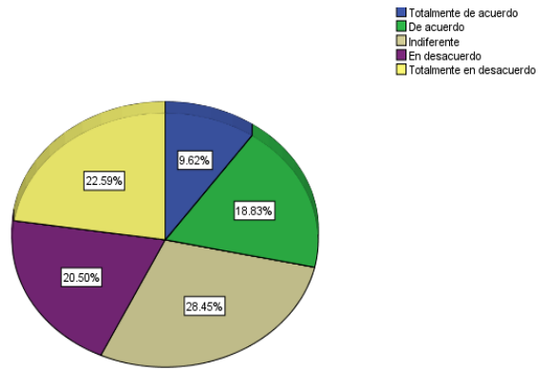
Sustainability

It addresses the implementation of contingency measures, cleaning and maintenance plans for facilities, monitoring of all provisions of the authorities in terms of care and access to the business.

To know if the company has implemented actions for the care and conservation of the environment and natural resources, separation of rubbish, use and behaviour of tourists visiting the port of Acapulco.



Graph 3 Economic recovery and sales volume
Source: Own elaboration
Note: More than 70% agree that the economic recovery and sales volume increased without help from the authorities



Graph 4 Care of the environment by tourists
Source: Own elaboration.
Note. Only 9.62% totally agree that tourists take care of the nature of the most common pollutants

Customer service

The appointment of a quality manager to ensure improvements in service, as well as the handling of complaints and the application of customer satisfaction surveys. To know if the company provides information on tourist services and local products when requested.

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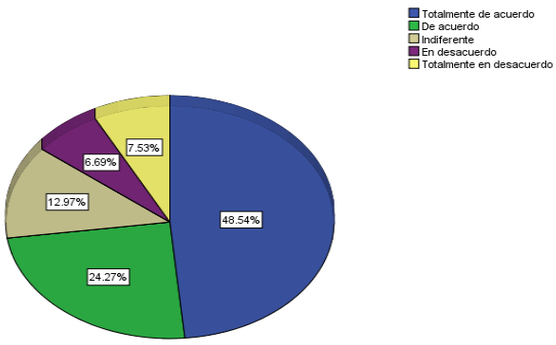
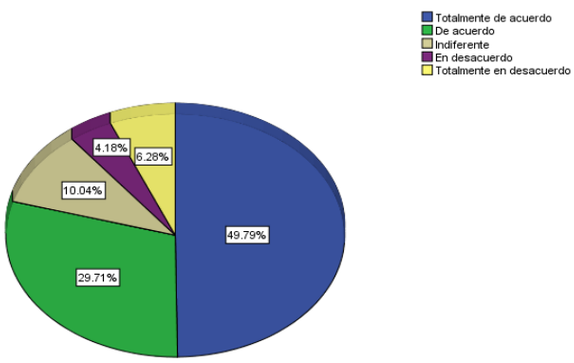


Graphic 5 Service improvement
Source: Own elaboration.
Note: The establishment carries out customer satisfaction surveys to improve service.



Graphic 6 Information to tourists
Source: Own elaboration.
Note: The establishment provides its customers with information on tourist services and local products..

Methodology

Descriptive approach with a quantitative and cross-sectional method. A total of 289 surveys were applied in accordance with the number of the population given by the size of the infinite formula to the private sector.

Respondents answered within the most important tourist areas in the city and port of Acapulco. This was carried out during the well-known "Semana Santa" (Holy Week), which is identified as being important in terms of the number of inbound tourists.

The instrument was developed by the REDAyN Steering Committee with Likert scale responses using statistics and mathematics to process data and obtain results that allow for generalised conclusions that can be projected over time.

Results

Mexico's economy is strengthened by micro, small and medium-sized enterprises (MSMEs), which represent 99.8% of the enterprises in the country, all of which help to consolidate or strengthen links with others (Lopez, Contreras, & and Estrada, 2015), that is 4.9 million establishments in the private and parastatal sector according to the National Institute of Statistics and Geography (Instituto Nacional de Geografía y Estadísticas, n.d.).

The results reveal that the total number of food and beverage establishments that allowed the validated surveys to be applied were 239 managers where ("64.02% were men") >> and ("36.01% were women") <<. Regarding the age variation the range considered is (<< 25 to 29 years >>).
The highest level of education of the respondents ("60% have a bachelor's degree")>>, followed by the upper secondary education level ("(high school) 29.03%") <<.

The increase in sales compared to before the pandemic is validated by a higher percentage with the response "agree" in the case of 146 managers, also 61.01% (same number of managers) mention that currently their profit is equal to + $20,000.00 considering the establishment as their main activity. Finally, 92.90% (222 pax) answered that their business is a formal enterprise.

Marketing

The results show that << 58.60% totally agree that they currently use digital distribution channels; a similar figure of 58.40% << with two persons difference, when assuring that they have an impact on their income from the use of technology.

On the other hand, 82% say that during the pandemic they increased their sales through the use of social networks such as Instagram, WhatsApp, Twitter or Facebook.

Sustainability

69.87% have had to invest in the infrastructure of the establishment without government support after the pandemic. As well as 92.05% (220 pax) during the pandemic implemented contingency measures in accordance with the authorities to achieve sales in the establishment.

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The company has implemented actions for the care and conservation of the environment and natural resources in a percentage of 87.03%. Also, they agree that the business performs the separation of rubbish and 81.59% that they use biodegradable bags, although unfortunately they answered that 09.62% (23 pax) of tourists care for the nature of pollutants such as rubbish, waste, paint, among others.

Customer care

In terms of customer satisfaction, 90.37% of the companies ensure that their employees receive training to guarantee improvements in the services provided, and 82.22% establish mechanisms to deal with complaints that are known through the results of satisfaction surveys. Finally, 79.21% of the establishments offer tourist services to their clients so that they can get to know different attractions in the locality.

Thanks

To all the students of the Higher University Technician in Gastronomy generation 2021 - 2023 for their important collaboration in the collection of data; to the students Luis Andri Reyes Bustos and Miguel Ángel Muñoz Barrera for the capture and validation of tables and graphs; finally, to the academic area for the opportunity to participate in the congress; all members of the Technological University of Acapulco.

Conclusions

Once the analysis of the results is done, it is concluded that several establishments had to implement new strategies to increase their sales during the pandemic, the social networks they used to generate their sales were through Instagram, WhatsApp, Twitter and Facebook. This suggests that food and beverage establishments are implementing technology as part of their services on a daily basis.

On the other hand, it was observed that companies in the tourism sector have implemented actions for the care and conservation of the environment and natural resources, without government intervention. This has been done to promote more sustainable tourism.

It is also important to point out that it is necessary to implement more strategies and campaigns for sustainable tourism, in which the government is the main actor and in turn interacts with the entire tourism sector and its population.

Finally, it is considered very important that all establishments should provide training to their employees in customer service and continue to provide adequate information on tourism services and local products. This is part of the competitiveness of a quality service.

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Export of vegetables in the rural development district of Tecamachalco, Puebla, within the framework of the USMCA

Exportación de hortalizas en el distrito de desarrollo rural, Tecamachalco Puebla, en el marco del T-MEC

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Abstract

This research addresses the problems faced by exporters of vegetables in the Rural Development District of Tecamachalco, Puebla. In the international framework of the USMCA, the marketing process is complicated due to the certification of the products that have to be regularized for export through SENASICA, HACCP, and PRIMUS LAB, whose marketing channels have been established through intermediaries, so it has created a disparity between the producer and the final consumer. The nationwide marketing chain has been identified in three supply centers: Huixcolotla, the City of Puebla, and Iztapalapa, in CDMX, in addition to municipal markets and local flea markets. Also, it was identified that the most important means of international marketing is through land transport, and the main border cities are: Tijuana, Nuevo Laredo, Matamoros, Mexicali, Nogales, and Ciudad Juárez. Finally, the fieldwork was carried out with producers of the region in the municipalities of Tecamachalco, Acatzingo, Tochtepec, Tlacotepec, Tepeaca, and Huixcolotla, where a sample of 185 producers was applied through a questionnaire, which was used as an instrument in the regional level survey.

Export, Vegetables, Intermediary, Commercialization, and Border

Resumen

La presente investigación aborda la problemática que enfrentan los exportadores de hortalizas en el Distrito de Desarrollo Rural de Tecamachalco, Puebla. En el marco internacional del T-MEC, el proceso de comercialización es complicado debido a la certificación de los productos que deben de estar regularizados para la exportación por medio de SENASICA, HACCP y PRIMUS LAB, cuyos canales de comercialización se han establecido por medio de intermediarios, lo que ha creado una disparidad entre el productor y el consumidor final. La cadena de comercialización a nivel nacional se ha identificado en tres centrales de abasto: Huixcolotla, la Ciudad de Puebla, e Iztapalapa en CDMX además de mercados municipales y tianguis locales, el mercado de hortalizas para la exportación es muy exclusivo. Se identificó que el principal medio de comercialización internacional es mediante transporte terrestre y las principales ciudades fronterizas son: Tijuana, Nuevo Laredo, Matamoros, Mexicali, Nogales, Ciudad Juárez. El trabajo de campo se realizó con los productores de la región en los municipios: Tecamachalco, Acatzingo, Tochtepec, Tlacotepec, Tepeaca y Huixcolotla, donde se aplicó a una muestra de 185 productores mediante un cuestionario que fungió como instrumento en una encuesta a nivel regional.

Exportación, hortalizas, Intermediario, comercialización, frontera

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Introduction

This paper addresses the performance of Mexico's vegetable exports to the USA, with the objective of assessing the competitiveness of the main vegetable products in the US markets, by contrasting the national and regional markets, in the period 2022. This document is divided into four sections:

1. Literature review, this section reviews different regional studies on vegetable exports that address the different regional studies on the object of study.

2. Methodology, which explains the theoretical underpinning of the methodological development, the sample design.

3. Results, this section presents the results obtained in the survey applied to the producers of the region in the Rural Development District of Tecamachalco, the marketing channels, the marketing routes, the production of the main vegetable crops, main border cities, states of the American Union that present the demand for vegetable crops, and the main markets of the region.

1. 4 Conclusions and References.

Literature review

Mexico has been the main supplier of fresh vegetable imports to the United States. Today, this dynamic and competitive trade has led to other countries also having a presence in the US fresh vegetable markets. Such is the case of: Canada, Honduras, Dominican Republic, Spain and Holland, which stand as some examples of the competition faced by Mexican exports, to such an extent that they concur with homogeneous product in terms of: health, quality and safety, eventually influencing a reduction of the market share that our country was serving. (Borbón, et, al, 2018: 43.) The comparative advantages among vegetable producing countries are established on the basis of climate, soil fertility, labour, inputs, availability of irrigation water.

One of the main problems faced by producers in the state of Puebla is the lack of diagnostics for the design of public policies, because the lack of technical assistance and financing is reflected in the volumes of production and sales, the export context is very limited to certain producers who have the requirements for international marketing, Only a few producers can have access to international trade in vegetables; certifications range from irrigation water analysis, field crops, food safety, traceability of batches, the cold chain to maintain the products at a certain temperature until they reach the final consumer, are some of the difficulties to be able to market in the different marketing channels.

Comparative advantage is a concept of great importance for economic theory, since with an empirical measurement it is possible to identify the direction and intensity with which a country invests and trades with a product, good or service, thus taking advantage of the difference it possesses in a factor or product with respect to other countries. Similarly, with a disaggregated calculation of this type of advantage, socially desirable specialisation patterns can be assessed (Vollrath, 1991). Comparative advantages in the T-MECS are not only important for manufacturing in the industrial sector, the agricultural sector in Mexico is also a business opportunity, in terms of competitiveness, which is why this paper addresses the macroeconomic context and competitiveness in international trade.

In the T-MEC Framework, Chapter 3, Agriculture of the T-ECM, establishes in Article 3.7 the Agricultural Trade Committee and in Article 3.8 the Agricultural Advisory Committees. (T-MEC, 2018: 149-151).

Article 3.7: Committee on Agricultural Trade

1. The Parties hereby establish a Committee on Agricultural Trade (Agricultural Committee), composed of representatives of each Party.

2. The functions of the Committee on Agriculture shall include: (a) promoting trade in agricultural goods between the Parties under this Agreement; (b) overseeing and promoting cooperation in the implementation and administration of this Chapter; (c) providing a forum for the Parties to consult and seek to address trade issues or barriers and to improve access to their respective markets, in

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coordination or in conjunction with other committees, working groups, or any other subsidiary bodies established under this Agreement; and (d) seeking to exchange information on trade in agricultural goods between the Parties, including information covered by Article 3. 10. 1 (Transparency and Consultations) or any other relevant transparency provisions in this Chapter; (e) foster cooperation between the Parties in areas of mutual interest, such as rural development, technology, research and development, and capacity building, and the creation of joint programs as mutually agreed between the agencies involved in agriculture, among others; (f) carry out additional tasks, including those that may be assigned to it by the Commission or referred to it by any other committee; (g) recommend to the Commission any amendments or additions to this Chapter; and (h) report annually to the Commission on its activities.

3. The Agricultural Committee shall establish its terms of reference at its first meeting and may revise those terms as necessary.

4. The Agricultural Committee shall meet within one year of entry into force of this Agreement and once a year thereafter, unless the Parties decide otherwise.

Article 3.8: Agricultural Consultative Committees

1. The activities of the Agricultural Advisory Committees (AACs) set out in:

(a) the Terms of Reference of the Canada-U.S. Agricultural Consultative Committee pursuant to the Memorandum of Understanding between the Government of the United States of America and Canada Regarding Agricultural Trade Areas (ROU) of December 4, 1998;

(b) the Memorandum of Understanding between the United States Department of Agriculture and the Office of the United States Trade Representative, and the Secretaría de Agricultura, Ganadería, Desarrollo Rural y Pesca y Alimentación de los Estados Unidos Mexicanos Relating to Food and Agricultural Trade Areas (US-MX MOU) of 1 October 2001 and re-established on 6 March 2007; and (c) the Memorandum of Understanding between the United States Department of Agriculture and the Office of the United States Trade Representative, and the Secretaría de Agricultura, Ganadería, Desarrollo Rural y Pesca y Alimentación de los Estados Unidos Mexicanos Relating to Food and Agricultural Trade Areas (US-MX MOU) of 1 October 2001 and re-established on 6 March 2007;

and (c) the Memorandum of Understanding between the Secretaría de Agricultura, Ganadería, Desarrollo Rural y Pesca y Alimentación de los Estados Unidos Mexicanos and the Department of Agriculture and Agribusiness Canada for the Establishment of the Mexico-Canada Agricultural Consultative Committee (MDE MX-CA) of February 1, 2002 and re-established on March 6, 2006, shall, upon entry into force of this Agreement, be organised in accordance with this Agreement.

1.The CCAs shall be governed and operated in accordance with the respective ROU or MOU and all implementing or administrative documents, including any amendments thereto.

2.The CCAs may report to the Committee on Agriculture, the Committee on Sanitary and Phytosanitary Measures, or the Committee on Technical Barriers to Trade on their activities.

The treaty was signed on 30 July 2018, to enter into force on 1 July 2020, the treaty is intended to keep the efforts of these 3 countries in an international trade environment at the forefront of the global market.

Moreno, 2015, in his research determines the comparative advantages between Mexico, China and the USA, in a global market, analysing the demand for agricultural products in the various marketing channels, that is, at the forefront of international trade.

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Mexico and China have the best prospects for growth in the US agricultural market. China has concentrated its trade in the categories and sub-categories containing the products with the longest shelf life and in processed products; in some cases its growth has been thanks to the loss of the Canadian market. In this sense, despite the fact that Chinese exports of fresh fruit and vegetables to the United States have grown in absolute and relative terms, especially in the case of vegetables, the subcategories are different from those exported by Mexico, so there is no direct competition between China and Mexico globally, although it is relevant locally, as some of the products exported by China are important for some regions of Mexico, such as garlic, onions and spring onions. On the other hand, Chinese exports face important obstacles, such as safety, mainly related to pesticide and antibiotic residues, as well as the depletion of aquifers and the possible appreciation of the Chinese currency (Moreno, et al, 2015:145).

One of the contributions in international trade are the clusters, in the case of northern Mexico due to its proximity to the USA, the marketing chains have been structured according to the demand for agricultural products, an investigation carried out in Baja California Norte in the export of tomatoes shows us the opportunities, in a study carried out in the Rural Development District 001 in Ensenada in the valleys of San Quitín and Meneadero, a methodology is used to carry out a regional diagnosis:

a cluster is understood as the associativity of companies in the same sector or activity operating within a radius of 300 km in which service providers, suppliers of raw materials, any entity related to the sector, and the government are interconnected in order to obtain competitive advantages. Cooperation is a practice that characterises industrial organisation through clusters and is an exercise contrary to the basic principles that govern capitalist enterprise, whose activity is based on competition (Velázquez, et al., 2012: 46).

Currently, there are many advantages of tomato production in Mexico, such as those derived from the North American Free Trade Agreement (NAFTA), since Mexican producers (Sinaloa and Baja California) have lower production costs than their main foreign competitors, according to their comparative and competitive advantages. However, their weaknesses are evident, which affect the sector due to: the concentration of exports in the United States, the low participation of Mexican businessmen in marketing, and the fact that they have not been able to penetrate the market with processed products; in addition, there is a marked dependence on other agents, as seed, machinery and other indispensable inputs for production are imported (Macías, 2003).

Another issue to be addressed are the networks of producers and marketers, although in the process of production and marketing of vegetables, they are not homogeneous, asymmetries are recurrent, in addition to the levels of investment and availability of resources, Lugo Morín, 2011, indicates:

Within horticultural production there are various social and economic actors; from producers, suppliers of agricultural goods and services and marketers (local intermediaries and trading companies, exporters and agro-packers). These groups of actors have led to struggles for the appropriation of the economic surpluses generated by the horticultural system, observed in relations of negotiation and subordination, forming asymmetrical social networks. These asymmetrical social networks are formed between differentiated social groups and their axis is economic motivation. While symmetrical social networks are those that occur between social groups of equal status and their articulating axes are kinship, friendship, neighbourliness or geographical proximity, as well as religion or cultural aspects (Lugo Morín et al., 2011).

Agricultural activity in the RDD of Tecamachalco, Puebla, is strategic, since around 158,000 ha are planted, 36% of which are irrigated, the rest being rainfed (SIAP, 2012). According to these statistics, the Rural Development District (RDD) of Tecamachalco is characterised by the production of vegetables, mainly under the irrigation modality thanks to the availability of more than 700 deep water wells in the region (CONAGUA, 2009).

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In the state of Puebla, the economic and social importance of this group of vegetables is considerable due to their level of profitability, sown area, jobs generated, investment required in the purchase of raw materials and inputs for production and harvesting (Arvizu et al., 2014). The importance of determining the social networks will allow us to create associations with established objectives to enter national and international markets based on the laws in force, or to apply technology transfer schemes appropriate to the regions according to their production needs.

Methodology

The information collected was classified into primary and secondary, the first concerns obtaining information through questionnaires, interview forms, research guides, ordinary observation, the second refers to that which is extracted from documentary sources, censuses, vital statistics, through statistical tables, the secondary information serves as a basis for the analysis of the problem, in the collection of information producers and leaders of organisations in the region were interviewed who provided first-hand information on the different aspects of the study.

The field work was carried out by means of a random sample of producers with which it is possible to make inferences from the results obtained in the survey applied to the target population.

Technique and instrument used

The technique of either survey, structured interview, or observation has its own limitations in the research. The survey was used to explore certain aspects of the population, observation and key informant interviews were also required. As far as experience in economic studies is concerned, the selected technique was the survey, this technique consists in the collection of a part of the population called sample, data, opinions, through questions formulated on various indicators, the information obtained is processed in a quantitative analysis, in order to identify and know the magnitude of the problem, the instrument used was the questionnaire.

In such a way that the elaboration of the questionnaire directed towards representatives of organisations and producers, where the questions formulated were directed to know the specific aspects of the variables, the exploration of the same can be with one or more questions and sometimes a single question was used to investigate in one or more variables.

The collection of information from secondary sources

The first phase consisted of the collection of bibliographical information referring to the research problem in books, newspapers, theses and magazines, in the libraries of the B.U.A.P., El Colegio de Postgraduados and newspaper libraries. Subsequently, secondary or statistical information was collected in I.N.E.GI. (Censuses, Yearbooks and municipal notebooks) in the city of Puebla, as well as the consultation via Internet of the official pages of I.N.E.G.I., SADER, for this stage the method of bibliographic synthesis was used, using the instrument called bibliographic work sheet, with the obtained information a data base will be made to interpret the situation of the coffee production at national, state and municipal level.

Recording of information collected through direct observation

The second phase involved trips to the study municipalities, in order to have contact with key informants: municipal authorities, representatives of farmers' organisations, intermediaries and producers. The purpose of this activity was to identify the regional marketing channels, as well as to identify the main points of sale, in central supply centres inside and outside the State of Puebla, and to find out where these organisations sell the product at wholesale and retail.

Registration of direct information from primary sources

The third phase consisted of the elaboration of questionnaires to be applied in the organisations in the municipalities of study, the interviews were carried out in the second half of July and the first half of August, applied in the municipality of Tecamachalco. The interview technique was used, using a field notebook and questionnaire guide.

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Coding and processing of the information

The next phase was the emptying of the information obtained in the questionnaires into tabular sheets, to create a database by key, after which the data was analysed in the program Statstical Pachage for the Social Sciences (S.P.S.S.).

The sample design

The sample size of producers

When analysing the information it was determined that the appropriate sampling scheme for these data was a sampling for complex studies, due to the differences in the population sizes of each stratum it was decided to allocate proportionally to each of the municipalities.

The sample design (Rojas, 2013: 304) was carried out according to the methodology in the sample design for "complex studies".

a). A small population, less than 10,000 elements.

b). Several groups among which the sample will be fixed.

c). A questionnaire with more than 50 questions.

d) Numerous open questions

Where: N=2,325 Producers in the study region. This is an estimate, based on the number of hectares. In Puebla there are 487,000 agricultural producers (SDR 2023).

Z is the confidence level = 1.96, Error level 10%, probability p = .6 and q = .4.

$$n = \frac{\frac{Z^2 q}{E^2 p}}{1+\frac{1}{N}\left[\frac{Z^2 q}{E^2 p}-1\right]}$$

$$n = \frac{\frac{(1.96)^2(0.4)}{(.10)^2(0.6)}}{1+\frac{1}{2{,}325}\left[\frac{(1.96)^2(0.4)}{(0.10)^2(0.6)}-1\right]}$$

n = 255 The survey was applied to 185 producers.

The survey was applied to 185 producers.

The fieldwork was carried out in the Rural Development District of Tecamachalco, in the municipalities of Tecamachalco 26%, Quecholac18% Acatzingo 15%, Tochtepec 14%, Tepeaca 10%, Huixcolotla 9%, Tlacotepec 8%. In the first half of 2023.

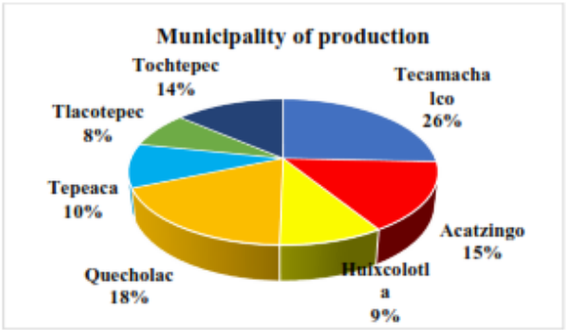

Figure 1
Source: Own elaboration, obtained in the field, 2023.

Figure 1 Broccoli crop
Source: Own elaboration, obtained in the field, 2023

The research was carried out in the field, with vegetable producers, who use greenhouses and most of them are in the open air, in the municipalities of the Rural Development District of Tecamachcalco, where the region has irrigation systems, and innovative methods and techniques in intensive production, also the strategic location of the supply centres of Huixcolotla, Puebla and Mexico City, the markets are predominantly local, due to the connectivity between federal roads and highways, between the capital of the Mexican Republic and the southeast. The road network is one of the strategies in the commercialisation process.

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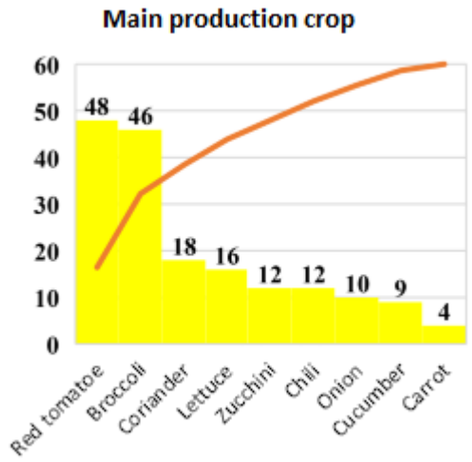
Figure 2 Field research
Source: Own elaboration, obtained in the field, 2023.

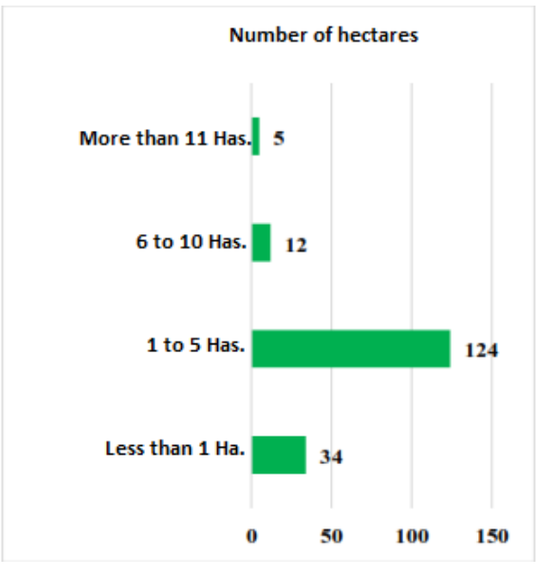
The main crops produced were as follows: 48 cases red tomato, 46 cases broccoli, 18 cases coriander, 16 cases lettuce, 12 cases courgette, 10 cases onion, 9 cases cucumber, and 4 cases reported carrot production, the production corresponds to the demand that is presented in the market, the information obtained in the field, shows us the production at regional level that is produced according to the established markets.



Graphic 2
Source: Own elaboration, obtained in the field, 2023.

Figure 3 Greenhouses
Source: Own elaboration, obtained in the field, 2023

The number of hectares cultivated in the representative sample, which has the highest frequency is from 1 to 5 hectares, with 124 cases, 34 producers reported that they produce in less than 1 hectare, the frequency of 6 to 10 hectares was indicated in 12 cases and only 5 producers produced in more than 11 hectares, which indicates that the production is not in large extensions, most of the production is between 1 to 5 hectares.



Graphic 3
Source: Own elaboration, obtained in the field, 2023

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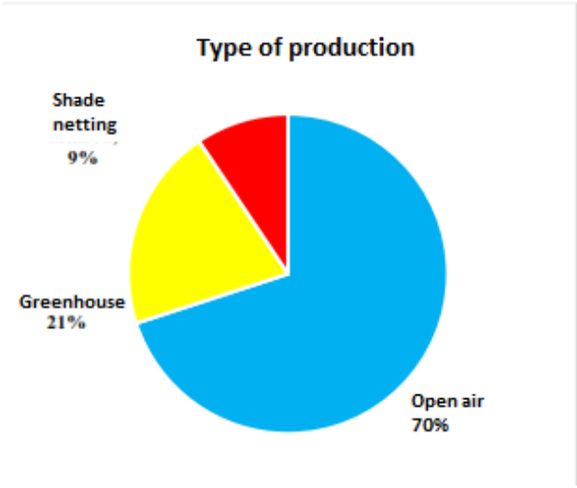
As far as production is concerned, 70% produce in the open air, 21% in greenhouses and 9% in shade nets, which shows that vegetable production is extensive and not intensive.



Graphic 4
Source: Own elaboration, obtained in the field, 2023.

According to the volume of production, the crop with the highest production in tonnes is broccoli with 540.8 tonnes, followed by onion with 419.5 tonnes, tomato with 374 tonnes, lettuce with 236.5 tonnes, carrot with 157 tonnes and chilli with 147 tonnes, and the rest of the crops produce less than 100 tonnes. This allows us to analyse the demand among the main products in the market. The main range of hectares per producer is 1 to 5 ha.

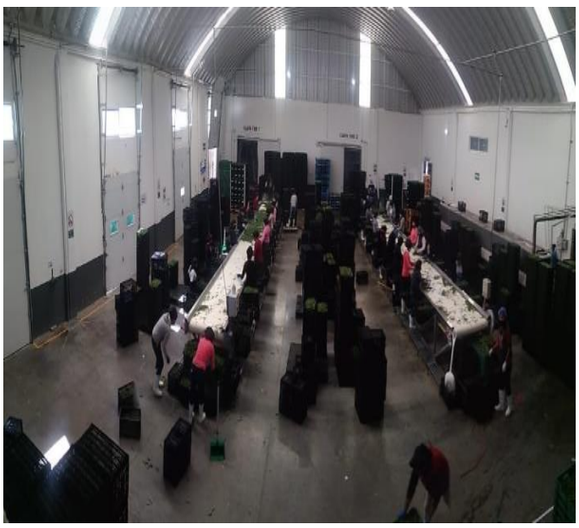
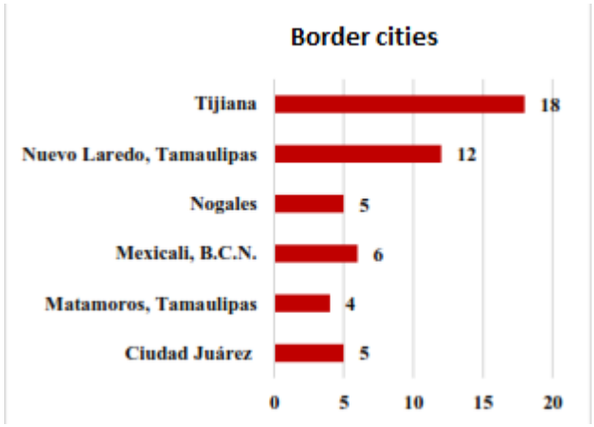


Figure 4 Packing house
Source: Own elaboration, obtained in the field, 2023

Figure 5 Marketing process
Source: Own elaboration, obtained in the field, 2023

The main border cities for the commercialisation of vegetables are the following: Tijuana 18 cases, Nuevo Laredo Tamaulipas 12 cases, Mexicali, Baja California Norte, 6 cases, Nogales Sonora, 5 cases, Ciudad Juarez Chihuahua, 5 cases and Matamoros Tamaulipas with 4 cases.



Graphic 5
Source: Own elaboration, obtained in the field, 2023

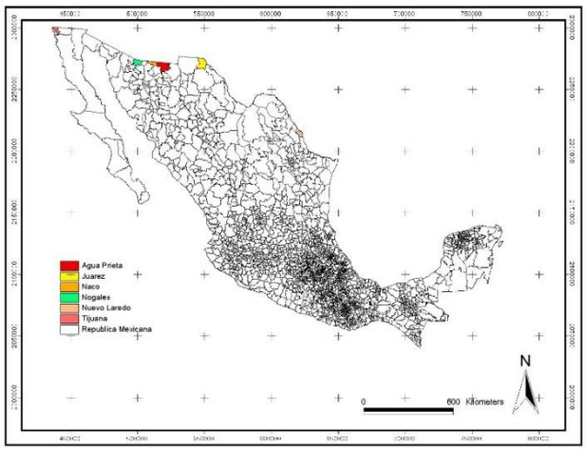


Figure 6 Border cities
Source: Own elaboration, obtained in the field, 2023

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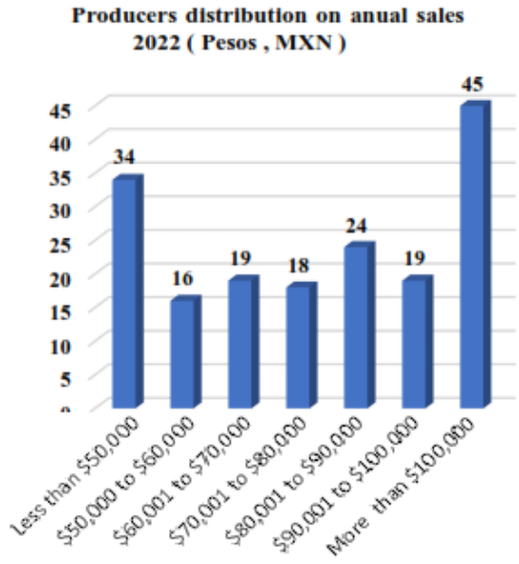
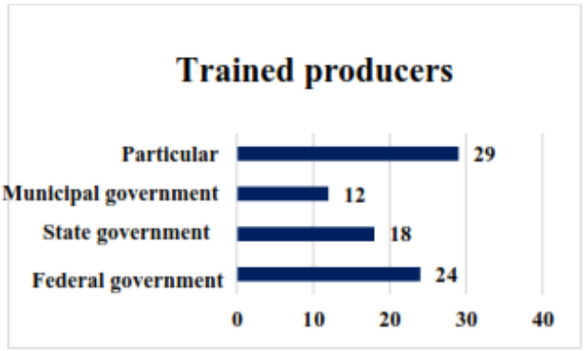
The main US states detected in the field research were the packing houses and intermediaries that have certifications to be able to export, only one case was found of a packing house that started with the procedures to export broccoli to Canada, the main states of the American Union were the following: California 17 cases, Texas 12, New Mexico 9, Arizona 7, Illinois 5, Florida 4 and 3 in New York, this indicates that the main market are the border states and part of the east coast of the USA.

Graphic 6
Source: Own elaboration, obtained in the field, 2023

In terms of annual revenues in 2022, 45 cases reported sales greater than $100,000 MXN, 19 cases from $90,001 to $100,000 MXN, 24 cases from $80,001 to $90,000 MXN, 18 cases from $70,001 to $80,000, 19 cases from $60,001 to $70,000 MXN, 16 cases from $50,001 to $60,000 and 34 cases reported less than $50,000 annually.

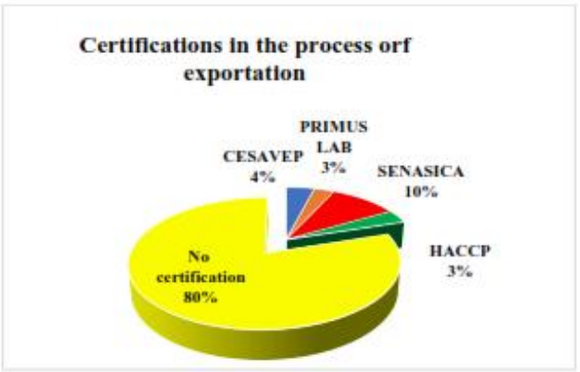


Graphic 7
Source: Own elaboration, obtained in the field, 2023



Graphic 8
Source: Own elaboration, obtained in the field, 2023

Regarding training, 29 cases indicated that they received technical assistance in a particular way, 24 cases through the federal government, 18 through the state government and 12 through the federal government, the rest did not receive any training, this is another of the problems in the vegetable export value chain, due to the lack of technical assistance that allows better control of quality from planting, harvesting and post-harvesting.



Graphic 9
Source: Own elaboration, obtained in the field, 2023

The main problem is certification because traceability goes from irrigation wells and crops, the value chain is registered with quality control up to the packing plants and customs before entering the United States. 80% of the producers interviewed are not certified, 10% are certified by SENASICA, 4% by CESAVEP, 3% by PRIMUS LAB and 3% HACCP, 3% in PRIMUS LAB and 3% HACCP, quality control in the processes is what allows to obtain markets at national and international level, food safety and traceability of the same is the way in which producers obtain better economic benefits, with the above mentioned, it is necessary the transfer of technology in terms of certification.

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Conclusions

In the study region most of the production is in the open air, 70%, greenhouse 21%, shade net 9%, so there is a great opportunity in the technification of irrigated agriculture, according to the results obtained, the main vegetable crops are: Red tomato, broccoli, coriander, lettuce, courgette, chilli, onion, cucumber and carrot, the main border cities in the marketing channels: Mexicali, Tijuana, Baja California Norte, Ciudad Juárez, Chihuahua, Nogales Sonora, Nuevo Laredo and Matamoros Tamaulipas. The main US states with which the producers of the Rural Development District of Tecamachalco trade are: Arizona, California, Florida, New Mexico and New York.

It is important to consolidate an agricultural policy for the consolidation of greenhouse production, for the production of vegetables with their respective transfer of technological packages in order to not only reinforce Mexico's competitiveness as a country, but also to promote the development of the regions through economic development and job creation. The design of public policies should be based on a diagnosis, to determine the problems, the variables that can be measured and evaluated with respect to the impact obtained for the production and commercialisation processes of vegetables, from the federal, state and municipal levels.

In the Rural Development District of Tecamachalco, the main market is national, the main supply centres in which they commercialise are: Huixcolotla, Puebla and Iztapalapa in CDMX, the purpose to promote the export of vegetables is to carry out good practices, traceability, certification, to have access to international markets.

The comparative advantages, so that regional agricultural development must be understood as a cross-cutting issue in which the institutions CONAGUA, SADER, as well as the interaction with foreign trade institutions such as the USDA in the USA, must intervene together to analyse the demand for fresh produce, within the framework of the TMEC. One of the main problems in the export of vegetables is certification, which is one of the requirements for the export of vegetables.

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Objectives
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† Researcher contributing as first author.

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

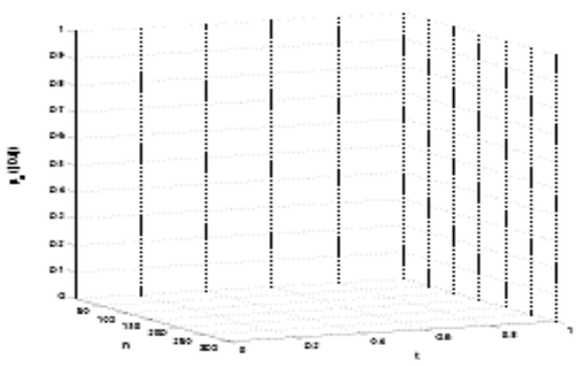
[Title No.12 in Times New Roman, single spaced and bold]

Products in development No.12 Times New Roman, single spaced.

Including graphs, figures and tables-Editable

In the article content any graphic, table and figure should be editable formats that can change size, type and number of letter, for the purposes of edition, these must be high quality, not pixelated and should be noticeable even reducing image scale.

[Indicating the title at the bottom with No.10 and Times New Roman Bold]



Graphic 1 Title and *Source (in italics)*

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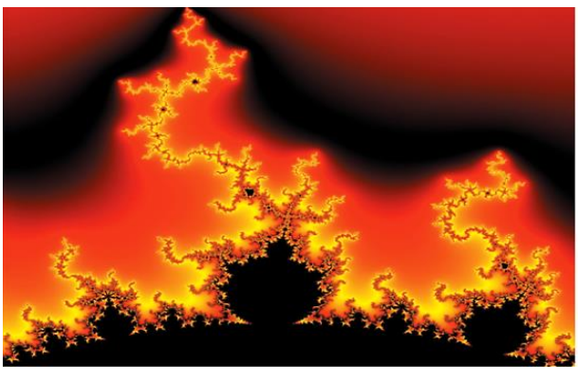

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Each article shall present separately in **3 folders**: a) Figures, b) Charts and c) Tables in .JPG format, indicating the number and sequential Bold Title.

For the use of equations, noted as follows:

$$Y_{ij} = \alpha + \sum_{h=1}^{r} \beta_h X_{hij} + u_j + e_{ij} \quad (1)$$

Must be editable and number aligned on the right side.

Methodology

Develop give the meaning of the variables in linear writing and important is the comparison of the used criteria.

Results

The results shall be by section of the article.

Annexes

Tables and adequate sources

Thanks

Indicate if they were financed by any institution, University or company.

Conclusions

Explain clearly the results and possibilities of improvement.

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References

Use APA system. Should not be numbered, nor with bullets, however if necessary numbering will be because reference or mention is made somewhere in the Article.

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Each article must submit your dates into a Word document (.docx):

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2. Description of the method
3. Analysis from the regression demand curve
4. Results
5. Thanks
6. Conclusions
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