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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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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.

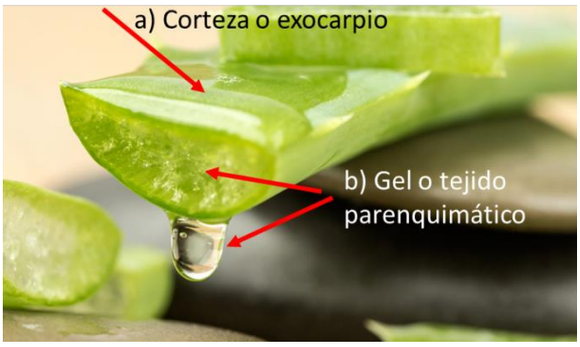

Figure 2 Aloe vera leaf structure
Source: Own elaboration

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.

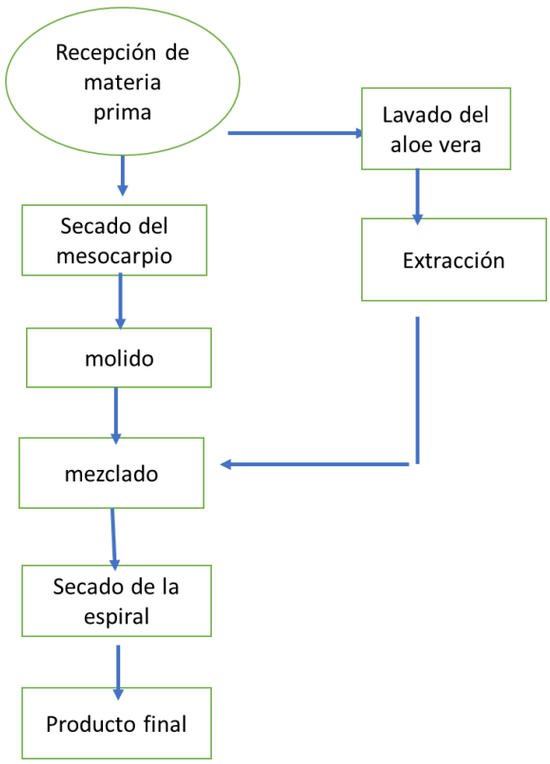

Figure 2 Flow chart
Source: Own elaboration

Figure 3 Ground coconut tow
Source: Own elaboration

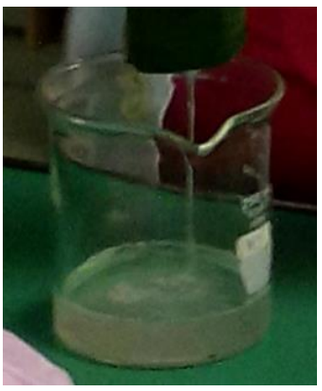

Figure 4 Aloe Pulp
Source: Own elaboration

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.

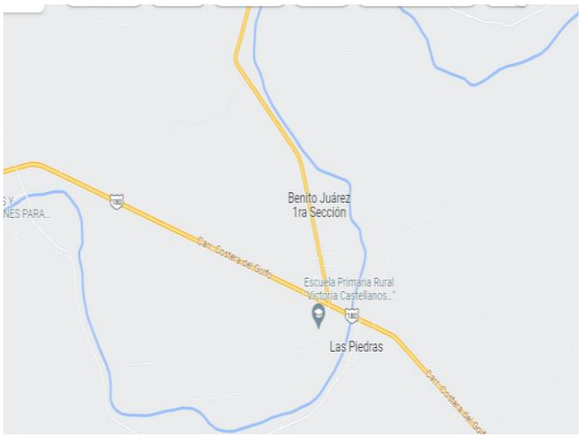

Figure 8 location ejido las piedras
Source: Google maps

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.

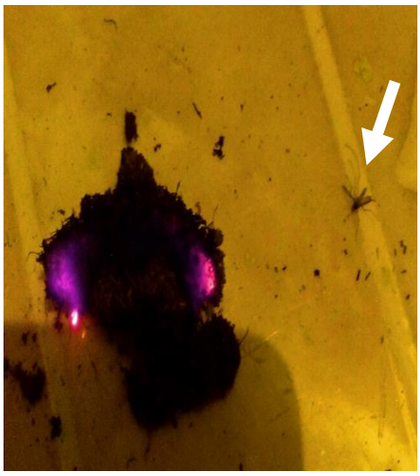

Figure 12 spiral burning
Source: Own elaboration

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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.

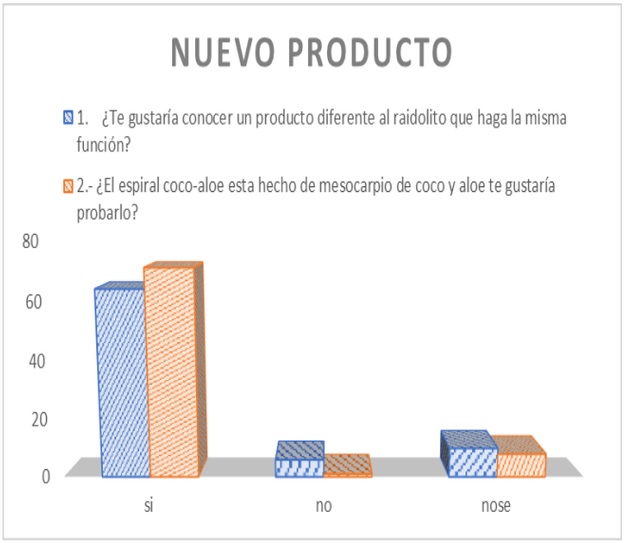

Figure 13 graphs to get to know a new product
Source: Own elaboration

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.

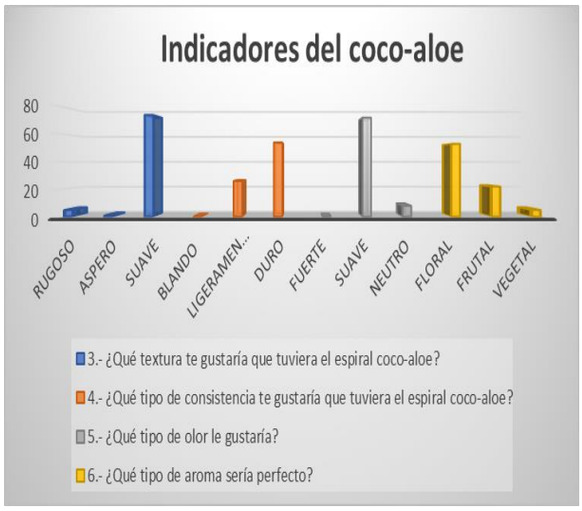

Figure 14 Graphs of the spiral indicators
Source: Own elaboration

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

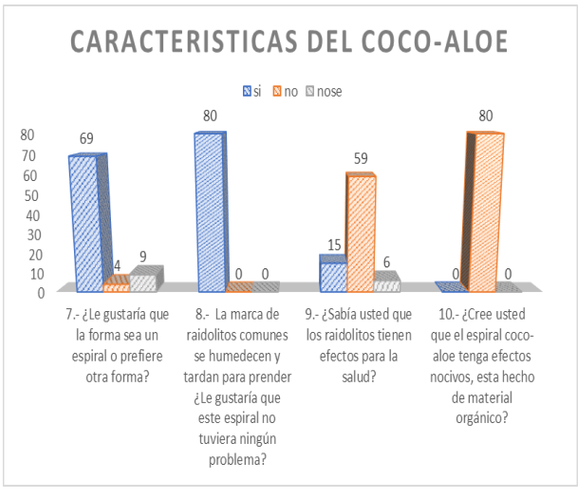

Figure 15 Coco-aloe spiral characteristics graph
Source: Own elaboration

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.

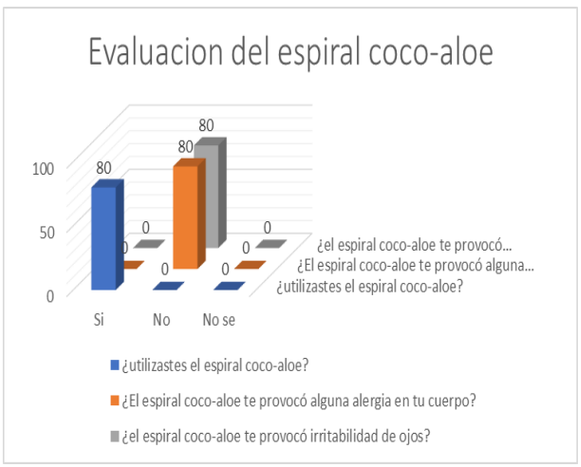

Figure 16 Graph of evaluation of the coco-aloe spiral by the people who used it
Source: Own elaboration

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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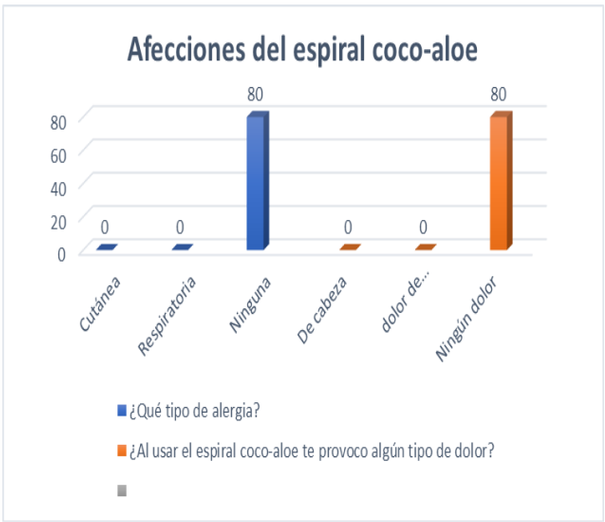

Figure 17 graph of the evaluation of conditions of the coco-aloe spiral by the people who used it
Source: Own elaboration

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.

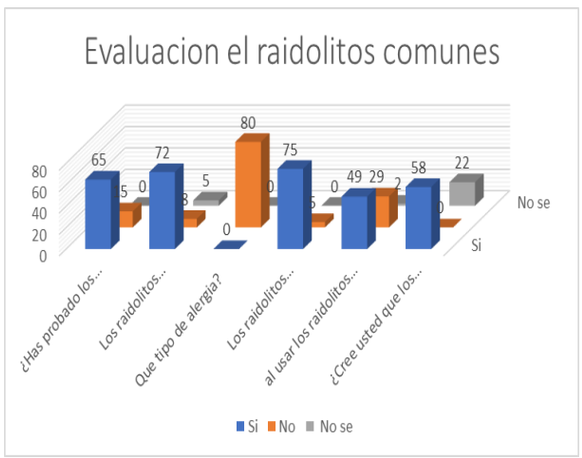

Figure 18 Evaluation graph of common raidoliths
Source: Own elaboration

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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