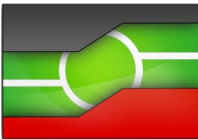
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## GENERAL INFORMATION

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**Name:**

Miguel Angel Echeverri

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**Project title:** Creation of an organic preservative through the avocado seed variety *persea americana* to improve the quality of fruits and vegetables.

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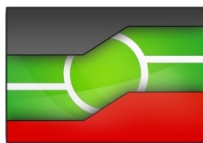
**Training line:**

Biotechnology

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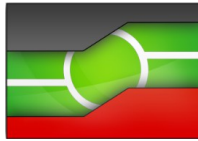
**Project duration:** 2 years

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## Summary

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### 1. Description of the problem and research question


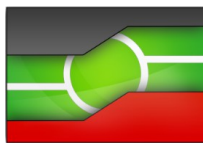
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#### 1.1 Description of the problem

The decomposition of food happens mainly as a result of chemical reactions, the product of these reactions, which generate toxins harmful to humans. Some of them are formed in a natural pesticide way to prevent insect attacks, in a similar way to protect the edible fruit from damage that may be generated by different climates, sunlight or microbes. It should be noted that the causes of some of these toxins are still unknown. According to a study conducted by food hygiene, a website in 2018 expressed: "something similar happens with natural toxins, which are compounds produced by living organisms, which can be harmful, to other creatures, including humans. *Natural toxins in food, what are they and where are they found?*" Perez , R., P. (2018, April 9).

Among the organisms that produce toxins were found algae, plants and fungi, which can reach the consumer by ingesting them directly or indirectly through animals that have digested them or contaminated food. As a consequence, some experts such as Ed Blonz, a health professional, especially in human nutrition, announced in an article published by the

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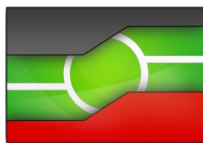
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American Cancer Society site, "that the doses found in some edibles are not cause for concern, however, health authorities in several countries recommend caution with foods containing the following toxic substances." *Radium (2015). Referring to toxic substances found naturally in fruits and vegetables.*

This problem is diagnosed by the WHO, where a fact sheet, published on May 5, 2018, on the eight most common groups of natural toxins, which can affect food safety and pose a health risk, can be referenced. Several of these groups are: **cyanogenic glycosides**; substances produced by at least 2,000 plant species, some of which are used as food in certain parts of the world: mainly found in cassava, stone fruits, bamboo roots and almonds. *(Natural toxins in food.) [NTF] (2018)*

On the other hand, contaminated substances can result in food poisoning, as most of these preservatives produce chronic diseases, that is how much that are added to many food products can cause respiratory distress or aggravate symptoms. *Healthychildren. (2015). Food poisoning and contamination....*

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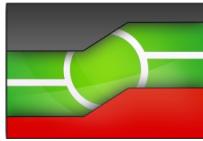
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According to an InChem study on carcinogenesis, preservatives and additives, many of these elements are transformed into toxic substances upon digestion, as nitrites and nitrates in vegetables, to delay spoilage and the growth of pathogenic bacteria, when combined with juices and stomach enzymes, can be converted into cancer-causing agents, so they have been listed as probable human carcinogens under conditions where endogenous nitrosation could take place, i.e., process of converting an organic compound containing the NO functional group (part of the molecule responsible for its chemical behavior, as it gives it characteristic properties). *Citizen. (2016). Harmful effects of preservatives in food.*

Although this is diagnosed by the magazine "Come bien" where it can be referenced that a fundamental aspect to take into account is the harmful effect that these have on the digestive process, as it not only affects the intestinal and stomach flora but also the mouth which hinders the digestion of food. In other words, it could be causing problems of irritable bowel syndrome, which is increasing in the population; similarly, we can see how it has caused major diseases in minors. *Eat well (2015). Preservatives and their harmful effects on health.*

"These additives are being studied and the Joint FAO/WHO Expert Committee on Food Additives (JECFA) has evaluated benzoic acid and its salts on several occasions and found.

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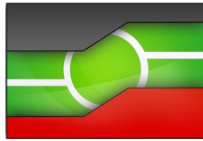
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that are acceptable for use in food, but nevertheless research continues. On the other side of the coin, Professor Peter W Piper, a researcher at the University of Sheffield, England, has found that sodium benzoate, used as a preservative in many foods, destroys the DNA of cellular mitochondria, causing a strong aging process. On the other hand, it can trigger liver cirrhosis and degenerative diseases such as Parkinson's disease (*World Health Organization.*) [WHO] (2018). *Food additives.*


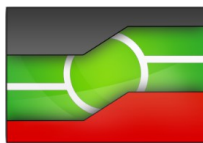
**Most common preservatives and harmful toxins in (Colombia, Medellín, you decide, local is better)**

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Conservantes más comunes	Frutas y verduras donde se usan frecuentemente	Consecuencias de las toxinas nocivas de los conservantes.
Dióxido de azufre	se usa generalmente en zumos y frutos secos	se asocia a problemas de asma y bronquitis
Ácido acético	principalmente encontrado en el vinagre	Puede ser irritante en el tubo digestivo
Ácido sórbico	frecuentemente se usan en los quesos y la mermelada, pero también se encuentra en algunas frutas	Poca toxicidad y no presenta efectos en el cuerpo.

With reference to the description of the problem, it can be understood that most of the additives or preservatives applied to fruits and vegetables, reflect some consequences

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The present project aims to investigate and develop an organic preservative with the *Persea americana* variety, colloquially known as avocado, which is the main ingredient of the avocado. Based on the problems raised, this project aims to investigate and lead to the development of an organic preservative with the *Persea americana* variety, colloquially known as avocado, being this the main ingredient. This preservative will fulfill the function of the traditional preservatives for fruits and vegetables, that is, to maintain the freshness and quality of the product in which it is applied, with the important difference that it will not contain toxins harmful to human health, allowing a contribution to the prevention of chronic diseases.

## 1.2 Research question

How to elaborate an organic preservative through the avocado seed of the *Persea America* variety to improve the quality of fruits and vegetables?

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## 2. General and specific objectives


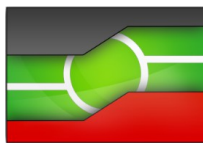
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### 2.1 Overall objective

To elaborate an organic preservative through the avocado seed variety *persea americana* by means of the maceration method to improve the quality of fruits and vegetables free of toxins harmful to human health.

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## 2.2 Specific objectives

1. Identify which chemicals in traditional preservatives produce toxins that are harmful to human health, through an exhaustive literature review.
2. To extract and characterize the organic preservative based on avocado seed variety *persea americana* by means of cold maceration, in order to obtain better antioxidant activity.
3. Evaluate the effectiveness of the organic preservative produced, by observing and recording data that shows the product before and after its application on fruits and/or vegetables.


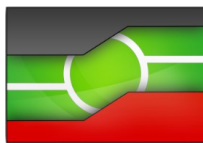
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## 3. Rationale and impact social/environmental

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The purpose of this research is to study the deterioration of foods due to the use of chemical preservatives, whose main cause is to attribute deficiencies in food production. Although it is important to note that over the years it has been shown that the use of this type of antioxidants has had or has generated a negative impact on human health, causing chronic diseases, among which are: cancer, cardiovascular diseases, among others.

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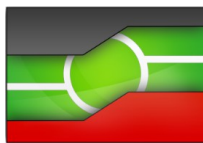
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On the other hand, the human being has seen the need to manifest a solution to this, due to the growth that is evident with respect to consumerism, i.e., rush to get more and more things, even much more than what is actually needed, And with this has manifested the obligation to generate a much longer period of duration in those foods that are consumed in a society in their daily lives, due to the way we live today, which has generated a kind of shortage in finding foods that can be kept for longer in a refrigerator or cupboard.

Similarly, most food companies use chemical preservatives to make foods fresher and more attractive, although some are often harmful because of the use of chemicals that are not necessarily fit for human consumption, causing problems for consumers and causing foods affected by these preservatives to lose the necessary nutrients, resulting in a negative impact on human health.

With reference to this, we will try to provide an alternative solution to this problem, through the creation of an organic preservative through the avocado seed variety *Persea americana*,

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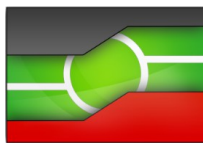
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The result is expected to have a better impact than those chemical preservatives commonly used in fruits and vegetables, although in this case it does not manifest an attribution of deficiency in food production. In this way, the quality of fruits and vegetables is improved, and an alternative solution or improvement to human health is provided, which has sometimes been threatened by the impact of some antioxidants. The project will have a social/environmental impact because it proposes to enter the industry with an "organic preservative" that allows the correct maintenance of food and the elimination of toxic agents for human health. Preservatives are one of the methods commonly used in processed foods to prevent spoilage, which are created by microbial growth or chemical alterations.

Taking into account that the basis of the project is the creation of an organic preservative that improves the quality of food, a great social impact can be evidenced, since an alternative is being implemented to avoid some affections caused in the human being by foods that present a deficiency in conservation, This means that most of the components that are added to many food products can cause chronic diseases, which means that when ingested they are transformed into toxic substances, that is, contaminated substances that can result in food poisoning, as a consequence of the fact that most of these preservatives produce chronic diseases.

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respiratory distress or aggravate symptoms, as well as cancer, heart, or stomach disease. *Vix. Laura Yabrun (n.d.) Harmful effects of food preservatives.*

On the other hand, when chemical preservatives are implemented in food, it should be taken into account that they are made from artificial contaminants which are harmful to the environment, generating in a certain way a great consequence in environmental pollution, since they contain a great capacity to contaminate water, air or soil. This fact is aggravated by the use of pesticides, pharmacological substances, fertilizers and other chemical products used in the industry.

The implementation of an organic preservative is a fundamental step to avoid this type of situations that occur both at a social and environmental level, preventing chronic diseases in human beings, even generating a great contribution to reduce environmental pollution, i.e., simplifying the pollution of soil, air and water on the planet.


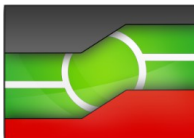
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#### **4. Background and theoretical framework**

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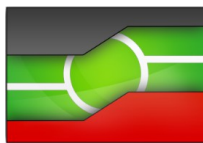
#### **4. Background:**

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Faour(2015) proposes to identify the different antioxidants contained in avocado. The avocado tree (*Persea americana* Mill.) is a tree native to Central America that has adapted well to tropical and subtropical zones. The main crop consumed worldwide is the "Hass", which has characteristics in terms of aroma, flavor, color and texture that make it quite attractive to consumers. It is also a good source of phytochemicals, such as monounsaturated fatty acids, vitamin E and sterols, which have been inversely related to cardiovascular diseases. Monthly bulletin of INPUTS AND FACTORS ASSOCIATED WITH AGRICULTURAL PRODUCTION (DANE). October 2015. num. 40. The cultivation of avocado (*Persea americana* Miller.), a fruit with extraordinary nutritional, curative and industrial properties (Part One).

In this bibliographic review, a compilation of the composition is made, fundamentally the antioxidant compounds, and the variables that affect its content, such as the part of the fruit, its maturation or temperature, among others. A review of the clinical studies carried out on the beneficial effects attributed to it on the human being at the moment it is consumed has also been carried out. These clinical studies are basically focused on its cardiovascular, anticarcinogenic and cognitive effects.

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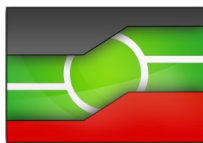
This article analyzes some clinical studies, which revealed the benefits that avocado can have on human health, because it is an oleaginous fruit rich in nutrients and phenolic compounds (antioxidants that can contribute to prevent some diseases).

It can be said that some diagnoses showed the validity of avocados in preventing cardiovascular diseases. On the other hand, in relation to breast cancer, the results showed that plasma levels of carotenoids may play a role in reducing the risk of breast cancer, particularly in women with high mammographic density.

From this work it can be deduced that the Hass avocado variety has high benefits to prevent cardiovascular and cancer diseases. This is why we want to make the preservative through this fruit, and thus prevent the damage that is sometimes caused by chemical preservatives.

In a second precedent, Ceballos and Montoya (2011) conducted a research focused on the knowledge of new sources of natural products, which have nutraceutical and functional properties that play an important role in the prevention of diseases.

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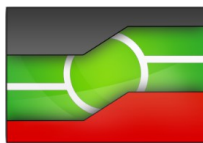
The purpose of this study was to recognize the chemical evolution of the fiber in the seed, pulp and peel of three avocado varieties.

The avocado (*persea americana*), contains fats that are the main component after water is characterized by the content of unsaturated fatty acids being mostly monounsaturated, which can reduce the rate of total cholesterol in the blood. On the other hand it is rich in vitamin E, vitamin B6, potassium and magnesium.(2011,p.3)

The research found that the composition of the peel and the seed show that they could be important for use in animal diet supplementation or as a soil recuperator for agricultural production. However, research work is needed to evaluate the presence of toxic substances in avocado by-products and the efficiencies for their industrial application.

In this case, as the avocado seed can be used to diagnose the nutritional properties of the organic preservative, which will be made with the seed of this fruit, and thus improve or provide a solution for various chronic diseases that manifest themselves when consuming fruits and vegetables with chemical preservatives, which sometimes do not have a good impact on health.

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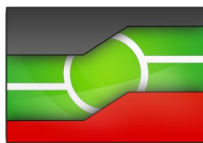
In the third background Rosero(2020) performs an extraction and characterization of phenolic active principles with antioxidant activity from avocado residues: pericarp and seed (*persea americana*). Avocado is a dicotyledonous plant belonging to the order Ranales, family Lauracea and genus *Persea*. The genus *Persea* consists of 150 species distributed in tropical and subtropical regions. Trees belonging to this genus are characterized by their leathery and aromatic leaves. On the other hand, avocado cultivation has been present in Colombia since pre-Columbian times. It is known that the first plantings of this crop were made in the Montes de María<sup>(22)</sup>. It should be noted that the great variety of avocados is due to the ideal agroclimatic conditions of the producing regions.

Among the main avocado producers are the departments of Tolima, Bolívar, Antioquia, and Santander. In Colombia there are three varieties of avocado: Mexican, Guatemalan and Antillean, the latter being the most adapted to the climatic conditions of the country. Among the varieties belonging to the

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Antillean race is the common avocado.



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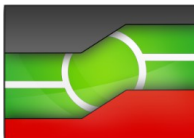
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Criollo, one of the best known and most consumed in Colombia. The fruits are characterized by long necks, smooth epicarp and low oil content.

In this background we can see that the avocado is a dicotyledonous plant belonging to the order Ranales, family Lauracea and genus *Persea*. The latter is made up of 150 species distributed in tropical and subtropical regions. Trees belonging to this genus are characterized by their leathery and aromatic leaves. Among the species is the *Persea americana* classified by Miller, which developed several subspecies due to its geographic isolation, which gave rise to different botanical types.

Because the main function of the project is the creation and implementation of an organic preservative from the variability of the *persea americana* seed, it is for this reason that first you must know or acquire knowledge of the cultivation of this type of fruit, i.e., its characteristics, major growing sites, climatic conditions, among others, as this will allow a better development when generating the preservative.

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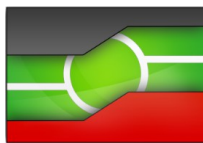
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In this fourth background Rodriguez, Alexander, Guerrero and Bibiana(2019) has as an objective: "to obtain a natural preservative from the Hass avocado seed variety (*Persea americana miller*), in order to give it a use in the food industry. To carry out the main objective, it was essential to recover bibliographic information on the characteristics of preservatives in general, concepts about antioxidants, total polyphenol content, antioxidant activity" (2019, p.15), enzymatic degradation tests, it was also necessary to make a characterization of the residue where properties of the raw material such as weight, length and diameter, apparent and packed density, as well as moisture and ash content were determined. In addition, tests were carried out on the preservative at 0.1%, 0.3% and 0.5% so that it can be applied in foodstuffs, evaluating pH, titratable acidity and microbiological analysis.

The extraction methods studied were ultrasound-assisted extraction and leaching, where by means of a PUGH decision matrix, the relevant critical criteria were evaluated for the project to extract the preservative to the best disposition with the methods found in the literature. Finally, the necessary variables were established to elaborate an analysis of the financial viability of the project taking into account the evaluation criteria (IRR, IOT, Cash Flow, etc.).

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The purpose is to determine whether or not it is appropriate to carry out this process to obtain the preservative for the food industry.


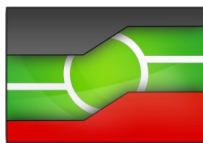
As we can see, this article affirms that avocado pulp does serve as a complement to create a natural preservative, helping to prevent some diseases or chronic damage that occur when foods with chemical preservatives are consumed, which has been used as a natural preservative for many years. years is detrimental to health, most often manifesting itself in the form of cardiovascular disease or cancer.

After analyzing the article, it was possible to find a connection in the moment when a natural preservative is made from the avocado seed, specifically the "Hass" variety. This article facilitated the analysis of the different methods of extraction of the components contained in the seed for the creation and implementation of the preservative.

## 4.2 Theoretical framework:

### 4.2.1 Preservatives.

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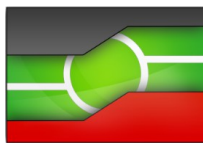
Preservatives are natural and artificial substances used in the preservation of foodstuffs against the action of microorganisms, in order to prevent spoilage for a certain period of time under certain storage conditions.

Food preservatives are additives that are applied to foods to ensure their stability during their shelf life and prevent any type of microorganism from damaging them and rendering them unsuitable for consumption. Currently, there are several types of food additives that fulfill this preservation function. Not all of them can be applied in the same products or in the same food processes. Their choice will depend on the specific needs of each type of food and the type of microorganism to be dealt with. Mercadal. Food preservatives (2018)

#### **4.2.1.1 Characteristics.**

Preservatives have been used for thousands of years in different forms for food preservation (salting, smoking, fermentation of milk...) for the long voyages of sailors, for example. There are currently 30 authorized legal ones, many of them are antioxidants and 14 have a secondary preservative effect. Many are natural products or exact copies of their formula. Methods for food preservation can be physical or chemical. Physical methods include

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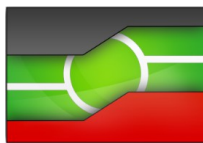
sterilization, pasteurization, refrigeration, dehydration, freezing, and in chemicals, the use of preservatives. The preservative is an agent that helps a correct processing of food and not an agent to mask a poor sanitary or technological handling, nor a way to deceive the consumer of the freshness or properties of the food, as one tends to think. 10 reasons to consume organic and natural products (2008).

#### **4.2.1.2 Obtaining process.**

The immense production of waste that the normal activity of mankind involves is one of the main problems that we are currently facing. For this reason, it is necessary to search for processes that allow the use of this waste for various applications, which could also provide important economic income, since this possibility creates new sources of wealth that provide greater profitability to the initial industrial process.

Extraction with supercritical fluids is a technique for the separation of dissolved substances or substances included in a matrix, based fundamentally on the capacity of certain fluids in a supercritical state to modify their solvent power. The essential components of the equipment are: sample holder, restrictor, collection system, pump and injection system. The restrictor is useful for maintaining the column pressure at the desired level and for converting the eluent from a fluid to a solvent.

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supercritical in a gas. The advantages of FSC extraction are: fast and efficient extraction, the possible use of CO<sub>2</sub>, H<sub>2</sub>O and NH<sub>3</sub> as solvents, non-polluting and easy to remove their excess. Departmental Section of Analytical Chemistry. Faculty of Pharmacy (2012).

#### **4.2.1.3 Damage caused to vegetables and fruits.**


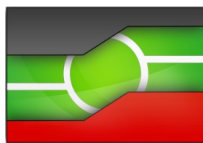
"The reasons why they contain these toxins are not always known," explains the New Zealand government's consumer advice page. "Sometimes it is a natural pesticide to prevent insect attacks. Or it may be formed to protect the plant from damage by weather, sunlight or microbes." Although some experts have reported that the dosage found in fruits and vegetables is not something to worry about, in most cases, that dosage involves consumption of a huge amount of fruit or vegetable.

Even so, health authorities in several countries recommend caution with foods containing the following toxic substances.

#### **4.2.1.4 Negative health consequences.**

The long-term effects of preservatives can cause chronic diseases, although it is said that there are still many studies to be carried out in this regard, however, there is already evidence that confirms the following

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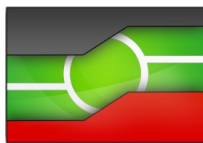
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that artificial ingredients used in food can be very harmful to health. Revista el ciudadano (2017).

The use of these and other preservatives is its harmful effect on the digestive process, since it notoriously alters not only the intestinal and stomach flora but also the oral flora, which hinders the digestion of food and especially sugars, since a fundamental collaborator for digestion are the yeasts present in the human organism and that these preservatives inhibit or destroy them. In other words, they could be causing problems of irritable colon, which is increasing in the world population. In addition, many preservatives are causing allergies in children. Eat Well (2015).

This is how many of the additives and colorings added to many food products can cause respiratory distress or aggravate symptoms. In patients suffering from asthma, some elements such as sodium benzoate, aspartame and some others can at some point provoke serious attacks and also trigger major allergic reactions. In some experiments that have been carried out on rats, it has been proven that preservatives can cause serious damage to the heart. Another long-term effect is cancer. According to an InChem study on carcinogenesis, preservatives and additives, many of these elements are transformed into toxic substances when digested, as nitrites and nitrates are converted into toxic substances.

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when combined with juices and stomach enzymes, can b e c o m e cancer-causing agents. Panichelo (2017).


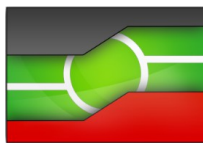
#### **4.2.2 Organic preservatives.**

It is a preservative of vegetable origin, non-toxic to humans derived from specific enzymes and organic acids for application in the food industry (bakery, confectionery, meat, dairy and beverages), developed to eliminate the wide range of fungal and bacterial microorganisms that affect the preservation of food, milk and its derivatives. It acts as a preservative, ensuring quality control in products without affecting taste, color, odor, texture or weight of treated foods. Bioapplications (2019).

##### **4.2.2.1 Characteristics.**

- It does not change color or flavor of the products.
  - Harmless to human health.
  - Thermal stability.
  - Broad antimicrobial spectrum.
  - Compatibility with other preservatives.
  - Organic and biodegradable.
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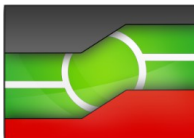
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- It retains its effectiveness over very wide pH ranges and constant temperature variations until pasteurization.
  - Improved distribution flexibility.
  - Increases export potential.
  - Protects against thermal abuse.
  - Increases consumer safety.
  - Controls bacterial growth.
  - Limits the growth of bacteria that survive pasteurization.

#### 4.2.3 Types of preservatives.

##### Saturated Organic Acids

**Propionic acid and its salts (E-280):** It is a harmless preservative very effective in inhibiting the appearance of mold, but not very effective against yeasts and bacteria. It is very economical and widely used in bakery, being essential in the manufacture of sliced bread. It is also used to externally impregnate certain types of cheese such as Emmental and as a preservative in processed cheeses. The salts are used especially, since the acid has too intense an odor. With the exception of common salt, it is the world's most widely used preservative in the food industry. In addition, it is used in

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other types of products such as pharmaceuticals, pesticides or solvents. The most commonly used food preserving agents on the market (2018).


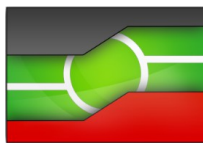
### Unsaturated Organic Acids

**Sorbic Acid and its salts (E-200 - E-203):** This preservative can be obtained both naturally and synthetically. It is a harmless acid, widely used to prevent the appearance of fungi and bacteria, it is usually used in the bakery and pastry sector, although it is also used in processed dairy products such as yogurts and cheeses. This acid acts on different fungi that can appear in meats and cheeses. It is also widely used in the preservation of margarine. Although it is more expensive than other preservatives, it is increasingly used as a substitute for other more toxic and less potent preservatives. The most widely used food preserving agents on the market (2018).

**Potassium Sorbate (E-202):** It is known as the potassium salt of Sorbic Acid, and one of its main uses is the preservation of foods such as wine. It is also used outside the food industry, as a preservative for cosmetic products. The most widely used food preserving agents on the market (2018).

**Benzoic acid and its salts (E-210 - E-217):** This preservative can be used in its acid form as well as in its potassium, sodium or calcium salts. One of its applications is in foods that have

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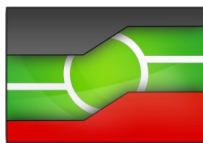
an acidic pH, and liquid foods such as soft drinks, sodas or other beverages. It is a food preservative used for the protection of food against mold and yeast, being less effective against bacteria. Although it is not mutagenic or carcinogenic, it is more toxic than other preservatives and therefore tends to be replaced by sorbates; in the food sector it can only be used in very small quantities because it can generate a sour taste in food. Mixed with other sulfates, it can be used to attack other types of microorganisms. It is also used in perfumery, in the construction of plastics and in products such as tobacco and toothpaste. The most widely used food preserving agents on the market (2018).

**Sodium Diacetate (E-262):** This naturally occurring preservative is the potassium salt of Acetic Acid, which is present in most fruits. This additive can also be obtained synthetically. It is a component used in food as a preservative and flavoring agent. Its function is to prevent the appearance of fungi and bacteria. It is mainly used in bakery, meat, soups and sauces, or in potato or corn-based products. The most commonly used food preserving agents on the market (2018).

### **Inorganic Preservatives**

**Nitrites and Nitrates (E-249 - E252):** They are a potent inhibitor of Cl. botulinum. These preservatives also act only against bacteria and not against fungi or yeasts.

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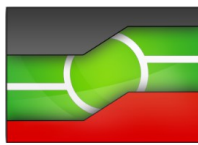
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for sausages. They are highly criticized because when they decompose or are subjected to high temperatures they form carcinogenic nitrosamines. This can be avoided by simultaneously adding Ascorbic Acid in the product. The most commonly used food preserving agents on the market (2018).

**Sulfites (E-220 - E228):** They are used against the appearance of molds, yeasts and bacteria, and are especially effective in acid media. In high doses they can alter the taste of food and destroy Vitamin B1. They are widely used in vegetables and in the wine industry. They are neither carcinogenic nor teratogenic, but can cause reactions in sensitive individuals, as for example in the case of asthmatics. The most widely used food preserving agents on the market (2018).

#### **4.2.3.1 Obtaining process.**

A study conducted by a group of researchers from the University of Maribor, Slovenia, indicates that extracts of guarana seeds, an exotic climbing plant, have antioxidant and antimicrobial properties and could therefore be used as preservatives in the food industry. The researchers have used various solvents such as water, acetone, methanol and ethanol in the extraction process of guarana seeds. They then evaluated the preservative properties of this

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polyphenol-rich solution against three types of bacteria harmful to health, *Escherichia coli*, *Pseudomonas fluorescens* and *Bacillus cereus*.


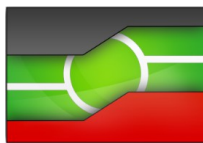
The response to three fungal strains, *Aspergillus niger*, *Trichoderma viride* and '*Penicillium cyclopium*', was also observed. The results revealed that, although all the extracts showed a strong antioxidant power, the solutions obtained by using alcohols showed a higher antimicrobial activity than the extracts obtained by using water. Food safety, natural preservatives (2008).

#### **4.2.3.2 Natural stimulant**

*Paullinia cupana* is a climbing plant that is abundant in the Amazon rainforest, especially in Brazil and Venezuela. Its fruit is a red ovoid capsule that usually contains a single seed of brownish color and smaller than a chestnut. Its most important active ingredient is guaranine, a stimulant with a composition and activity similar to caffeine. It has been used since time immemorial by different indigenous tribes as a medicinal plant, and its seeds are generally used in energy drinks.

Its antiseptic properties were already known by the Amazonian Indians who used the cooked leaves in poultices, placing them on wounds and cuts. In the food industry it is used

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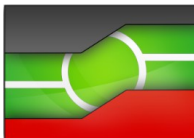
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mainly as a source of flavor and aroma for the preparation of various non-alcoholic beverages such as soft drinks, whose consumption is very popular especially in their countries of origin and throughout South America. This plant, whose properties are often exaggerated in naturist forums, is also used as a physical and mental invigorator in beverages, preparations and concentrates for stimulant and sports purposes, often without the necessary control. Food safety, natural preservatives (2008).

#### **4.2.4 Human health benefits.**

Organic preservatives have several benefits as they are healthier, because they are free of toxic residues from chemicals, pesticides, fertilizers or synthetic additives. They protect the health of the consumer and the farmer. They help to maintain the biochemical balance of our organism: Because they do not contain traces of anabolics or STB hormones. They are more nutritious; They contain higher proportions of vitamins, proteins, antioxidants, natural sugars and minerals than the products of other manufacturers.

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conventional. They have better taste, color and aroma: Since the methods used in their production are natural and do not alter their nutritional quality, which allows rediscovering the true taste of unaltered food, they promote the development of fair trade: Through the support to independent producers who receive a fair payment for their products without the participation of intermediaries.

They do not harm ecosystems: Because they do not use transgenic varieties (which do use pesticides), nor is seed irradiation allowed; instead, they promote the cultivation of native varieties, saving them from extinction. amiga revista (2019)

Purer water: By not using hazardous products or large amounts of nitrogen, contamination of drinking water sources is eliminated, protecting this resource for the future.


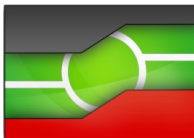
Fertile soil: Soil is the foundation of the food chain and the main goal and concern of organic agriculture. We are facing major erosion and loss of fertile soil due to conventional agricultural practices.

More energy: The procedures used in traditional agriculture consume enormous amounts of energy.

Organic agriculture is based on the practice of intensive manual labor.

Rescue and promote biodiversity: Because the production methods used do not generate ecological problems. A shared social responsibility from the producer, to the consumer. Nutrigermi (2018).

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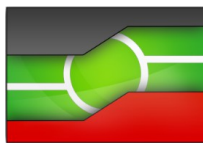
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#### 4.2.5 Organic preservatives through the avocado seed type persea americana.

In recent years, avocado has been one of the fastest growing food products in Colombia, due to this it has been qualified as "green gold" or Hass variety avocado, which records an annual increase of close to 15% thus reaching 15,000 hectares planted in 13 departments of the country, according to the national agricultural survey, ENA (DANE, 2016), "During 2015 in Colombia a production of 274.330 tons of avocado, from the various varieties grown, with average yields of 7.2 tons per hectare per year, with the department of Tolima being the main producer with 52,838 tons, followed by the departments of Valle del Cauca, Caldas and Risaralda" .

In Bogota, one of the companies that currently markets this product is the company Productos del Campo San Gregorio and it can be seen how it has been processing, reaching a monthly production of 100 to 150 tons of this fruit, a company that will be studied to give a feasibility at an industrial level using its residues (seed). With the above, the food industry in avocado processing is generating a large amount of these organic by-product residues such as peel, seed, etc. where they can be presented as a usable residue for the production of



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The use of antioxidants or polymers here will serve to control the amount of material that is discarded into the environment and can accumulate over time until its final deterioration.


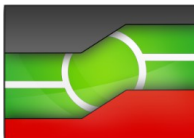
#### 4.2.5.1 Characteristics.

1. One of the characteristics that has been most evaluated in these residues has been their antioxidant activity, polyphenol content, being cataloged as potential sources of antioxidant compounds, currently they have found their applicability **in food and cosmetics**, since these chemical substances, by their nature, are responsible for protecting the cells due to the damage caused by free radicals in each of them. For this reason, the intake of polyphenols as a natural substance through diet has increased in popularity in recent years to prevent diseases. Repository america (2019).

#### 4.2.5.2 Method of extraction.

Extraction by maceration. This extraction is carried out at room temperature. It consists of soaking the plant material, duly fragmented, in a solvent (water or ethanol, ethanol is preferred since at long extraction times water can promote fermentation or the formation of molds) until it penetrates and dissolves the soluble portions. Any container can be used

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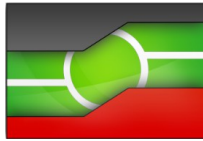
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The plant material with the solvent is placed in a lid that is not attacked with the solvent; in this lid the plant material is placed with the solvent and covered and left to rest for a period of 2 to 14 days with sporadic agitation. Then the liquid is filtered, the residue is squeezed, the solvent is recovered in a rotary evaporator and the extract is obtained. Obtaining essential oils and ethanolic extracts from Amazonian plants (2004).

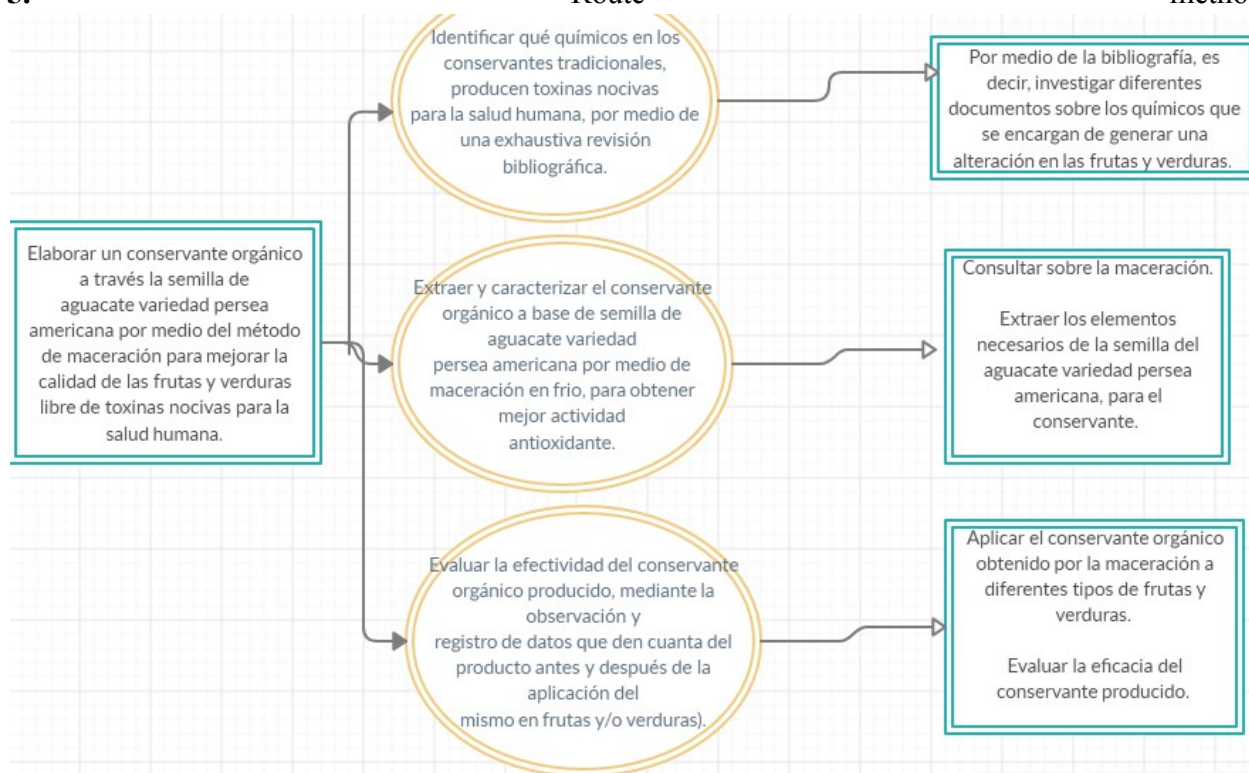
#### **4.2.5.3 Benefit in fruits and vegetables.**

#### **4.2.5.4 human health benefits.**


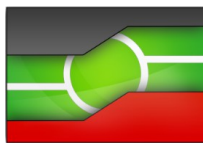
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## 5. methodological.



In this research it is expected to be able to interpret or explain in an effective way a detailed image about how the methodological route will be, which is proposed to be used to achieve the final product, which is "an organic preservative through the avocado seed variety *persea americana*".


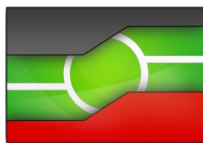
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At the beginning of this explanation we will start by efficiently identifying the chemicals commonly used in some preservatives, by means of an exhaustive bibliographic review, where it will be possible to obtain a greater intellect about the impact that these have both in the food production and in the health of all those people who consume these foods that contain this type of antioxidants; followed by the method to be used, which consists of a process called "cold maceration", this is known as an extraction method where a product is immersed in a cold liquid for a period of time, in this case we will use water as a technique which allows to extract all those characteristics of the preservative.

Although it is important to note that it will also be carried out through a solvent called 70% ethanol, which will allow us to characterize the organic antioxidant, by means of a high performance liquid chromatography (HPLC), in which, by the action of a pump, a mixture of compounds or analytes is passed through a solvent system commonly known as mobile phase. The mobile phase passes through a chromatographic column containing the stationary phase at a specified flow rate. Separation of the compounds occurs based on their interaction with the mobile phase and the stationary phase.

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Having mentioned this, the next step will be based on the evaluation of the final product, where different tests will be taken in which the impact of the preservative on the chosen foods (fruits and vegetables) will be evidenced, through various applications where the preservative obtained in various concentrations will have to be applied in order to observe at what point the expected result is obtained in this, that is, its durability in these and of course, how it works compared to other organic preservatives or even compare with chemical preservatives. Here it will be determined how successful and how viable the realization of the project can be, and the different methods that were used to carry out this project.


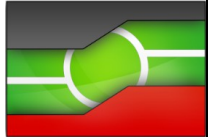
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## 6. Expected results

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With the execution of the project it is expected to make an organic preservative through the avocado seed *Persea americana*, with the intention that can meet the needs covered by a chemical preservative, in the same way that can replace them to avoid counterproductive for humans and preserve food with a better quality; apart from this it is achieved to help reduce environmental pollution by causes of chemicals benefiting the environment.

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## 7. Timeline

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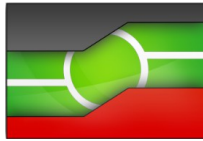
ACTIVITY	MONTH 1				OBSERV
	Week				
	1	2	3	4	

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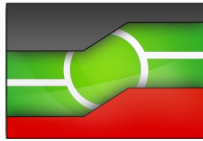
## 8. Budget

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Items: materials, equipment, field trips, among others	Justification	Quantity	Unit value	Total value \$


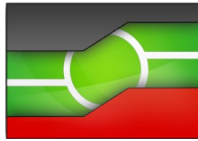
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<b>Digital electronic stirrer (Vortex)</b>	Laboratory stirrers, also known as mixers, are laboratory products used in chemistry and biology for mixing liquids and preparing solutions and suspensions.	1	1,467,677	1,467,677
<b>Orbital shaker (Shaker)</b>	It is used for mixing, homogenizing and/or repairing combinations of substances.	1	20,577,000	20,577,000
<b>Autoclave</b>	It is a thick-walled metal container with a hermetic seal for working with steam at high pressure and high temperature, used to sterilize instruments and equipment. food.	1	11,353,861	11,353,861
<b>Vertical autoclave</b>	allows working at high pressure for industrial reaction, cooking or steam sterilization to disinfect equipment and instruments surgical procedures.	1	33,739,528	33,739,528
<b>Bactoincinerator</b>	heat and infrared sterilization of laboratory instruments (microbiological loops) and microbiological cabinets. biosafety.	1	926,761	926,761


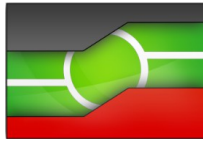
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Analytical balance	Measure small masses	1	4,428,512	4,428,512
Electronic precision balance	non-automatic weighing instruments that use the action of gravity to weigh the product. determination of mass.	1	5,419,561	5,419,561
Dyeing tray	for staining gels and electrophoresis membranes or for dye removal. They hold and lock slides in place. site.	2	381,640	763,280
Water bath	to heat a liquid or solid substance, uniformly and slowly, by immersing the vessel containing it in a larger vessel containing water or another liquid which is brought to boiling.	1	4,824,632	4,824,632
Dry bath	Separate solid and liquid wastes	1	2,847,949	2,847,949
Modular double block for dry bath	provide precise digital temperature selection	1	580,006	580,006
Vacuum pump with 2 pressure gauges	Vacuuming of refrigeration and air systems conditioning	1	3,230,532	3,230,532
Biosafety cabinet	provide full protection to the product, process, operator and environment.	1	38,383,578.00	38,383,578


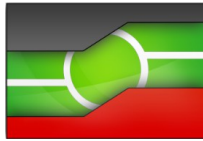


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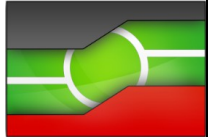
<b>Refrigerated centrifuge</b>	allows the centrifugation of tubes (0.2-50 ml) for the separation of constituents of liquid mixtures or suspensions, at temperatures between 20 and 40°C. °C.	1	26,969,827	26,969,827
<b>Stereomicroscope</b>	to work with samples that need to be further dissected to see in more detail the small parts of which they are composed	1	3,474,666	3,474,666
<b>Stereomicroscope</b>	to work with samples that have a greater need to be dissected to see the parts in more detail. small that compose them	1	2,875,987	2,875,987
<b>Fermenter (Bioreactor)</b>	maintains a biologically active environment or used to grow cells or tissues in culture operations cellular.	1	91,496,007	91,496,007
<b>Incubator with 2 removable grills</b>	Allows control of temperature, humidity and other conditions necessary for the development of a microbiological culture.	1	10,297,543	10,297,543
<b>Refrigerated incubator</b>	s allow working at near ambient and lower temperatures. This equipment is generally used for cell growth and cell growth applications. bacteriology.	1	12,340,866	12,340,866

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pH Meter	is a sensor used in the electrochemical method to measure the pH of a solution.	2	1,601,001	3,202,002
Trapezoidal Table	has, as its main function, to maintain work in team	1	145,000	145,000
Micropipette vol 0.5 - 10 ul	used to absorb and transfer small volumes of liquids and allow them to be handled in the different scientific techniques.	1	909,121	909,121
Micropipette vol 10 - 100 ul	used to absorb and transfer small volumes of liquids and allow them to be handled in the different scientific techniques.	1	909,121	909,121
Micropipette vol 100 - 1000 ul	used to absorb and transfer small volumes of liquids and allow them to be handled in the different scientific techniques.	1	654,431	654,431
Micropipette vol 100 - 1000 ul	used to absorb and transfer small volumes of liquids and allow them to be handled in the different scientific techniques.	1	941,102	941,102
Binocular microscope	allows the distance between the two eyepieces to be adjusted to suit the observer's eyes.	1	2,389,600	2,389,600

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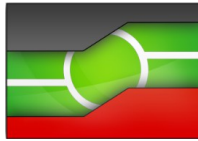
Binocular microscope	allows the distance between the two eyepieces to be adjusted to suit the observer's eyes.	1	3,091,639	3,091,639
Binocular microscope	The distance between the two eyepieces can be adjusted to suit the eyes of the user. observer.	1	3,497,361.00	3,497,361.00
Binocular microscope	The distance between the two eyepieces can be adjusted to suit the eyes of the user. observer.	1	5,482,111	5,482,111
No frost refrigerator	cooled by using cold air flows inside the unit and circulating the air through the unit. by it on an ongoing basis.	1	1,125,974	1,125,974
Heating plate	heating the glassware or its contents	1	1,987,641	1,987,641.00
Aluminum microclick rotor	Processes samples up to 100 ml with the six-place capacity of the fixed angle	1	4,177,731	4,177,731
Microcentrifuge	has the function of rotating laboratory samples stored in capillary tubes, thus separating their components, whether liquid or solid, from according to their density.	1	5,061,941	5,061,941
Rotor for centrifuge (15 mL tubes)	specialized for high rotational speeds or to be accurate for high centrifugal forces; the containers	6	6,952,441	41,714,646

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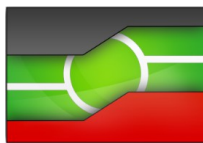
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#### Bibliographical references

- Preservatives and their harmful effects on health. (2015, February 16). Retrieved May 5, 2020, from <https://comebien.co/los-conservantes-y-sus-efectos-nocivos-para-la-salud/>
- Are food preservatives harmful (2017, January 6). Retrieved May 5, 2020, from <https://www.lavanguardia.com/vivo/nutricion/20170106/412997526741/nutricion-conservantes-alimentos.html>
- Food poisoning and contamination ( 2015, November 21). Retrieved May 5, 2015 from 2020, from <https://www.healthychildren.org/Spanish/health-issues/conditions/abdominal/Paginas/Food-Poisoning-and-Food-Contamination.aspx>
- Ingested nitrate and nitrite and stomach cancer risk: An updated review (2012, October 1). Retrieved 5 from May from 2020, from <https://www.sciencedirect.com/science/article/pii/S0278691512005406?via%3Dihub>

	<p align="center"><b>LOYOLA COLLEGE FOR SCIENCE AND INNOVATION EDUCATIONAL INSTITUTION</b>  Resolution of Creation: 00003 of January 05, 2010  Cra. 65 No. 98A-75, Telephone: 4405105  NIT: 900339251-3, DANE: 105001025984  Webpage: <a href="http://www.iecolegioloyola.edu.co">www.iecolegioloyola.edu.co</a> Núcleo  920, Castilla, Medellín</p>	
<b>Process: CURRICULAR MANAGEMENT</b>		
<b>Document name: PROPOSED DRAFT</b>	<b>Code: GCU-FR018</b>	<b>Version: 01</b>

- 
5. Natural toxins in food, what are they and where are they found (2018, June 5). Retrieved  
5 from May from 2020,  
[from https://higieneambiental.com/higiene-alimentaria/toxinas-naturales-en-los-  
alimentos-que-son-y-donde-se-encuentran](https://higieneambiental.com/higiene-alimentaria/toxinas-naturales-en-los-alimentos-que-son-y-donde-se-encuentran)
  6. Natural toxins in food. (2018, May 9). Retrieved 5 from May from 2020,  
[from https://www.who.int/news-room/fact-sheets/detail/natural-toxins-in-food](https://www.who.int/news-room/fact-sheets/detail/natural-toxins-in-food)
  7. Toxic substances found naturally in fruits and vegetables (2015, September 19). Retrieved 5  
from May from 2020, [from  
https://www.bbc.com/mundo/noticias/2015/09/150916\\_salud\\_sustancias\\_toxicas\\_naturales\\_frutas\\_veget  
ales\\_finde\\_wbm](https://www.bbc.com/mundo/noticias/2015/09/150916_salud_sustancias_toxicas_naturales_frutas_vegetales_finde_wbm)
  8. Avocado seeds and their potential use as an antioxidant in food (2014, August 25). Retrieved 5  
from May from 2020, [from  
http://www.foodnewslatam.com/inocuidad/55-agricultura/3136-semillas-del-aguacate-y-su-posible-uso-c  
omo-antioxidant-in-foods.html](http://www.foodnewslatam.com/inocuidad/55-agricultura/3136-semillas-del-aguacate-y-su-posible-uso-como-antioxidant-in-foods.html)
  9. Healthychildren.(11/21/2015). Food poisoning and contamination. Retrieved May 11.  
from:  
[https://www.healthychildren.org/Spanish/health-issues/conditions/abdominal/Paginas/Food-Poisoning-a  
nd-Food-Contamination.aspx](https://www.healthychildren.org/Spanish/health-issues/conditions/abdominal/Paginas/Food-Poisoning-and-Food-Contamination.aspx)
  10. The Citizen. (01/07/2016/).Harmful effects of preservatives in food. Retrieved 11 May  
May from 2020, from:
-

	<p align="center"><b>LOYOLA COLLEGE FOR SCIENCE AND INNOVATION EDUCATIONAL INSTITUTION</b>  Resolution of Creation: 00003 of January 05, 2010  Cra. 65 No. 98A-75, Telephone: 4405105  NIT: 900339251-3, DANE: 105001025984  Webpage: <a href="http://www.iecolegioloyola.edu.co">www.iecolegioloyola.edu.co</a> Núcleo  920, Castilla, Medellín</p>	
<b>Process: CURRICULAR MANAGEMENT</b>		
<b>Document name: PROPOSED DRAFT</b>	<b>Code: GCU-FR018</b>	<b>Version: 01</b>

<https://www.elciudadano.com/tendencias/efectos-daninos-que-causan-los-conservantes-de-alimentos1313/07/01/>

11. Mercadal. Food preservatives. retrieved May 12, 2020 from:  
<https://www.mendoza.conicet.gov.ar/portal/enciclopedia/terminos/ConservAlim.htm>

12. Maite Pelayo (2008, Friday, January 18). Natural preservatives. Retrieved May 13 from:  
<https://www.consumer.es/seguridad-alimentaria/conservantes-naturales.html>

13. 10 reasons to consume organic and natural products (s. f.). Retrieved May 13, 2020, from  
<https://mercadopuntoverde.com/10-razones-para-consumir-productos-organicos-y-naturales/>


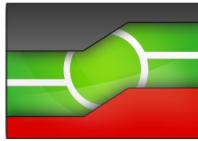
14. Perez , R., P. (2018, April 9). The most widely used food preserving agents in the market.  
Retrieved 13 from May from 2020, from  
<https://medium.com/@rp7529632/the-food-preserving-agents-m%C3%A1s-used-in-the-market-b5f947bb8bd>

15. Vix. Laura Yabrun (n.d) Harmful effects of food preservatives. Retrieved May 15  
from 2020, from:  
<https://www.vix.com/es/imj/salud/4385/efectos-nocivos-de-los-conservantes-alimentarios>

16. Maceration (July 22, 2019). Retrieved May 20, 2020, from  
<https://conceptodefinicion.de/maceracion/>

17. (19/09/2015). Toxic substances naturally occurring in fruits and vegetables.

Retrieved on 24 from May from 2020, from

	<p align="center"><b>LOYOLA COLLEGE FOR SCIENCE AND INNOVATION EDUCATIONAL INSTITUTION</b>  Resolution of Creation: 00003 of January 05, 2010  Cra. 65 No. 98A-75, Telephone: 4405105  NIT: 900339251-3, DANE: 105001025984  Webpage: <a href="http://www.iecolegioloyola.edu.co">www.iecolegioloyola.edu.co</a> Núcleo  920, Castilla, Medellín</p>	
<p align="center"><b>HUMANISM AND RESEARCH FOR LIFE</b></p>		
<p><b>Process: CURRICULAR MANAGEMENT</b></p>		
<p><b>Document name: PROPOSED DRAFT</b></p>	<p><b>Code: GCU-FR018</b></p>	<p><b>Version: 01</b></p>

<https://www.wradio.com.co/noticias/sociedad/las-cinco-sustancias-toxicas-que-se-encuentran-naturalmente-en-frutas-y-vegetales/20150919/nota/2938279.aspx>


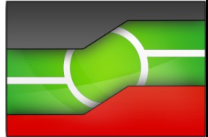
18. Monthly bulletin of INPUTS AND FACTORS ASSOCIATED WITH PRODUCTION AGRICULTURAL AND LIVESTOCK (DANE). October 2015. The cultivation of avocado (*Persea americana* Miller.), a fruit with extraordinary nutritional, curative and industrial properties (Part One), retrieved May 24. from 2020, [from](#)

[https://www.dane.gov.co/files/investigaciones/agropecuario/sipsa/Bol\\_Insumos\\_oct\\_2015.pdf](https://www.dane.gov.co/files/investigaciones/agropecuario/sipsa/Bol_Insumos_oct_2015.pdf)

19. X (2019, July 20). *Natural preservatives*. Consumer. <https://www.consumer.es/seguridad-alimentaria/conservantes-naturales.html>

20. Amiga, R. (2019, February 9.) *Is it worth buying organic?* Revistaamiga. <http://www.amigarevista.com/index.php/hogar/decoracion/item/1162-vale-la-pena-comprar-productos-organicos>

21. ÁVILA, F., & GUERRERO, K. (2019, August). *OBTAINING A NATURAL PRESERVATIVE FROM AVOCADO SEED VARIETY HASS (PERSEA AMERICANA)*.

	<b>LOYOLA COLLEGE FOR SCIENCE AND INNOVATION EDUCATIONAL INSTITUTION</b> Resolution of Creation: 00003 of January 05, 2010 Cra. 65 No. 98A-75, Telephone: 4405105 NIT: 900339251-3, DANE: 105001025984 Webpage: www.iecolegioloyola.edu.co Núcleo 920, Castilla, Medellín		
	<b>HUMANISM AND RESEARCH FOR LIFE</b>		
<b>Process: CURRICULAR MANAGEMENT</b>			
<b>Document name: PROPOSED DRAFT</b>	<b>Code: GCU-FR018</b>	<b>Version: 01</b>	

---

MILL.). repository uamerica.

<https://repository.uamerica.edu.co/bitstream/20.500.11839/7627/1/6112706-2019-2-IQ.pdf>

22. Gonzales Villa, A. (2004, April). *OBTAINING OF ESSENTIAL OILS AND ETHANOLIC EXTRACTS FROM PLANTS FROM AMAZONAS.* Bdigital.

<http://www.bdigital.unal.edu.co/1173/1/angelaandregonzalezvilla.2004.pdf>

23. *10 reasons to consume organic and natural products* (s. f.). Frutas | NutriGermi | Cali.

<https://www.nutrigermi.com/beneficios>

24. Perez, R. (2018, April 9). *The most widely used food preserving agents in the market.*

Medium.

<https://medium.com/@rp7529632/food-preservation-agents-m%C3%A1s-used-in-the-market-b5f947bb8bd>

25. Panichelo (2017, April 30). *Preservatives in the food industry* - Panichelo.


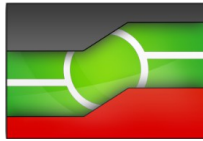
<https://panichelo.com/articulos/los-conservantes-en-la-industria-alimenticia/>

26. Eat well (2015, February 16). *Preservatives and their harmful effects on health.* Comebien.

<https://comebien.co/los-conservantes-y-sus-efectos-nocivos-para-la-salud/>

---



	<p align="center"> <b>LOYOLA COLLEGE FOR SCIENCE AND INNOVATION EDUCATIONAL INSTITUTION</b>          Resolution of Creation: 00003 of January 05, 2010          Cra. 65 No. 98A-75, Telephone: 4405105          NIT: 900339251-3, DANE: 105001025984          Webpage: <a href="http://www.iecolegioloyola.edu.co">www.iecolegioloyola.edu.co</a> Núcleo          920, Castilla, Medellín       </p>	
<p align="center"><b>HUMANISM AND RESEARCH FOR LIFE</b></p>		
<p><b>Process: CURRICULAR MANAGEMENT</b></p>		
<p><b>Document name: PROPOSED DRAFT</b></p>	<p><b>Code: GCU-FR018</b></p>	<p><b>Version: 01</b></p>

---

27. Clarín (2017, January 23): *Are preservatives bad for your health?* Clarín.


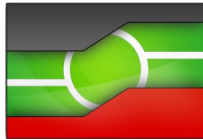
[https://www.clarin.com/buena-vida/salud/conservantes-malos-salud\\_0\\_rkn2H3Qve.html](https://www.clarin.com/buena-vida/salud/conservantes-malos-salud_0_rkn2H3Qve.html)

28. The Citizen. (2016, July 1). *Harmful effects caused by food preservatives.*

<https://www.elciudadano.com/tendencias/efectos-daninos-que-causan-los-conservantes-de-alimentos131>

[3/07/01/](#)


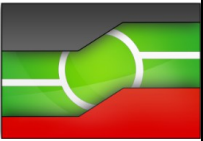
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	<p align="center"> <b>LOYOLA COLLEGE FOR SCIENCE AND INNOVATION EDUCATIONAL INSTITUTION</b>          Resolution of Creation: 00003 of January 05, 2010          Cra. 65 No. 98A-75, Telephone: 4405105          NIT: 900339251-3, DANE: 105001025984          Webpage: <a href="http://www.iecolegioloyola.edu.co">www.iecolegioloyola.edu.co</a> Núcleo          920, Castilla, Medellín       </p>	
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Annexes

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