# Social, environmental and economic impacts through the production, commercialization and exportation of Hass avocado in the Eastern Antioquia (Colombia)

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**Abstract**

The purpose of this work is to determine, analyze and explain the social, environmental and economic impacts caused by the production and export of avocado Hass in the Department of Antioquia. Characterize the stages in the different production, marketing and export processes, and know the positive and negative effects they generate. This research aims to promote a sustainable economic development, based on social responsibility, economic growth and the preservation of the environment.

**Key Word:** Production, impacts, export, environment, development, Hass avocado.

**Resumen**

El propósito de este trabajo es determinar, analizar y explicar los impactos sociales, ambientales y económicos ocasionados por la producción, comercialización y exportación del aguacate Hass en el Oriente del Departamento de Antioquia. Caracterizar las etapas en los diferentes procesos de producción, comercialización y exportación, y conocer los efectos positivos y negativos que estos generan. Mediante esta investigación se pretende promover un desarrollo económico sostenible, basado en la responsabilidad social, el crecimiento económico y la preservación del medio ambiente.

**Palabras Claves**: Producción, impactos, exportación, medio ambiente, desarrollo, aguacate Hass.

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## Introduction

Avocado, also known as avocado, is a tropical fruit native to Mexico, characterized by its flavor and its multiple nutrients. Colombia is considered the fourth producer of avocado worldwide, within the cultivated varieties is the Hass, in the Eastern of the department of Antioquia, Hass avocado cultivation represents the main agricultural activity in the region, in this area the climate and land conditions are suitable for production during almost every month of the year. Agriculture requires a great deal of the use of natural resources, also generating its degradation little by little, in the different stages of production, commercialization and export, there are several impacts related to the social, economic and environmental aspects in which this research is focused.

Rendón Schneir in the year 2013 in Peru, performed a study with the objective of measuring the environmental impacts especially by water consumption in the different agricultural activities, in which determined, that although the economic progress and social progress are necessary for development, it is also necessary to take care of natural resources, not degrade them or extinguish them for the present and future damages that they may cause. Likewise, Arbeláez, Estacio, and Olivera in the year 2010, developed a study to the agricultural sector, specifically to the sugar sector of Colombia; which presents similar objectives to those exposed in this investigation. In the study developed, the socioeconomic impacts generated by the sugar activity in the Colombian economy were identified and quantified, finding as a result, important positive impacts through the generation of employment and the improvement of the quality of life for the inhabitants of the area.

This study identifies and analyzes the social, environmental and economic impacts generated by the production, commercialization and export of Hass avocado in Eastern Antioquia.

The development of this research was conducted for the period between 2014 and 2019 for which it was necessary to make several tours of the area of crops, visits and surveys to producers, traders, exporters and entities related to the sector, through which managed to

obtain accurate information to determine the different impacts related to the production, commercialization and export of the Hass avocado in the region.

Among the findings found in the present investigation it was determined that the avocado municipalities of the area such as El Retiro, Rionegro, La Ceja, among others, generate employment for their inhabitants and therefore, a better quality of life for all the families of the region, also, people who have been part of armed groups have found in the avocado crop an opportunity to change their lifestyle and livelihood in order to survive.

The work developed finds, both nationally and regionally, important impacts of the sector in various aspects. Hass avocado production plays a very important role in the economy of the Eastern Antioquia, the increase in exports year after year according to data from the Ministry of Agriculture have shown significant growth for the area and for the country, In recent years, exports increased from 1.408 tons in 2014 to 35.000 tons exported in 2018. In addition, foreign investment apart from generating foreign currency to the country has also had a positive impact in the area; since the companies that come from different countries have provided the farmers with better jobs, formalizing their hiring and guaranteeing optimal living conditions, which has generated economic and social development for the region.

Regarding the environmental impacts generated by the cultivation of avocado, it is found that the use of agrochemicals (fertilizers, pesticides, pesticides), cause imminent damage to the environment and human health. Regarding water consumption, within the positive aspects of the region it should be noted as a great benefit for natural resources, the climatic conditions of the area, since rainwater fulfills the function of natural irrigation, which means that Eastern Antioquia water consumption for avocado production it is not so significant and this activity is not causing the waste of a resource as vital to living beings as water.

This research work consists of three main chapters, the first chapter establishes and describes the general structure of the research (State of the art, approach to the problem, objectives, theoretical, conceptual and methodological framework), in the second chapter, all the information corresponding to the research is developed, in which the development of the proposed objectives and the description of the obtained findings are presented. Finally, the last part of the study presents the conclusions and recommendations with the objective of mitigating the negative impacts and continuing to strengthen the positive impacts through the production, commercialization and export of the Hass avocado, through the support and strengthening of public and private institutions with the aim of improving the efficiency of the sector, good agricultural practices for the protection and care of the environment, the use of resources and an adequate process throughout the production chain and supply; This way achieving to increase the well being, development and quality of life for all inhabitants of the Eastern Antioquia.

# 1. Project formulation

## 1.1 State of the art

The Hass avocado in Colombia, began to be exported to Europe in 200 (PROCOLOMBIA, 2017). Between 2014 and 2018, exports increased exponentially from 1,408 to 35,000 tons; contributing to growth for the Colombian economy and making it competitive in international markets. Avocado exports have been directed especially to the Netherlands, Spain, the United Kingdom, Belgium and France. (Granados & Valencia, 2018)

Arbeláez, Estacio, and Olivera in 2010, made a study that, despite dealing with the sugar sector, has objectives similar to those presented here on the avocado sector. This research identifies and quantifies the socioeconomic impacts generated by the activity of the sugar sector in the Colombian economy and in the regional economy of the Cauca River geographical valley, they used methodologies such as the input-output matrix, looked at official sources such as the National Administrative Department of Statistics (DANE) and the National Planning Department (DNP) and also made comparisons of various economic and social indicators to estimate the impact on the sector. They found, as a result, important contributions and positive socioeconomic impacts to the sector, generating this productive activity employment and quality of life of the inhabitants of the area, also, they added that the progress of the region depended on a greater economic growth and in the development of the social capacities of its inhabitants. (Arbeláez, Estacio, & Olivera, 2010).

Burgos and Anaya in 2011, in Mexico, performed a study regarding the ecological impact whose objective was to evaluate avocado cultivation in Michoacán at a regional and parcel scale. In the research they proposed as a general objective to define specific characteristics about the avocado producers of Michoacán based on the ecological impact generated. The objectives were: (a) To reach the diversity of production forms present in the world, through direct information to Michoacan producers of avocado, (b) Construct, design and measure indicators of potential ecological impact, which include the physical features of the properties and the ways of managing the orchard and the crop, and (c) Establish a typology of producers that allows analyzing from a semi-quantitative perspective, according to the potential ecological impact of the process and the way of management. As

a result, they established that the use of the watershed approach is fundamental to understanding and addressing the problem of the negative impact of avocado activity on the components of the ecosystem, natural resources and the environment. (Burgos & Anaya, 2011).

In 2012, Ayala and Villafán investigated agricultural and agroindustrial activities in the state of Michoacán (Mexico); they focused on the municipality of Uruapan, which stands out for its avocado activity, which represents the economic base of the municipality. Avocado agribusiness in this region has generated damages, mainly in the environmental aspect. In the research they raised the "Corporate Social Responsibility (CSR)" as a contribution to solve this problem. The objective of the study was to know the level of CSR of the avocado´s companies of the state of Uruapan; for this they elaborated a CSR index based on an "Analytic Hierarchy Process (AHP)". They interviewed and evaluated twelve companies between July and December 2010. "In the results we obtained an average level of CSR (51.58%), a high level (47.85%), a low level in connection with the community (22.95%) and a low level in the environment (24.15%) of positive effects, or that inhibit competitiveness. Finally, they proposed the recommendations to elaborate a CSR strategy and be applied in the region's avocado sector". (Villafán & Ayala, 2012).

In the study carried out in 2012, called "The Avocado in Colombia: Case Study of the Montes de María, in the Colombian Caribbean", different aspects corresponding to the cultivation of avocado were analyzed in the area of Montes de María, which for many years was characterized by leading the production of avocado in the country; but that now is relegated by departments like Tolima and Antioquia. Within the studies they determined that this area has been directly affected by the armed conflict, and for this reason many farmers were killed and others were displaced. As a result of the abandonment of crops, serious diseases were generated that destroyed them; this added to the violence, had a strong impact in the area; the struggle for territorial control of groups outside the law forced the displacement of a large number of families who found their sustenance and source of income in the avocado crop. They conducted interviews with different farmers in the area who said that as a result of the armed conflict they had to leave their land between 2000 and 2003, as a result of the extortions they could not continue paying, so staying on their farms

became in a life and death issue. This situation definitely changed the lives of many families in the area. Suffering for many years and hoping that the security conditions will improve to be able to return to their lands, finding them abandoned and in terrible conditions, causing a great social impact to all the inhabitants of the area who saw in the avocado crop an opportunity to subsist. (Yabrudy, 2012).

In 2013 Rendón Schneir in Peru, performed a study whose objective was focused on measuring environmental impacts, especially by the use of water in agricultural activity, also identify and discuss strategies for the future development of the valley that seek a balance between the agro-export (which generates foreign exchange), the economic development and the sustainable management of natural resources, (mainly water) by entities and private actors linked to agricultural activity. Looking from an economic and environmental history approach, establish analytical guidelines and theoretical references conducive to an understanding of the main agro-environmental problems of the Coast of Peru to demonstrate the relevance of the environmental dimension in the study of socioeconomic dynamics in the Ica valley, and the possibility of its application in other valleys From Peru, concluding that economic progress and social progress are indisputable truths as constituent parts of them, while production for export and domestic consumption, provide wealth and are necessary in the face of other alternatives. However, it is also necessary to take care of the resources that sustain that production, not to degrade them or extinguish them for the present and future damages that they may cause. The Ica Valley is a case in which these trends are verified. The development of the agro-export model generated higher welfare levels, based on the use of comparative advantages and commercial and economic policy, but also affected the environmental system, especially in the water resource. (Rendón, 2013).

In studies carried out by Saúl Rick Fernández Pérez, in 2016, in which the possibilities of exporting Hass avocado to Europe are analyzed, it indicates that Colombia has areas suitable for its production, however, this sector presents certain difficulties in its production, marketing and export process; caused by different factors: the difficult acquisition of land, the low financial capacity of producers and farmers, the few resources

to implement technology and technify processes so that small producers can not successfully develop production projects.

Additionally, the problem that is presented internationally in terms of low competitiveness compared to large producers such as Mexico is due to the fact that the national companies that want to export and internationalize do not prosper, as the production and marketing processes are poorly structured.

In this study they focused on the Netherlands, analyzing the general aspects of the product and a strategic analysis of the market, demographic, political and cultural aspects. After doing the respective research, Holland was identified as the destination country for the export of the Colombian Hass avocado, taking into account the advantages of the agreements with the European Union, in which they grant a 0% tariff for these products. (Férnandez, 2016).

In 2016, a research group from the University of Amazonia presented a book on Science, Innovation and Competitiveness, in which these researchers talk about avocado byproducts as a potential raw material for various industrial sectors, this research deals with the importance of the avocado in the Colombian economic sector and that in turn has an important growth in the global market, since as it is a highly demanding product, Most Colombians consume the avocado but do not reuse the waste such as seeds and husks, which would cause environmental impacts, thanks to this the need arose to make good use of these wastes and they began to do bibliographic research on the compounds of the seeds and husks, finding that both are rich in phytochemicals, particularly polyphenols, compounds of interest to the food, cosmetic, pharmaceutical and environmental industries; they also found that the seed is largely composed of starch, which can be used as a biopolymer or vehicle for medicines. The seed meal showed positive effects on the treatment of hypercholesterolemia in mice. They also evidenced the potential of these by-products in the treatment of contaminated water and in the production of biofuels; they came to the conclusion of the different uses that can be given to the by-products of the avocado, becoming, then, an alternative raw material for different industries and as an economical source of bioactive compounds. (Muñoz & Rojas, 2016)

In studies performed by the Colombian Agricultural Institute ICA and by the company producing fruit seedlings, Profrutales Ltda., An investigation was made on the avocado crops in Colombia of ten different varieties, making reference to the fact that the avocado of big size is the most marketed in the country, while, for other markets, for export and agribusiness the most desired is the small avocado; like the Hass.

### 1.2 Problem Statement

For Colombia, the agricultural sector is important in its economic and social development, "according to the National Planning Department (DNP), in the prospective document - Visión Colombia 2019, the agricultural sector will represent 15.4% of the national GDP, which It highlights the importance of this sector for the development of the Colombian state." (Martínez, 2013).

During the last few years the demand for Hass avocado worldwide has been increasing, because its consumption is growing around 3% every year, especially in Europe and North America (Analdex, 2017); as indicated by the Ministry of Agriculture during the first quarter of 2018 compared to the same period of 2017, an increase in exports of 54% was registered, generating a great opportunity for the agricultural sector, and for the economic growth of the country. (Granados & Valencia, 2018).

The conditions of the land and climate of Eastern Antioquia are suitable for the production of this type of avocado; this activity is contributing to the economic growth of the region; the production and export of this product generates several positive and negative impacts regarding factors related to the environment, the economic and the social.

At present, different environmental phenomena on our planet are being presented; causing irreversible damage not only to natural resources but to mankind. So in recent years it is giving great importance to the preservation and care of the environment in different human activities. The correct use of the field benefits the development of the agricultural sector and all those who are related to it, generating employment and thus improving the living conditions of the peasants and their families; additionally, Colombia has been a country highly affected by the conflict and the forced appropriation of land, with the objective of planting illicit crops by different armed groups; This situation has also caused serious environmental impacts and social damages to our society.

Although, the economic growth is positive for the development of a country, the agriculture demands great quantity of natural resources and therefore little by little its degradation, also, the use of agrochemicals for its production generates a serious impact to the environment.

These difficulties, if they can not be overcome, will cause a rapid deterioration of natural resources and the producers will not be able to successfully develop their production projects, due to the loss of crops due to soil deterioration, lack of resources, especially water and to the general damage caused to the environment; this way, putting at risk both the economy and the sustainability and well-being of humanity.

However, several government entities and private entities, such as Analdex, Procolombia, Proexport, Ministry of Agriculture, Colombian Agricultural Institute, CORPOICA, Asohofrucol, CorpoHass, among other, have been developing operational work plans, training and productive transformation programs, focused mainly on promoting associative work and generating control mechanisms and the implementation of new agricultural practices as a great opportunity to achieve optimal conditions that help small and large producers to improve the different processes of the production and export chain.

In this research were analyzed the impacts on the economic, environmental and social level generated by the production and export of Hass avocado in the Eastern Antioquia, which intervene considerably in the welfare and development of the population.

**Problematizing question:**

¿What are the effects in the social, environmental and economic environment that the production, commercialization and export of Hass avocado generate in Eastern Antioquia?

## 1.3 Objetives

### 1.3.1 General Objetive

- Analyze the social, environmental and economic effects generated by the production, commercialization and export of Hass avocado in the East of Antioquia (Colombia) since 2014.

### 1.3.2 Specific Objetives

- Characterize the Hass avocado production, marketing and export process.
- Determine the social impacts of production, commercialization and export of Hass avocado in Eastern Antioquia.
- Determine the environmental impacts of production, commercialization and export of Hass avocado in Eastern Antioquia.
- Determine the economic impacts of production, commercialization and export of Hass avocado in Eastern Antioquia.
- Formulate strategies to mitigate the negative impacts and enhance the positive impacts generated by the production, commercialization and export of Hass avocado in the Eastern Antioquia

## 1.4 Justification

### 1.4.1 Theoretical Justification

Through international trade, social development and the economic growth of a country can be achieved. However, the desire for economic progress and industrialization is presenting serious damage to the environment and at the same time to the deterioration of human health. This research is carried out with the objective of analyzing and characterizing the social, environmental and economic effects generated by the production, marketing and export of Hass avocado in the Eastern Antioquia; this way making a contribution from the theory of sustainable development and its relationship with the theories of international business, which will propose actions, strategies, and effective environmental practices for the protection of the environment, social equity and sustainable economic development to ensure a better future for all, the preservation of the environment and the well-being of our society.

### 1.4.2 Social and/or Business Justification

This research will allow avocado producers, marketers and exporters to know strategies that mitigate the negative impacts and potentiate the positive impacts on the production and export of Hass avocado, as well as knowing the risks, strengths and weaknesses of its value chain, and in this way they can improve the productive and export techniques of the product. This study also aims to be a guide for future research that can serve farmers and producers to improve, strengthen and develop different agricultural and environmental practices to achieve produce, market and export their products in a socially and environmentally responsible and generating impacts positive economic.

Highlighting the importance of the field as a pillar in the development and progress of the country; Being clear that, through its impulse, it contributes to the generation of employment, the reduction of poverty, and the opportunity for a more dignified and quality life for rural people, who depend mainly on agricultural activities and which are, in large part, the most vulnerable population in the country.

### 1.4.3 Personal Justification

This research allows us to have another look at all the problems generated around us; knowing and being part of the reality that is currently being presented and that is becoming more and more important in society, such as the protection of our natural resources and social welfare, achieving greater awareness as citizens of care and respect for everything that surrounds us, taking into account that from the environment man obtains all the necessary resources to survive.

## 1.5 Referential Framework

### 1.5.1 Theoretical Framework

Starting from the theory of sustainable development and its relationship with international trade, it is established that sustainable development refers to the progress and improvement of the quality of life of society, without negatively compromising natural resources. Through sustainable economic development the balance between caring for the environment, economic growth and social welfare can be maintained.

The term sustainable development appears for the first time in 1987 with the publication of the Brundtland Report, carried out by the United Nations World Commission on Environment and Development, becoming a reference for the implementation of sustainable development policies and strategies. This report considered the negative environmental consequences generated by economic development, industrialization and globalization; in which the concept of sustainable development was determined as the new way forward, defined as "Sustainable development is development that satisfices the needs of the present generation without compromising the ability of future generations to satisfy their own needs". (Gómez, 2014, pág. 16). Under this concept, sustainability is considered as the integration of environmental, social and economic aspects; the interaction of these three factors and the joint work in favor of economic development and the preservation of the environment.

Sustainable development is based on three main aspects: the environmental aspect (natural resources), the economic aspect (the desire for progress and the satisfaction of human needs) and the social aspect (quality of life). "Sustainable development implies change; sometimes we want to improve or transform the system itself, on the other hand, we want to change the system to improve some of its products" (Gallopín, 2003, pág. 12).

In recent decades, scientists began to observe different changes and environmental impacts worldwide, generated mainly by industries and various activities associated with the human species, causing this loss of biodiversity and irreversible damage to natural resources. As a result of this situation, it was proposed the possibility of economic development where the environment is protected, through the commitment of all parties involved to establish a

social, economic, and environmental change, so that the environment can recover according to it is affected by human activity.

Over time, different contributions have emerged, in which they have linked the concepts of production, consumption and growth as the basis of an economic system, indicating that most of the world economy is the product of land exploitation.

Among the contributions associated with these theories is that of the economist Adam Smith, considered the father of modern economics and the first development economist. In 1776, he published "The Wealth of Nations", stating that wealth comes from the work of the nation and in which it interrelates history, human nature, ethics and economic development. (Vergara & Ortíz, 2016). The theory proposed by Smith, on international trade, called the theory of absolute advantage refers to "that each country specializes in producing those goods for which it has absolute advantage, measured by the lower average cost of production in terms of of work with respect to other countries" (Rivas & Vázquez, 2016, pág. 10); this way achieving benefits through trade.

Another theory corresponds to the economist David Ricardo, the theory of international trade, in which states that a country should specialize in those goods and services that can produce more efficiently and acquire from other countries those that produce less efficiently ; emphasizing productivity. In addition, Ricardo contributed the theory of differential rent, which is based on the three factors of production: land, labor and capital; indicating that when there is an increase in the population, there is also an increase in the demand for food, which implies the cultivation and exploitation of less and less fertile lands, generating an increase in the price of agricultural products, sustaining through its theories that economic development would end due to the scarcity of natural resources. (Vergara & Ortíz, 2016).

Another of the economic theories that refers to the analysis of impacts, is the theory of externalities, which is described as those activities that affect others without them paying for them or being compensated. As proposed by San Juan, cited by Mendezcarlo and others, "According to economic doctrine, an externality is generated when the activity of an economic agent causes a real involuntary effect on the welfare of another agent, this

variation may be an improvement or an impoverishment" (Mendezcarlo, Medina, & Becerra, 2010).

An example of a negative externality is the damage to health in people who are part of a society highly contaminated by different industrial processes. Also, there are positive externalities; an example of this is the company that paves the access road to its facilities and this paved road is still serving the community for the easy transportation and mobility of its products.

### 1.5.2 Conceptual Framework

This research focuses on determining the social, environmental and economic impacts generated by the production and export of Hass avocado in the Eastern Antioquia. In this regard, it is understood that "A social impact is the effects or changes that cause a certain action, intervention or phenomenon on a given community". (Hernández W. , 2013, pág. 20). Avocado due to its high demand generates that crops and land are treated with fertilizers or chemicals to achieve a quality product, generating a high environmental impact, defining it as the "Change in the environment, whether adverse or beneficial, as a total or partial result of the environmental aspects of an organization" (ICONTEC, 2015); impacts that are caused by human activities or nature itself. At present, multiple environmental problems are being presented, such as the pollution of rivers, the loss of biodiversity, the erosion of water, and air pollution affecting the integrity of natural resources and of all humanity.

The production, commercialization and export of avocado generates important economic effects, promotes the generation of employment, and stimulates the growth and consolidation of the economic sector. "The economic effects depend on the action or phenomenon caused, they are usually positive from the point of view of those who promote them, they can have negative consequences, which can become predominant over segments of the population without influence". (Hernández, 2013).

The negative impacts generate irreversible social and environmental damage that society pays without any fault; this is called cost outsourcing that "is to transfer to others (society,

neighboring communities, the State, employees, other companies) costs of the damage caused; in this case, the cost of the effects of pollution." (Atehortúa, 2017, págs. 49-50).

The supply chain is composed of three important processes: Production, which refers to the creation and generation of a good and the set of activities and means necessary for its development (Canteli, Cantero, & Miguélez.), being this the initial stage of all economic process; Commercialization, which consists of the process of getting the product to the consumer through the sale and introducing it into the market. (Kotler & Armstrong, 2008); And at last, the Export that "implies producing goods in the local market and selling them in foreign markets, is the method that has the least risk and effort, since it avoids many of the fixed costs. It is commonly used as the first way of penetration in a market." (Gallego, 2014, págs. 48-49).

### 1.5.3 Legal Framework

Based on the regulations, the inspection and control of Hass avocado producers and exporters is achieved in order to guarantee a quality product and thus facilitate entry into international markets; The following are the legal requirements that must be taken into account:

Decree - Law 2811 of 1974, of the Presidency of the Republic of the national code of the renewable natural resources; presents several articles in which it indicates that natural resources must be used efficiently to achieve maximum utilization, conservation and proper soil management; It also emphasizes the potential use of soils since it creates socio-economic aspects for the region.

Law 9 of 1979 of the Congress of the Republic, National Health Code, presents several articles emphasizing the sanitary control of water and agricultural and livestock activity, being essential for the socioeconomic development of the country; its preservation and conservation.

Resolution 3180 of August 26, 2009 ICA, which establishes all the requirements and procedures for the production and distribution of propagation material of fruit trees in the national territory and also dictates other provisions to take into account.

Resolution 448 of 2016 of January 21, 2016 ICA, this resolution refers to the documentary, infrastructure and technical records that must be taken into account by Hass avocado exporters.

Resolution 1507 of February 22, 2016 ICA, whereby the pests of official control are declared in avocado cultivation and also establishes the management and control measures for this product.

Resolution 3973 of April 14, 2016 ICA, which establishes the regulations for the obtaining of the phytosanitary license for the mobilization of plant material in the national territory.

Resolution 30021 of April 28, 2017 ICA, by means of which the requirements for the certification of Good Agricultural Practices (G.A.P) in primary production of vegetables and other species for human consumption are established.

Colombian Technical Standard NTC 1248. Agricultural products. Avocado. (Instituto Colombiano de Normas Técnicas y Certificación, 1994)

Colombian Technical Standard NTC 1248-2. Fresh fruits. Avocado. Packaging specifications. (Instituto Colombiano de Normas Técnicas y Certificación, 1996, a)

Colombian Technical Standard NTC 1248-3. Fresh fruits. Avocado. Storage and transport. (Instituto Colombiano de Normas Técnicas y Certificación, 1996, b).

Likewise, those described below, by which substances toxic to human health and the environment are examined, regulated and controlled. The proper handling of waste by the use of pesticides, and the minimum standards related to the safety and health management system at work for all employees of the different productive sectors.

Resolution 1675 of December 2013. Issued by the Ministry of Environment and Sustainable Development, which establishes the elements that must be contained in Return

Management Plans for Post-Consumption Products of Pesticides. (Ministerio de Ambiente y Desarrollo Sostenible, 2019).

Resolution 0312 of February 2019. By which the Minimum Standards of the Occupational Health and Safety Management System SG - SST are defined. (Ministerio del Trabajo, 2019). This norm is relevant to this investigation because it imposes on employers in general, including agricultural producers, traders and exporters, a series of requirements to protect the safety and health of their workers. Although it is a very positive initiative from the perspective of safety, it involves the employer incurring additional costs, such as hiring a technologist or occupational safety and health professional. It is important to point out that this regulation obeys to the commitments that Colombia has assumed by becoming part of the Organization for Economic Cooperation and Development (OECD) since May 2018.

Decree 1496 of August 6, 2018. By which the Globally Harmonized System of Classification and Labeling of Chemical Products is adopted and other provisions are issued in the field of chemical safety - SGA of the United Nations Organization. (República de Colombia. Ministerio del Trabajo, 2018). This decree is relevant to the present work because it imposes new standards in terms of labeling and safety data sheets for chemical substances. These rules apply to avocado producers who use agrochemicals and fertilizers in their production processes, which has a significant environmental impact.

## 1.6 Methodological Framework

### 1.6.1 Research method

Research is defined as a set of systematic, critical and empirical processes that are applied to the study of a phenomenon. (Hernández, Fernández, & Baptista, 2014, pág. 4).

This project according to the objectives presented corresponds to a deductive type of investigation; starting from the most general to the most specific.

- **Research approach**

It was carried out through a mixed approach, which consists of the combination of two approaches (quantitative and qualitative), which allowed collecting the data and information necessary to present and explain in more detail the impacts that our research presents. The studies of mixed approach "represent a set of systematic, empirical and critical research processes and involve the collection and analysis of quantitative and qualitative data, as well as their integration and joint discussion, to make inferences product of all the information collected" (Hernández, Fernández, & Baptista, 2014, pág. 580).

- **Type of study**

This study was carried out under an explanatory approach, which allowed establishing, describing and explaining the impacts caused by the production and commercialization of Hass avocado for export. "As the name implies, its interest is focused on explaining why a phenomenon occurs and under what conditions it manifests or why two or more variables are related" (Hernández, Fernández, & Baptista, 2014, pág. 95). Through this approach, the relevant impacts to the sector are explained and the different factors and social, environmental and economic effects of the Hass avocado production and export process in Antioquia are explained.

### 1.6.2 Investigation methodology

- **Techniques and instruments for gathering information**

For the development of this research it was necessary to perform interviews through a series of questions made to producers, marketers, and exporters, as well as public and private institutions that are part of the Hass avocado cultivation chain, to know and analyze the strengths and weaknesses presented by the different processes.

Through visits and field work in some producing farms in order to observe the different processes and aspects of the entire production, marketing and export activity.

Information was collected in order to present and describe data from sector sources such as: ICA, ASOHOFRUCOL, CORPOHASS, CORPOICA, DANE, and MINAGRICULTURA.

- **Selection and analysis of information**

The following instruments were used: Problem Tree and SWOT Matrix.

The problem tree is proposed in order to identify a central problem, which is tried to solve using a cause and effect type relation; the trunk of the tree is the central problem, the roots are the causes and the glass the effects.

The logic is that each problem is a consequence of those that appear below it and, in turn, is the cause of those above, reflecting the interrelation between causes and effects. The problema tree is constructed in the following way.

- Formulate the central problem.
- Identify the effects and verify the importance of the problem.
- Analyze the interrelationships of the effects.
- Identify the causes of the problem and their interrelations.
- Diagram the problem tree and verify the causal structure.

This instrument made it possible to identify the possible social, environmental and economic impacts (positive or negative) of the production, commercialization and export of the Hass avocado. The intention was that through interviews and the consultation of documentary sources it could be validated if in effect those are the impacts or if there are additional ones.

The SWOT matrix is a diagnostic tool that allows evaluating the internal and external impacts of a topic or organization; for this case (the production, marketing and export of Hass avocado) given its current situation and context, are identified the areas and activities that have a greater potential and that help to minimize negative impacts.

This matrix is constructed in the following way:.

- Internal Strenghts
- Internal Weaknesses
- External Opportunities
- External Threats

Initially, the four components of the matrix are identified, divided into the internal aspects that correspond to the strengths and weaknesses, and the external aspects or the context in which the organization operates that correspond to the opportunities and threats.

The formulation of strategies with the SWOT methodology is more an art than a technique, in which the aim is to create the best associations W→O; W→T; S→O; S→T; to mitigate the negative impacts and thus enhance the positive impacts, creating strategies that can be implemented by producers, traders and exporters of Hass avocado in Eastern Antioquia. With the strategies W→O it seeks to take advantage of external opportunities to mitigate internal weaknesses. With the strategies W→T it seeks to mitigate internal weaknesses to face external threats. With the strategies S→O it seeks to use internal strengths to take advantage of external opportunities. And with the strategies S→T it seeks to take advantage of internal strengths to face external threats.

- **Control of bias**

To reduce the bias, we tried to ensure that the research information came from reliable sources with the aim of giving results to problems for society and its environment. Several actors in the supply chain were interviewed, in order to reduce the bias related to the specific perception of each one.

### 1.7 Project scopes

The present investigation was made to the agricultural sector of the Eastern Region of the Department of Antioquia (Colombia), referring to the production, commercialization and export of Hass avocado, in the period between the year 2014 to 2019.

# 2. Investigation Development

## 2.1 Characterize the process

### 2.1.1 Production

**Characteristics of the fruit**

The avocado identified with the scientific name *Persea Americana Mill,* It is a tropical fruit originated in Mexico and Guatemala 10,000 years ago, it is classified in three ecological races, which developed in different areas and are known as Antillean, Guatemalan and Mexican. Its characteristics differ in the foliage color, the size of the fruit and the plant. (Instituto Colombiano Agropecuario, 2012, pág. 6).

The Hass variety is an avocado predominantly Guatemalan but with some Mexican genes. It was patented in 1935 by Rudolph Hass, in Habra Heights (California), by virtue of the quality of its fruits, high yield in production and late maturation, and its adaptation to subtropical conditions. The fruits are of medium size, oval shape, skin with rough texture and a green color that darkens when ripe. Its pulp is creamy and has a great nutritional value.(Bernal, Díaz, & Tamayo, Tecnología para el Cultivo del Aguacate, 2008).

Among other varieties of avocado planted in Colombia are the common or criollo, typical of the Antillean race, this corresponds to long-necked fruits, smooth peel and low oil content, and the variety Lorena or papelillo, originated in the Cauca Valley; it is characterized by its fruits are elongated and large in size, and its bark is smooth, thin and bright. (Bernal, Díaz, & Osorio, Actualización Tecnológica y Buenas Prácticas Agrícolas (BPA) en el Cultivo de Aguacate, 2014).

**Figure 1: Hass avocado**.
Source: *(ANALDEX, 2019)*.

**How is the production**

For its production, the process must be well planned so that the crop can meet all the indicated objectives and requirements. An internationally accepted methodology to mitigate the social and environmental impacts in production is the Good Agricultural Practices (GAP), which deal with the "Responsibility of the quality of the product, the consumer, the producer, its workers and their family, responsibility with the environment and socio-business responsibility." (Atehortúa, 2017, pág. 139). It is a set of strategies and recommendations that can be applied to the different productive stages. These allow the tasks carried out in the different processes to be carried out properly, from the selection of the land and the material to be planted, to the delivery from the product to the final consumer, taking into account the protection of the environment, the safety, health and well-being of the workers; guaranteeing the use of products free of contaminating agents that represent a risk for humanity, and the reduction of the use of agrochemicals (pesticides and pesticides) in order to minimize the environmental impact. The GAPs become a good reference for the programming, organization and coordination of an adequate production process. (Bernal, Díaz, & Osorio, Actualización Tecnológica y Buenas Prácticas Agrícolas (BPA) en el Cultivo de Aguacate, 2014, págs. 152,153).

Knowing about the phenology (relationship between climatic factors and the cycles of living things) of the crop helps to make decisions regarding the appropriate location, requirements in climate and soil and management of pests and diseases. Likewise, to determine what factors can favor or affect it during the production process and take the appropriate measures with respect to the crop in general. (Instituto Colombiano Agropecuario , 2012).

For an efficient production of the Hass avocado it is fundamental to know and take into account the following aspects:

- Identify the whole process regarding the productive unit.
- Recommended use of the soil.
- Quality and quantity of water available and easy access to it.
- Climatic and agro-ecological conditions of the area where the crop is located.

- Resources that the area has (infrastructure, road network, services).
- Recognition of the area (locate facilities, analysis of soils, boundaries, water sources, roads, etc.) and identification of risks for the care of the product, the environment and the health of workers.
- Proper handling and preparation of soil and planting.
- Irrigation, fertilization and pruning activities. (Instituto Colombiano Agropecuario, 2012).

**Production risks**

Generally, crops are affected by pests and diseases caused by fungi and proliferation of foci of infection; factors that generate serious sanitary problems and that limit the productivity of the crop. As a result of this, producers have been affected by the loss of crops and the reduction of their income, while the production costs increase due to the use of pesticides and products for phytosanitary management of their crops.

Another factor that affects production is the low financial capacity of farmers to implement technology and the use of tools and appropriate processes that allow the improvement and optimization in the development of productive projects, for harvesting and production.

**Harvest calendar**

According to the harvest calendar, fruit availability is available throughout the year, however, due to the agroecological and physiological conditions of the crop, the harvest peak is between the months of October and January. The conditions in Antioquia allow harvesting avocado during a longer period, related to the other departments.

**Table 1:** Hass avocado harvest calendar.

| CALENDARIO COSECHA AGUACATE HASS | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Departamento** | **Ene** | **Feb** | **Mar** | **Abr** | **May** | **Jun** | **Jul** | **Ago** | **Sep** | **Oct** | **Nov** | **Dic** |
| Antioquia | | | | | | | | | | | | |
| Caldas | | | | | | | | | | | | |
| Cauca | | | | | | | | | | | | |
| Risaralda | | | | | | | | | | | | |
| Quindío | | | | | | | | | | | | |
| Tolima | | | | | | | | | | | | |
| Valle del Cauca | | | | | | | | | | | | |

*Source: National Avocado Council Cited by MINAGRICULTURA 2018. (Granados & Valencia, 2018)*

## Size of world production

In the world ranking of avocados, Mexico is the largest producer worldwide, Michoacán is the state that produces the most avocados, and of the best quality, so that almost all production is destined for export. Colombia is the fourth producing country and the third in terms of harvested area. In 2017, its harvested area was 35,114 hectares and its production was 403,184 tons. (Granados & Valencia, 2018).

**Table 2:** Worlwide production of avocado **(All varieties)**

| | País | Producción (Ton). |
|---|---|---|
| 1 | México | 2.021.609 |
| 2 | Dominicana Republica | 643.443 |
| 3 | Perú | 487.272 |
| **4** | **Colombia** | **403.184** |
| 5 | Indonesia | 326.284 |
| 6 | Brasil | 209.176 |
| 7 | Kenya | 188.368 |
| 8 | Estado Unidos | 184.714 |
| 9 | Chile | 146.981 |
| 10 | Otros | 1.078.954 |

**Table 3:** Harvest area of avocado **(All varieties)**

| | País | Área Cosechada Has. |
|---|---|---|
| 1 | México | 180.536 |
| 2 | Perú | 37.871 |
| **3** | **Colombia** | **35.114** |
| 4 | Chile | 29.933 |
| 5 | Indonesia | 23.957 |
| 6 | Estado Unidos | 23.241 |
| 8 | China | 20.065 |
| 9 | Ethiopia | 17.835 |
| 10 | Otros | 178.689 |

Source: FAOSTAT Cited by MINAGRICULTURA 2017. (Granados & Valencia, 2018)

It is evident that the productivity presented in table 2 and 3, results in that Mexico has a productivity of 11.2 tons / hectare, Colombia's productivity is slightly higher with 11.48 tons / hectare, with Peru having a higher productivity corresponding to 12.87 tons / hectare 12% higher than that of Colombia. The United States presents a lower yield with 7.94 Tons / hectare, compared to the other countries.

**National Production**

El cultivo de aguacate Hass corresponde al 21% del total de área sembrada con aguacate en el país. "Se estima que cerca del 68% del área sembrada se encuentra en edad productiva y el restante se encuentra en etapa de desarrollo, por lo tanto, se espera que la producción anual del fruto se incremente paulatinamente". (Granados & Valencia, 2018).

**Table 4:** National production of Hass avocado.

| Variable | 2014 | 2015 | 2016 | 2017 | 2018* |
|---|---|---|---|---|---|
| Área (Ha) | 7.800 | 8.765 | 11.860 | 13.500 | 15.530 |
| Area Consechada (Ha) | 4.385 | 7.429 | 8.667 | 9.625 | 10.583 |
| Producción (Ton) | 28.500 | 52.000 | 65.000 | 77.000 | 95.250 |
| Rendimiento(Ton/Ha) | 6,5 | 7,0 | 7,5 | 8,0 | 9,0 |

Source: Municipal Agricultural Evaluations - ASOHOFRUCOL
Cited by MINAGRICULTURA 2018. (Granados & Valencia, 2018)

In the last 5 years there has been a significant increase in avocado harvest and production, from 28,500 tons in 2014 to 95,250 tons in 2018; representing an increase of 234% in production.

**Table 5:** Departmental Area, Production and Performance.

| Departamento | Área sembrada | Área cosechada | Producción | Rendimiento |
|---|---|---|---|---|
| Tolima | 4.138 | 2.820 | 28.197 | 10,0 |
| Caldas | 3.537 | 2.410 | 21.209 | 8,8 |
| Antioquia | 2.619 | 1.785 | 18.917 | 10,6 |
| Quindío | 1.818 | 1.239 | 10.532 | 8,5 |
| Valle del Cauca | 1.252 | 853 | 7.079 | 8,3 |
| Risaralda | 1.033 | 704 | 6.475 | 9,2 |
| Otros | 1.134 | 773 | 5.641 | 7,3 |
| TOTAL | 15.530 | 10.583 | 98.051 | 9,0 |

Source: Municipal Agricultural Evaluations – ASOHOFRUCOL
Cited by MINAGRICULTURA 2018. (Granados & Valencia, 2018)

The departments of Tolima, Antioquia, Caldas, Santander, Bolívar, Cesar, Valle del Cauca, Risaralda and Quindío represent 86% of the total planted area of the country. Tolima (28,197 tons), Caldas (21,209 tons) and Antioquia (18,917 tons) are the main representatives in fruit production, while the leaders in productivity and yield are Antioquia, Tolima and Risaralda (10.6, 10 and 9). , 2 tons per hectare, respectively).

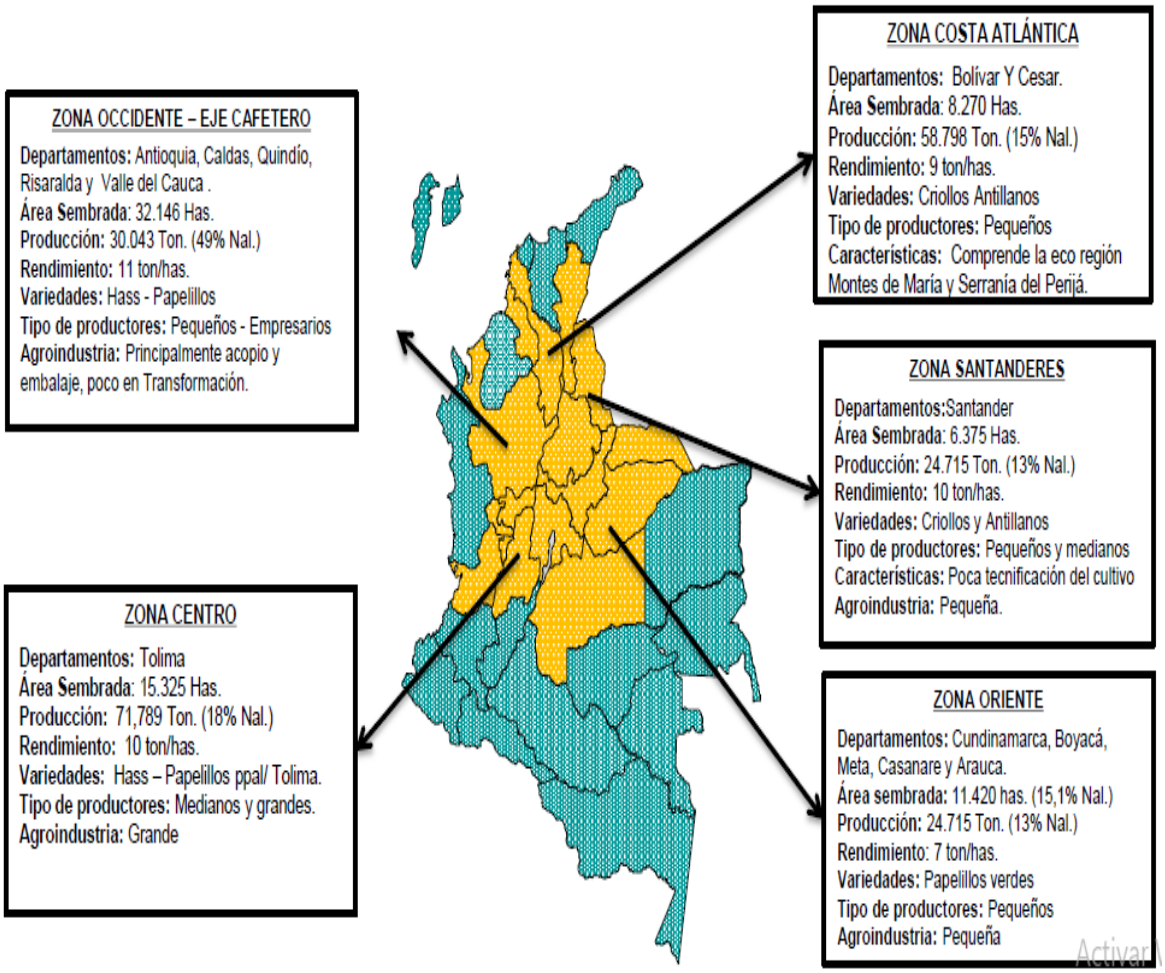



**Figure 1:** Main production areas in Colombia of Hass avocado.
Source: MINAGRICULTURA 2018. (Granados & Valencia, 2018).

**Departmental production (Antioquia)**

The region of Antioquia, unlike other territories, offers soils that make possible the cultivation and production of avocado during almost all the year, during the last 5 years Antioquia has evidenced a significant increase of its harvested area and production. This great potential that Antioquia has constitutes an important opportunity for the social and economic development of the region, transforming itself into an important zone of production, distribution and export of Hass avocado. (CORPOHASS, 2018).

**Production in Eastern Antioquia**

Within the areas planted with Hass avocado that the Department of Antioquia has, a large part of these are found specifically in Eastern Antioquia, in the municipalities of Sonsón, Abejorral, El Retiro, La Ceja, Guarne, San Vicente, among others.


**Figure 2:** Avocado cultivation in Eastern Antioquia.
Source: (Cámara de Comercio Oriente Antioqueño, 2018)

The municipalities with the highest number of farms cultivated with avocado are San Vicente, Sonsón and Abejorral. In this area, the production, commercialization and export of Hass avocado is gaining strength, becoming an important source of economic and social development for the region.

### 2.1.2 Commercialization

Commercialization is the process that unites producers and final consumers. This involves the different agents of the sector, producers, suppliers, and the different institutions and associations.

The commercialization chain is mainly responsible for the distribution of the product (supermarkets, wholesalers and retailers) includes all activities related to storage, sale, transportation and the process of delivery to the final consumer.

**Market Channels**

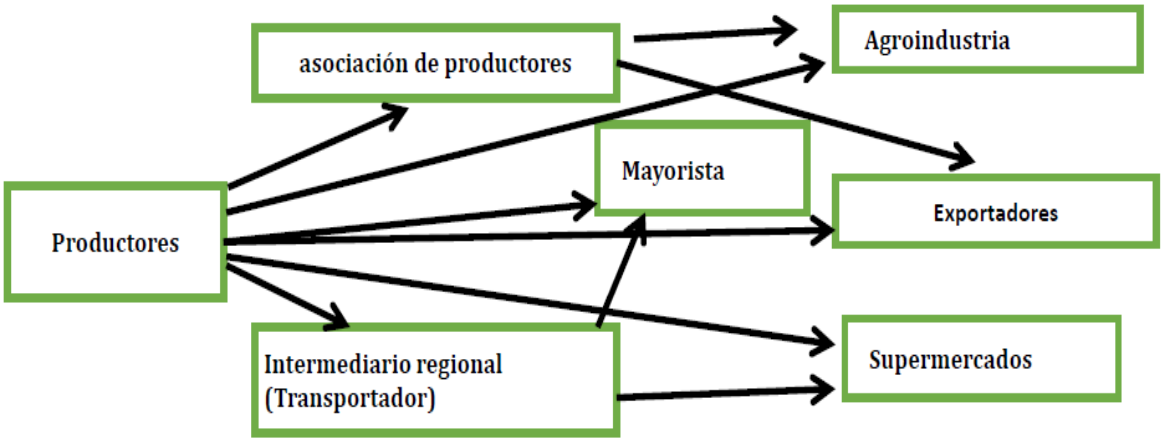



**Figure 3:** Market channels
Source: *(Camero, 2017)*.

In order for this process to be efficient, it must be known about consumer trends and responsiveness to what the market demands, and the client; taking into account the delivery time of the product, the price, the presentation characteristics, the packaging, the transport and the routes that are going to be used in order to optimize the marketing chain.


**Figure 4:** Marketing of Hass avocado.

Source: Own elaboration (photos taken at the Mayorista station in Antioquia).

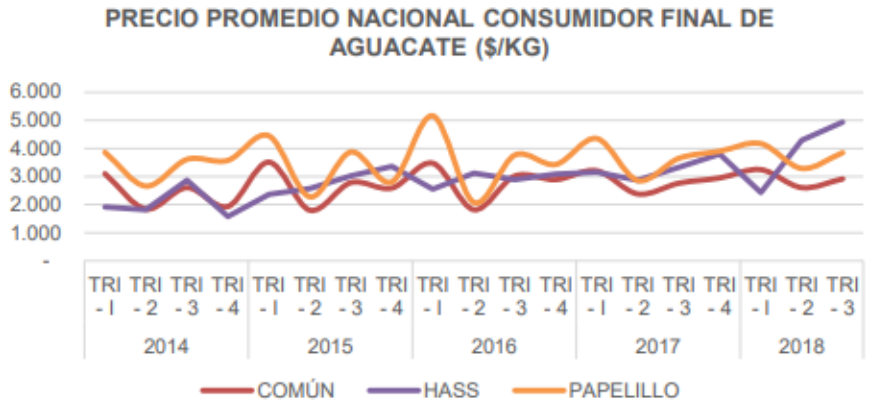

**Figure 5:** Marketing of Hass avocado in the Retiro.

Source: Own elaboration (Photos taken in the main park of the Municipality of El Retiro - Antioquia).

There is little presence of the product, of 100% of the Hass avocado that is produced in the area, 90% is for export and only 10% is for national commercialization (supermarkets, wholesale center, and national consumption). The deteriorated and lower quality product is what they leave to market in the department, its profitability is much better for export than for commercialization, so in eastern Antioquia it is not as strong.

**Price**

**Graphic 1:** Average national price for final consumer of avocado




Source: MINAGRICULTURA 2018 (Granados & Valencia, 2018)

The peaks of rising prices occur during the first quarter of each year, because during this time the volumes available in the markets for consumption are reduced.

In the second and third quarter, there is a stable trend in the price, while in the fourth there is a decrease in the price associated with the harvest season. (Granados & Valencia, 2018).

### 2.1.3 Exportation

**Table 6:** Avocado exporters worldwide.

| Exportadores | USD 2012 | USD 2013 | USD 2014 | USD 2015 | USD 2016 | Part.% 2016 | Var% 16/15 |
|---|---|---|---|---|---|---|---|
| Mexico | 877.908 | 1.106.274 | 1.395.254 | 1.632.463 | 2.023.982 | 46% | 24% |
| Holanda | 243.342 | 318.179 | 350.845 | 426.151 | 607.193 | 14% | 42% |
| Peru | 135.520 | 184.034 | 304.263 | 303.779 | 396.583 | 9% | 31% |
| Chile | 159.257 | 184.767 | 227.632 | 208.569 | 358.567 | 8% | 72% |
| España | 135.492 | 153.660 | 195.971 | 212.749 | 269.105 | 6% | 26% |
| Otros | 440.362 | 553.830 | 604.176 | 576.669 | 749.066 | 17% | 30% |
| Mundo | 1.991.881 | 2.500.744 | 3.078.141 | 3.360.380 | 4.404.496 | 100% | 31% |

Source: Trademap Cited by (PROCOLOMBIA, 2017).

The table shows that world avocado exports went from USD 1.991.881 in 2012 to USD 4.404.496 in 2016, showing an annual increase of 21.8%. The largest avocado exporter in the world for 2016 is Mexico with a 46% share.

**Table 7:** Importers of avocado worldwide.

| Importadores | USD 2012 | USD 2013 | USD 2014 | USD 2015 | USD 2016 | Part.% 2016 | Var% 16/15 |
|---|---|---|---|---|---|---|---|
| Estados Unidos | 913.751 | 1.141.822 | 1.603.046 | 1.703.479 | 1.993.006 | 40% | 17% |
| Holanda | 234.779 | 326.151 | 332.953 | 403.730 | 624.781 | 13% | 55% |
| Francia | 201.575 | 235.393 | 270.289 | 280.943 | 376.780 | 8% | 34% |
| Reino Unido | 74.550 | 90.753 | 111.335 | 169.549 | 242.442 | 5% | 43% |
| Japón | 161.901 | 162.020 | 168.569 | 153.516 | 211.145 | 4% | 38% |
| Otros | 653.447 | 827.288 | 989.123 | 1.147.177 | 1.477.658 | 30% | 29% |
| Mundo | 2.240.003 | 2.783.427 | 3.475.315 | 3.858.394 | 4.925.812 | 100% | 28% |

Source: Trademap cited by (PROCOLOMBIA, 2017)**.**

Global avocado imports increased from USD 2.240.003 in 2012 to USD 4.925.812 in 2016, showing an annual growth of 21.8%. The main importer is the United States, which had a 40% share in total avocado imports for 2016.

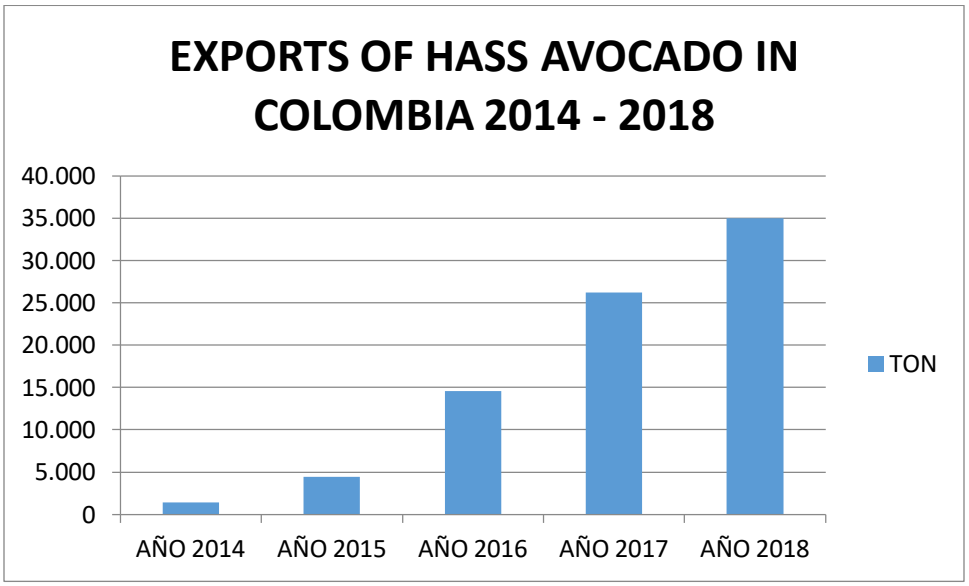
**Exports in Colombia**

Avocado exports of the Hass variety represent approximately 90% of the total exports of the avocado sub-heading in Colombia.

The growth in avocado consumption in the world continues to increase. Events such as the so-called "Super bowl" in the United States, trigger the consumption of avocado-based "guacamole", with which the sales of that fruit increase significantly. Thus, for example, for the realization of this sports event in 2019, Mexico dispatched to the United States no less than 120.000 tons of Hass avocado, strongly contesting that market with its Latin American competitors Peru, Chile and Colombia (Redacción Gestión. La República, 2019, párr. 1).

Sample of the above is presented in the following graph where there is a growth in exports during the last years, going from 1.408 tons in 2014 to 35.000 tons exported in 2018.

**Graphic 2:** Total exports of Hass avocado 2014-2018 (Tons).




Source: Own elaboration. Information taken from SICEX Cited by MINAGRICULTURA 2018. (Granados & Valencia, 2018)

**Destination exports**

The main export destination for the Colombian Hass avocado is Europe, mainly: the Netherlands, Spain and the United Kingdom.

Currently, the country has sanitary eligibility in order to consolidate in the North American market to which 268 Tons have successfully entered. (Granados & Valencia, 2018).

**Table 8:** Destination exports.

| | PAÍS DESTINO | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|
| 1 | PAÍSES BAJOS - HOLANDA | 1.369 | 3.318 | 7.385 | 10.184 | 11.982 |
| 2 | REINO UNIDO | 224 | 1.170 | 4.520 | 6.760 | 4.642 |
| 3 | ESPAÑA | 80 | 392 | 3.845 | 6.905 | 3.961 |
| 4 | FRANCIA | 44 | 407 | 1.481 | 1.592 | 1.351 |
| 5 | BELGICA | | | 104 | 2.047 | 1.332 |
| 6 | Otros. | 43 | 44 | 485 | 1.000 | 1.263 |
| | **Total general (Ton.)** | **1.760** | **5.332** | **17.821** | **28.487** | **24.532** |

Source: SICEX cited by MINAGRICULTURA 2018. (Granados & Valencia, 2018)

**Departments origin of exports**

Avocado exports have been led by the department of Antioquia contributing 56.7% of the total, followed by Risaralda with 23.6% and Valle del Cauca with 11.4% participation.

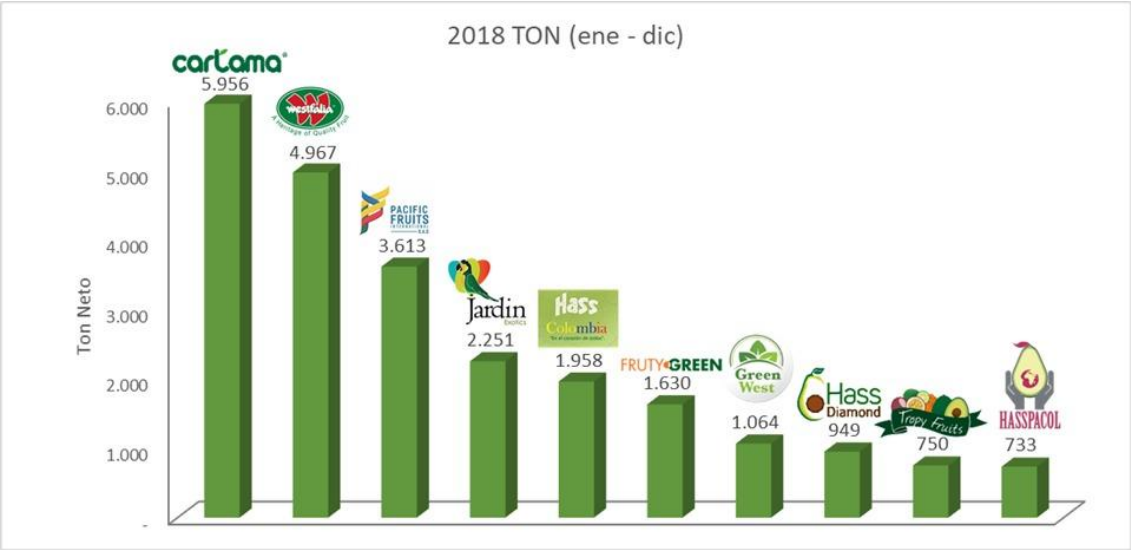
**Table 9:** Departments origin of exports.

| Departamento | Toneladas |
|---|---|
| Antioquia | 13.902 |
| Risaralda | 5.792 |
| Valle | 2.802 |
| Bogotá | 875 |
| Santander | 447 |
| Quindío | 274 |
| Cundinamarca | 184 |
| Caldas | 162 |
| Otros | 95 |
| **Total Exportaciones** | **24.532** |

Source: SICEX cited by MINAGRICULTURA 2018.
(Granados & Valencia, 2018)

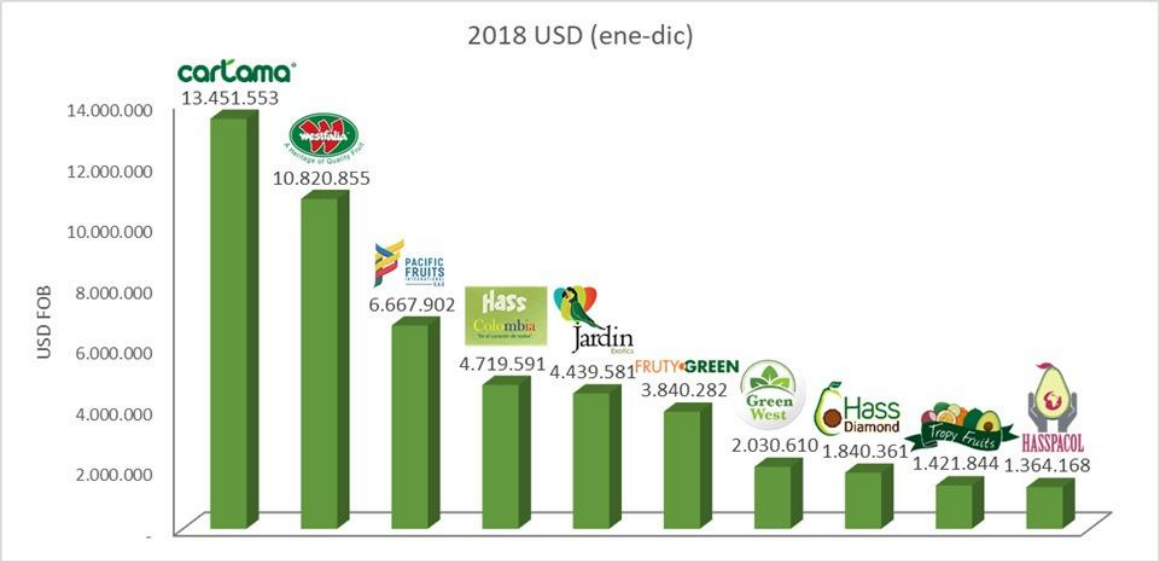
**Colombian companies exporting Hass avocado**

**Graphic 3:** Export companies of Hass avocado in Colombia.
(Tons exported)




Source: CARTAMA

**Graphic 4:** Export companies of Hass avocado in Colombia.
**(USD exported)**




Source: CARTAMA

The leading exporting company in Colombia is CARTAMA, it is a Colombian company which has been participating significantly among the exporting companies of the country; most producers in the Oriente region do the whole export process with this company, which supports them, accompanies and advises in the different stages of production and export. For the year 2018 the company exported USD 13.451.553 and 5.956 tons of Colombian Hass avocados.

**Figure 6:** Hass avocado tree (for export).

Source: Own elaboration (photo taken on the farm el Tercer Cielo in the Municipality of El Retiro - Antioquia).

**Export process**

Initially, the exporter must make a procedure to the Directorate of National Taxes and Customs (DIAN) which consists of registering in the Single Tax Registry (RUT), and be enabled in the boxes of obligations administered by the DIAN as exporter. Then it must proceed to search and classify the product according to its nature, in this case, Hass avocado, it is classified under subheading 0804.40; which allows to know the export documents, agreements between countries, taxes and charges in the country of destination and requirements that must be taken into account before export; These requirements are:

• INVIMA National Institute for the Surveillance of Food and Drug Certificates (This certificate is requested electronically and only once).

• Phytosanitary Certificate of the Colombian Agricultural Institute, ICA (This certificate is not electronic, it must be presented in the loading and unloading of the cargo, it is requested before ICA, it must be registered as an exporter of food and it is requested only once).

• Certificate of Sanitary Inspection of Exports of Foods and Raw Materials of the National Institute for Surveillance of Drugs and Foods, Invima. (This certificate is not electronic, and must be requested each time you want to export). (Dirección de Impuestos y Aduanas Nacionales , s.f.).

**Table 10:** Support documents for exports.

Documentos soporte para exportaciones – 0804100000

Cerrar ventana

| Documento - Entidad | Trámite | Requisito | Electrónico | Desde | Hasta | Paises |
|---|---|---|---|---|---|---|
| Cert inspec sanitaria exportac alimentos y materias primas - Instituto Nacional De Vigilancia De Medicamentos Y Alimentos | EMBARQUE/DESEMB | OPCIONAL | NO | 28-ago-2008 | ... | |
| Certificado de Exportación - Instituto Nacional De Vigilancia De Medicamentos Y Alimentos | PREVIO | OPCIONAL | SI | 05-ago-2008 | ... | |
| Certificado de no obligatoriedad - Instituto Nacional De Vigilancia De Medicamentos Y Alimentos | PREVIO | OPCIONAL | SI | 05-ago-2008 | ... | |
| Certificado fitosanitario - Instituto Colombiano Agropecuario | EMBARQUE/DESEMB | OPCIONAL | NO | 01-jun-2008 | ... | |

Source: (Dirección de Impuestos y Aduanas Nacionales , s.f.).

**Export Steps**

- Location of the tariff heading and sub-heading
- Register as an exporter
- Market study and potential demand
- Procedures of approval from ICA, INVIMA.
- Certificate of origin
- Customs clearance procedures with the DIAN: once the merchandise is ready and according to the INCOTERMS negotiation term used if applicable, use a cargo agent (airway) or maritime agent to contract international transport.
- Payment methods
- Exchange procedure refund of currency.

When the permissions have been approved by the corresponding entities, the next step is to verify the contracts and terms agreed in the negotiation; for this process, it is important to take into account the INCONTERMS international trade terms, given that these allow to identify the obligations between buyer and seller, and the conditions throughout the export process.

The INCOTERMS that are used worldwide are the following: EXW, FCA, CPT.CIP, DAT, DAP, DDP, FAS FOB, CFR and CIF.

The most used for the export of Hass avocado are FOB and CFR.

The incoterm FOB, which stands for "Free on Board" or "Freight on Board", is a shipping term that indicates that the seller must deliver the goods according to the instruction received from the buyer, in this case the seller puts the goods on board of the ship, which means that the responsibility and risk of the seller goes until the goods arrive on board the ship.

The incoterm CFR, which stands for “Cost and Freight”, is a type of negotiation that indicates that the seller must deliver the cargo to the destination agreed with the buyer, the seller must be responsible for paying the international freight and the risk is automatically transferred to the buyer after the seller has placed the goods on board of the ship, regardless of whether the freight was paid or not.

The INCOTERMS are fundamental to make a negotiation with foreign clients given that these become a sales contract where the relationship between buyer and seller is established, in order to show a clear negotiation of commitment between the parties. (Cámara de Comercio de Bogotá).

**Determination of the environmental, social and economic impacts of the production, commercialization and export of Hass avocado in Eastern Antioquia.**

In order to determine the social, economic and environmental impacts, secondary and primary sources were consulted. In the primary sources, 15 interviews were carried out

among producers, traders and exporters, listed in Table N ° 11, to which the interview instrument found in Annex N ° 1 was applied.

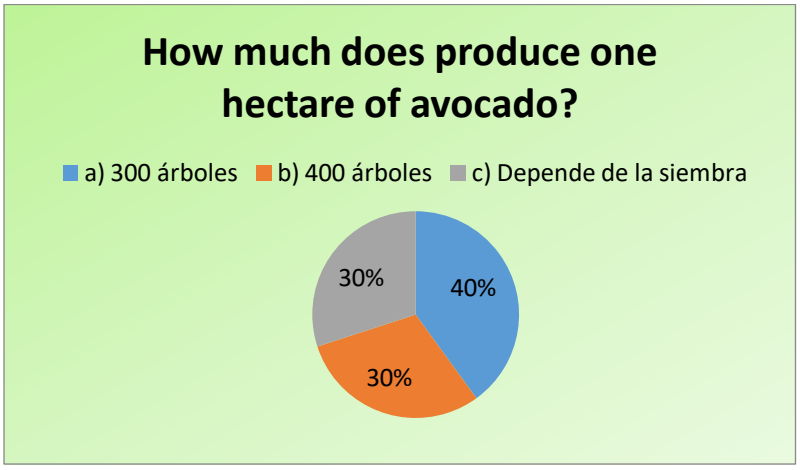
**Table 11:** List of producers, traders and exporters interviewed.

| Date of the interview | Interviewed name | Municipality | Company / place | Position |
|---|---|---|---|---|
| March 30, 2019 | Jonathan Morales | Medellín | Central Mayorista de Antioquia | Marketer |
| March 30, 2019 | Fredy Gómez | Medellín | Central Mayorista de Antioquia | Marketer |
| March 30, 2019 | Jhon Eder Sánchez | Medellín | Central Mayorista de Antioquia | Marketer |
| April 6, 2019 | David Zapata | El Retiro | Estate Getsemaní (Vereda Nazaret) | Producer |
| April 6, 2019 | Darío Mejía | El Retiro | Estate el Guarango (vereda pantanillo) | Producer / owner |
| April 6, 2019 | Darío Mejía | El Retiro | Estate el Guarango (vereda pantanillo) | Marketer |
| April 6, 2019 | Alexander Vallejo | El Retiro | Estate Tercer Cielo (vereda pantanillo) | Productor/agronomist |
| April 6, 2019 | Gilberto Buitrago | Rionegro | Supermarkets La Cantaleta | Marketer |
| April 6, 2019 | Pablo Emilio Montoya | El Retiro | Vereda Don Diego | Producer |
| April 6, 2019 | Alexander Vallejo | El Retiro | Estate Tercer Cielo (vereda pantanillo) | Productor/agronomist |
| April 6, 2019 | Mario Arenas | El Retiro | Vereda Don Diego | Producer |
| April 6, 2019 | Jorge Tamayo | La Ceja | Vereda San Rafael | Producer |
| April 11, 2019 | Alonso Jiménez | Rionegro | Estate la Azucena (vereda Santa Teresa) | Producer |
| April 11, 2019 | Iván Palacio | Rionegro | Finca la Bonita (Vereda Santa Teresa) | Producer |
| April 11, 2019 | Leonel Espinoza | La Ceja | Vereda la Miel | Producer |

The consolidated results of these interviews are presented below for each of the questions asked.

**Producers Survey**

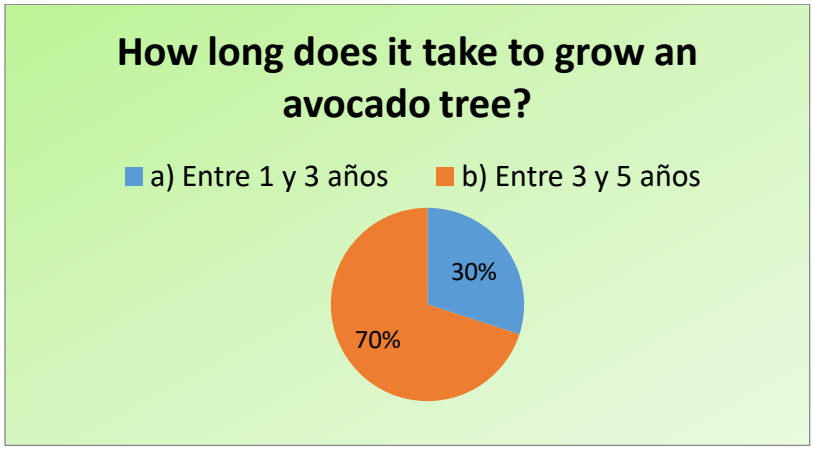
**Question 1**




**Graphic 5**: Trees produced in one hectare of avocado.

Of the 100% of the people surveyed 40%, they answered that one hectare of avocado can produce 300 trees, 30% responded 400 and another 30% indicated that this depends on the sowing; since the size and space between each tree planted interferes with the total amount that the hectare manages to produce. Thus, it is valid to establish that one hectare of land in Eastern Antioquia supports between 300 and 400 Hass avocado trees.

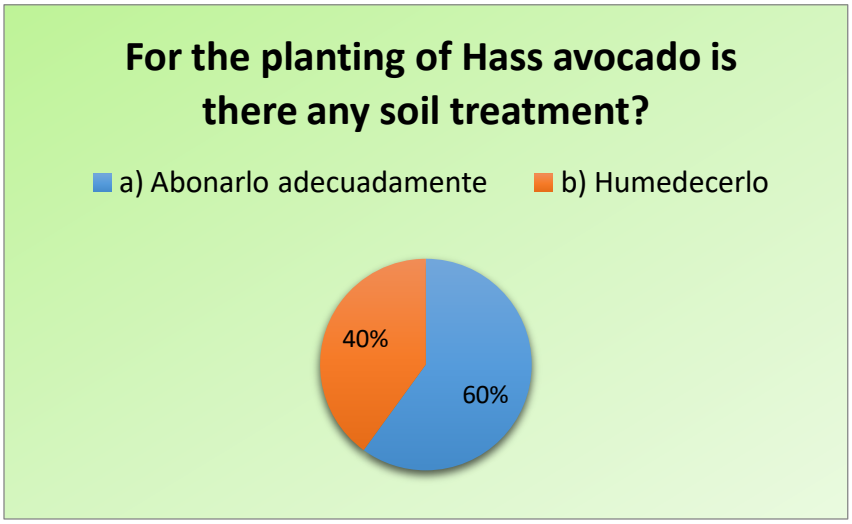
**Question 2**




**Graphic 6:** Avocado tree growing time.

70% of the surveyed population affirms that the avocado tree takes three to five years to grow; it is between the fourth and fifth year that the avocado is fully developed. Although, before this time the tree is already bearing fruit, it is more appropriate to let them mature and prosper properly. This is an important fact to be taken into account by a potential investor, since the investor should consider that only after the fifth year will his investment be completely productive and he will be able to start obtaining returns.

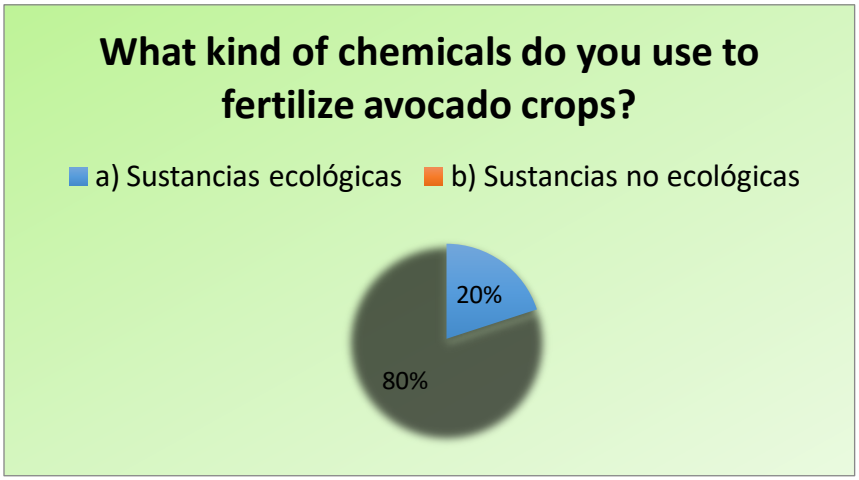
**Question 3**




**Graphic 7:** Soil treatment for the planting of Hass avocado.

The cultivation of avocado requires that the soil is humid, but especially that it is fertilized as expressed by 60% of the people surveyed, an adequate fertilizer to the land makes the crop grow in good conditions and with a good quality. This characteristic must be considered in terms of environmental impacts, since the cultivation of avocados necessarily demands the use of fertilizers that -depending on their characteristics- can have a significant environmental impact.

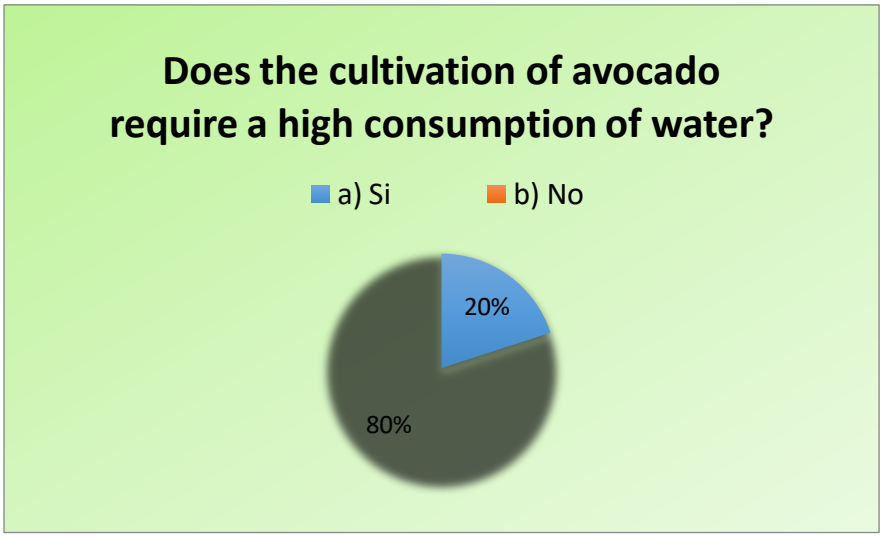
**Question 4**




**Graphic 8:** Chemical substances for crop fertilizer.

80% of the populations surveyed do not use organic substances, use different agrochemicals to fertilize; like potassium, magnesium, sulfur, iron, copper and nitrogen. While 20% make use of organic fertilizers such as animal droppings (chicken manure), organic waste, earthworm humus and ashes or cloaks of decomposed trees. Consistent with the analysis of the answers to Question 3, this poses a challenge in relation to the negative environmental impact that can be derived from the use of chemical fertilizers, with potential negative effects on water, air and soil. As an example, an investigation carried out in the Faculty of Veterinary Medicine and Zootechnics of the National University of Colombia, revealed that the use of urea as a nitrogen fertilizer releases a gas known as nitrous oxide, which is one of the most aggressive greenhouse gases and contributors to the global warming. (Garzón & Cárdenas, 2013).

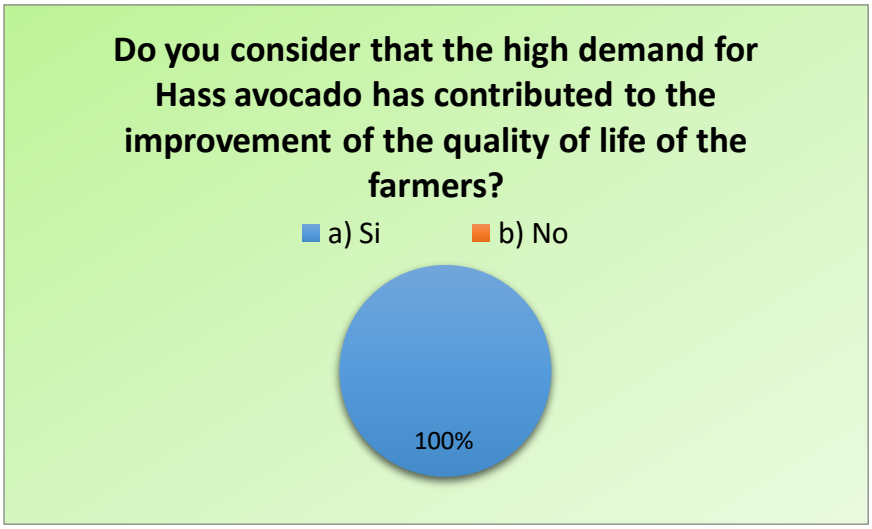
**Question 5**




**Graphic 9:** Water consumption in the avocado crop.

80% of respondents indicated that avocado cultivation requires water consumption; but in the zone of Eastern Antioquia not so much, since the rain waters make a process of natural irrigation, in time of drought it must be irrigated but generally the conditions of the climate of the region fulfill the function of irrigation during all the periods of harvest . 20% indicated that water is consumed, but especially during the first year of growth. This result of the investigation is important, because it indicates that the environmental impact on the water resource is not as significant in eastern Antioquia as it could be in other areas of the country as less favorable rain regimes and if they require additional irrigation.

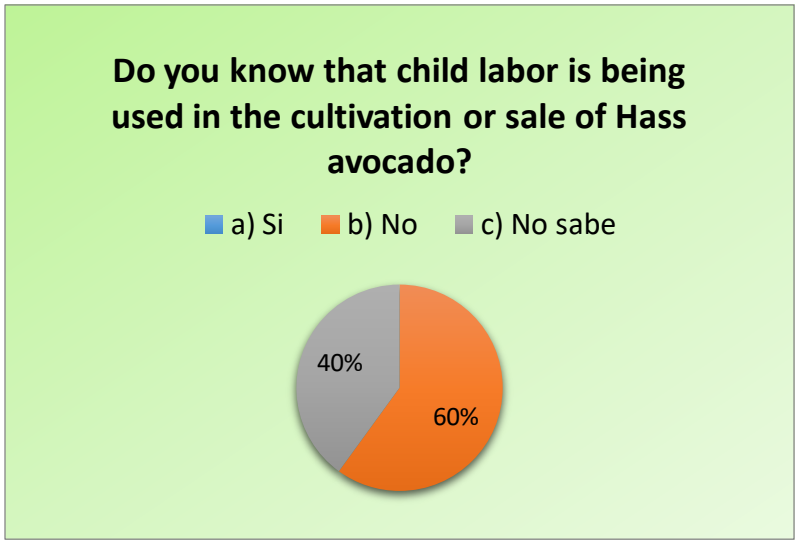
**Question 6**




**Graphic 10:** Improvement of the quality of life of the farmers.

100% of the surveyed population responded affirmatively to this Question; For all the inhabitants of the area, employment has increased and peasants have been formally employed, a situation that has improved the quality and living conditions of them and their families. This is undoubtedly one of the most positive and significant economic and social impacts that the entire Hass avocado supply chain has involved, since not only are people employed in direct production, commercialization and export activities, but there is also a lot of direct labor occupied around, in the provision of goods and services associated with this productive chain (tools and machinery, endowment and elements of personal protection for workers, surveillance services, food services, among others).

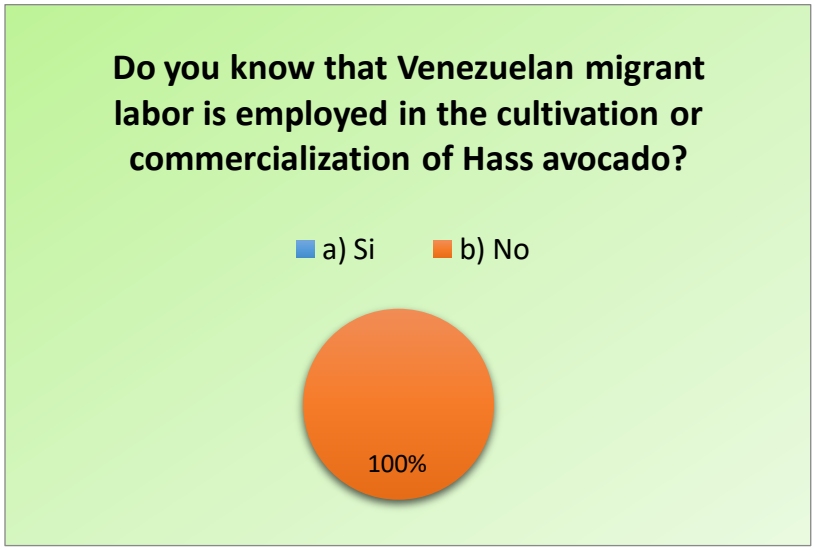
**Question 7**




**Graphic 11:** Employment of child labor.

60% of the people surveyed stated that the area does not use child labor to grow and sell avocados, and 40% do not know whether this occurs. This response suggests that there seems to be no negative social impact associated with the employment of children in the Hass avocado supply chain, which is not only relevant in terms of the local or regional impact, but may also be a requirement of the customers or consumers globally, which in many cases determine their purchase decision for information about the social behavior of their suppliers. (Atehortúa, 2017, págs. 34-35).

**Question 8**

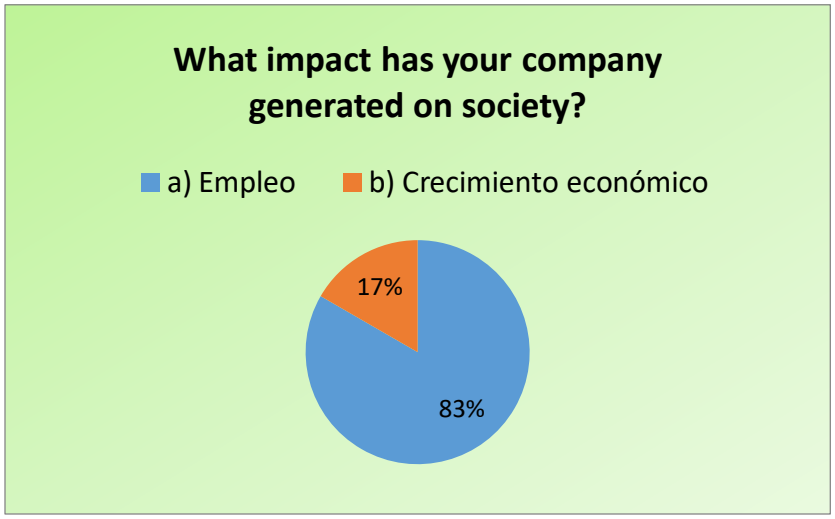



**Graphic 12:** Employment of Venezuelan migrant labor.

This question was introduced due to the current situation of abundant Venezuelan migrant labor, which is being exploited in other productive sectors, such as the coffee sector. 100% of the surveyed population affirms that Venezuelan migrant labor is not used in the production and commercialization of avocado, because they prefer to employ the peasants and inhabitants of the region. However, producers and marketers could also consider employing Venezuelan migrants, as long as they comply with all the legal requirements demanded by Migración Colombia and the Foreign Ministry to do so in an adequate manner and respecting these workers all their labor rights. No need to remember that there is the International Convention of the International Labor Organization ILO #097 on the protection of migrant workers, which unfortunately has not yet been ratified by Colombia. (Organización Internacional del Trabajo, 1952).

**Survey to marketers / exporters**

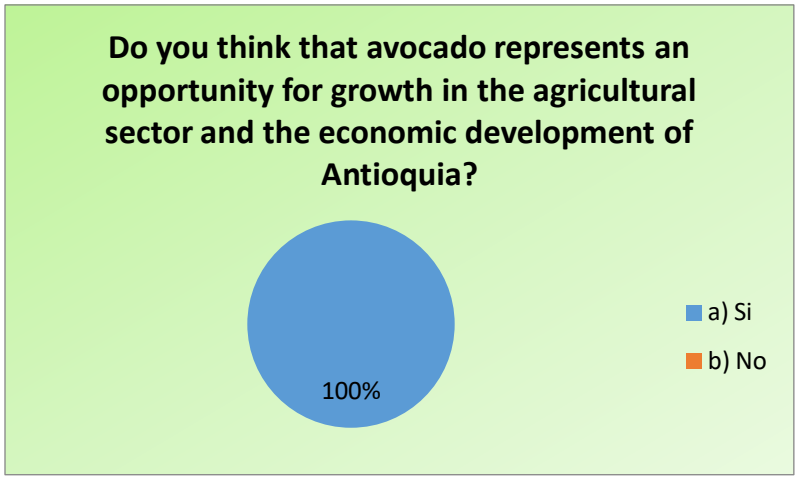
**Question 1**




**Graphic 13:** Impact generated in the society.

83% of the people surveyed indicated that the greatest impact that their company has generated in society is employment, direct and indirect, involved in all stages of production, commercialization and export of the product. From sowing, harvesting, packing, transport and sale. 17% expressed that they have generated economic growth in the area and in the agricultural sector of the country. These positive impacts coincide with the responses of the producers, which suggests that the Hass avocado international supply chain presents a great opportunity to generate economic development with social inclusion in Eastern Antioquia and, why not, in other areas both of the department and the country with similar agricultural vocation. Here it is also valid to affirm that the positive impacts do not derive only from the companies and direct employees of the sector, but also from the indirect economic spill over other suppliers of goods and services for the marketers and exporters (for example, suppliers of packaging, services of transport, surveillance services, among others).

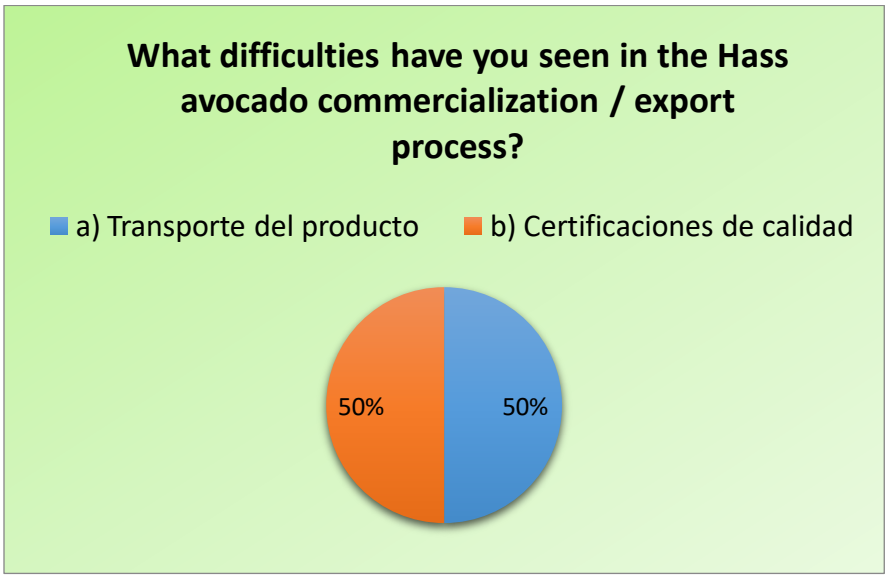
**Question 2**




**Graphic 14:** Opportunity for growth and economic development in Antioquia.

100% of the respondents consider that the avocado represents an opportunity for growth in the agricultural sector and the economic development of Antioquia, because this product has presented an increase in world consumption, which makes that its demand and production need is growing. Generating this a great opportunity for the social and economic development of the department.

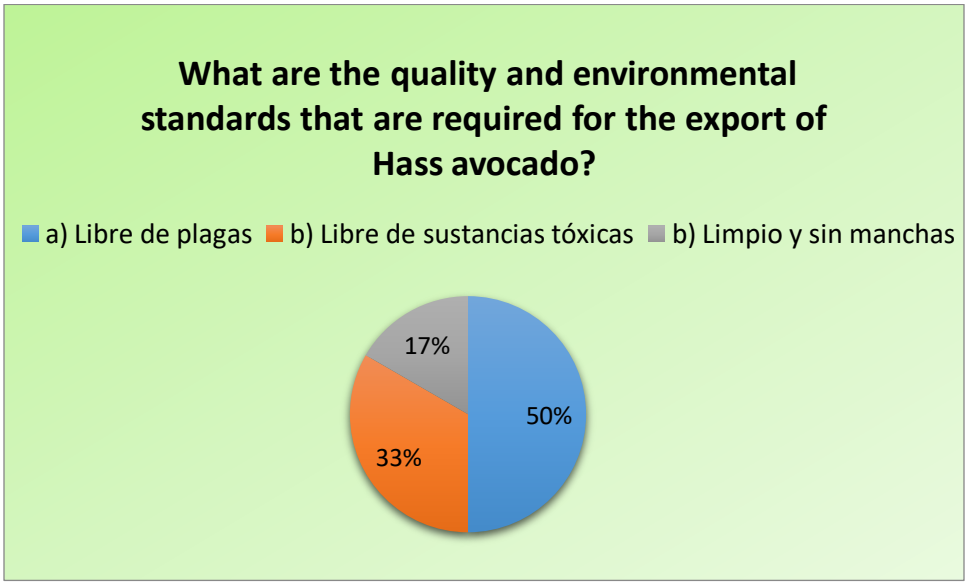
**Question 3**




**Graphic 15:** Difficulties in the commercialization / export process.

According to the 50% of the people surveyed, they find transport difficulty in marketing, due to the poor condition of the roads in different areas of the region, which considerably complicates the mobility of the product; because this is a perishable product in many situations, the deterioration of it is generated. The other 50% of the surveyed population evidenced as a difficulty obtaining quality certifications in order to access international markets. As has been pointed out by several authors, the requirement of certifications or quality seals can become a technical barrier to international trade, while also increasing the costs to the producer who must pay for the services of the certification bodies hired to this objective. (Atehortúa, 2017, págs. 137-139).

**Question 4**

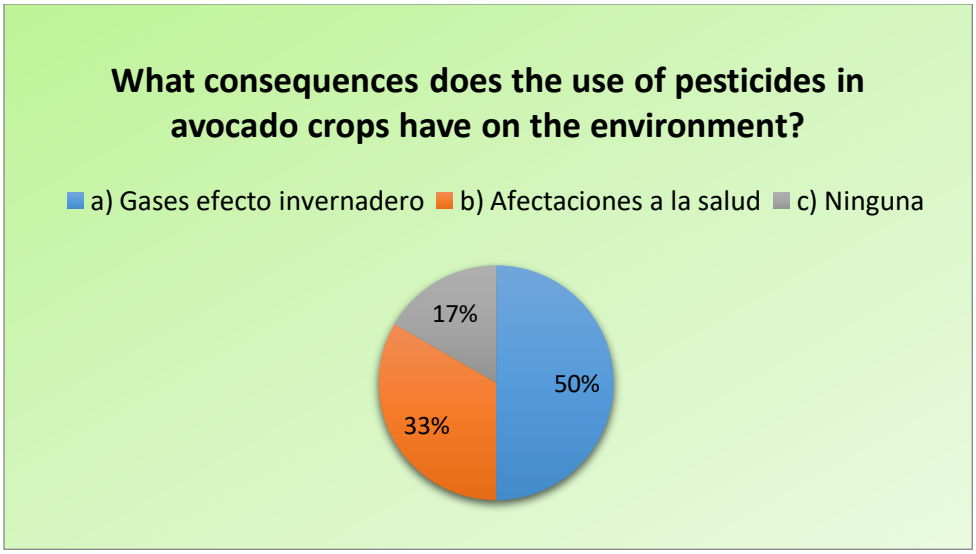



**Graphic 16:** Estándares ambientales y de calidad para exportación.

50% of the surveyed population indicates that within the quality and environmental standards required for the export of Hass avocado, the product must be free of pests and diseases, 33% indicate that it must be free of toxic substances, the product must not have any polluting agent that is harmful to the health of the final consumer, and 17% respond

that the product must be clean and free of stains; The avocado must have excellent quality to be exported. Because it is a food, it is clear that producers, traders and exporters are obliged to guarantee not only the quality but also the safety of the product, understood as that it will not cause any harm to the health of its potential consumers. This implies very strict sanitary controls along the entire supply chain, which are also subject to verification by authorities such as the Colombian Agricultural Institute or the National Institute for the Surveillance of Drugs and Foods (INVIMA).

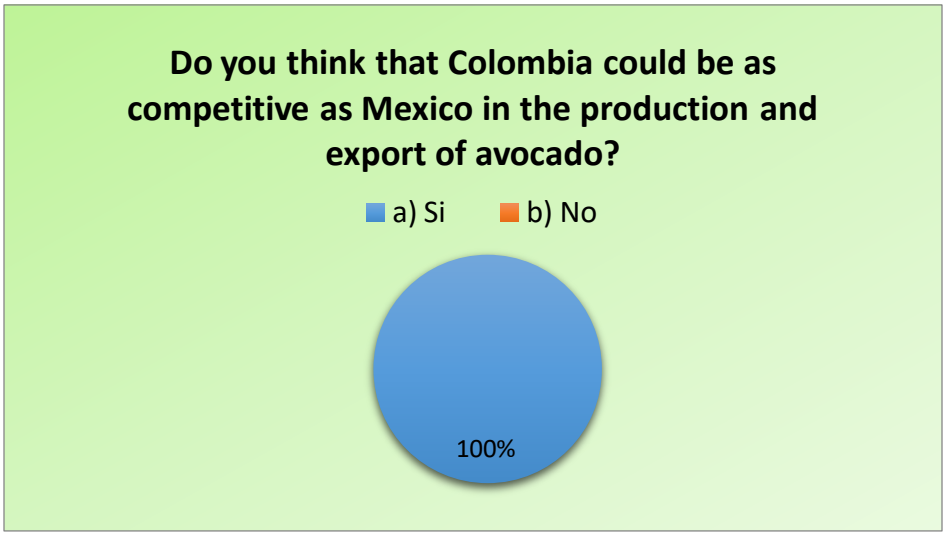
**Question 5**




**Graphic 17:** Consequences of the use of pesticides in the environment.

50% of the surveyed population expressed that the use of pesticides in crops generates greenhouse gases; the agrochemicals used in the different crops are necessary for their protection, but they emit harmful gases for natural resources, the environment and human health.

**Question 6**




**Graphic 18:** Competitiveness of Colombia in production and export.

100% of those surveyed indicated that Colombia can become as competitive as Mexico in the production and export of avocado; In spite of the fact that it is a process that requires time, Colombia has an important advantage over the rest of the countries, the conditions of the land and the climate are apt to harvest avocado during almost all the months of the year, likewise, the producers have been working hard to produce an excellent quality avocado, and thus achieve position as one of the best products in the world. However, this requires ensuring good agricultural practices, the technical accompaniment of specialized agronomists to guide the production work and the increasing strengthening of the knowledge of the producers, in order to ensure greater productivity for each hectare cultivated.

**Question 7**


**Graphic 19:** Destination of commercialization and export.

67% of the surveyed population exports to different European countries such as Spain, Belgium and France, and 33% commercialize it to Manizales, Cali and the entire Department of Antioquia.

To enter the United States, the demand is much higher in terms of phytosanitary and quality, so that exports to this country have become slower. Different public and private entities are providing advice to producers to enter the North American market.

In addition to the interviews with the actors of the international avocado supply chain, interviews were also carried out with entities related to the sector, which are listed in Table 12. An official of Analdex (which stands to the Asociasion Nacional de Comercio Exterior) , was interviewed, what offers a look from the union point of view and also share the pespective of several of the main exporters. These interviews are included in annexes 3, 4, 5, 6 and 7.

**Table 12:** List of entities interviewed.

| Date of the interview | Entity/Company | Interviewed name | Position |
|---|---|---|---|
| March 29, 2019 | ANALDEX | Giovanny Andrés Gómez | Director of economic affairs |
| April 4, 2019 | WESTFALIAFRUIT | Mauricio López Noguera | Commercial Manager |
| April 5, 2019 | HASS COLOMBIA | Sebastián Rodríguez | Environmental engineer |
| April 6, 2019 | CARTAMA | Héctor Salazar | Responsible for Supply |
| April 20, 2019 | BITACO HASS | Eugenio Valencia | Administrator |

## 2.2 Social impacts of Hass avocado production, commercialization and export in the Eastern Antioquia.

**Employment generation**

According to the people interviewed related to the sector, one of the positive social impacts is the generation of employment, different families from Antioquia depend on the sowing of the avocado. When generating employment, quality of life is also generated, this activity has undoubtedly been a great opportunity for the social development of the peasants of Eastern Antioquia. The data in Table 13 confirm the statements made by the interviewees.

**Table 13:** Employment generated in avocado production

| Tipo de Empleo | 2014 | 2016 | 2017 | 2018* |
|---|---|---|---|---|
| Directo | 12.034 | 12.850 | 13.107 | 13.631 |
| Indirecto | 36.102 | 38.550 | 39.321 | 40.894 |
| **Total Empleo Aguacate** | **50.150** | **53.416** | **54.445** | **54.525** |

Source: Agronet. Cited by MINAGRICULTURA 2018. (Granados & Valencia, 2018)

The generation of employment presents an upward trend year after year, related to the increase in production, commercialization and export of the product.

According to Héctor Salazar, producer and manager of the company CARTAMA (the main exporter of Hass avocado in Antioquia), the entry of foreign companies in the region, such as Chile, Mexico and Peru; Countries that are investing in the purchase of land for the production of this avocado variety have greatly benefited the inhabitants of the area, as these countries arrive looking for labor in the region, providing them with better paid salaries and benefits and guarantees better than those offered by the producers in the area, so that they can aspire in the future minimally to a pension after so much struggle and work in the field, which allows them to have more dignified and fair living conditions.

It also states that as a requirement to export the Hass avocado, the different companies that accompany the process not only demand a quality product and free of contaminating agents for the final consumer; but in addition to that, the producers who wish to export must have all employees legally hired and with access to all social benefits, thus formalizing employment for the peasants of the region; what guarantees a better quality of life for them and their families.

**Productive projects for displaced people**

In the municipality of Granada, Eastern Antioquia region, avocado production has had a great social impact; because many of the families living there were displaced from their lands by groups outside the law; different corporations provided help to these families by giving them the opportunity to acquire land again and also the opportunity to support them and train them for the production and cultivation of Hass avocado, which allowed this region to gradually progress socially and economically after the different situations of displacement and violence experienced.

In 2018 different entities of the agricultural sector developed a project called: Technological, Productive and Commercial Development of Avocado, with the objective of providing training and support to small producers and allowing the development of the Antioquia community, especially the development of the peasant. This project has benefited several municipalities in the Eastern and four in the North of Antioquia, where 220 hectares of Hass avocado were planted.

**Decrease in illicit crops**

Another of the programs developed by the Ministry of Commerce, Industry and Tourism, and the Ministry of Agriculture and Rural Development, was the project called Agro Exporta, which has promoted the Colombian agro, several municipalities of the East as Abejorral, Cocorná, Guarne, El Retiro, El Carmen, Nariño, San Carlos, San Rafael, San Vicente, Sonsón and La Ceja have benefited from this project, which has as a priority to support the areas most affected by the conflict; contributing to the development and improvement of the quality of life of all the inhabitants of the region. Likewise, the decrease in illicit crops has been promoted, through the strengthening of avocado production.

According to investigations performed in the region, several people who were part of armed groups have demobilized and have found in the avocado crop an opportunity for progress and sustenance.

## 2.3 Environmental impacts of production, commercialization and export of Hass avocado in the Eastern Antioquia.

**Air and soil pollution**

Among the environmental impacts generated by Hass avocado production, there is evidence of damage to natural resources; like air, water, and soil; this, due to the intensive use of agrochemicals, which are a mixture of different chemical products that are used in agriculture to protect crops against insects, fungi, pests and diseases.

Hass avocado cultivation has a significant impact on air and soil contamination, due to the different fumigations and soil preparations at the time of planting; although, the use of pesticides, herbicides and fungicides help to prevent and protect pest crops in order to have a quality crop, they emit different toxic substances that harm the quality of the environment and human health.

These can have harmful effects on health, such as causing cancer, alterations in the reproductive, immune and nervous systems, as well as the consumption of toxic substances that put the food safety of the products at risk.

In the use of pesticides, the toxic particles are suspended in the air, carried through the wind to different areas, contaminating them, causing serious damage to the animal, plant and natural resources.

The use of agrochemicals and pesticides during the entire life cycle of the product is necessary for the protection of this product against different pests and diseases, but these generate high damages to the soil, air and the environment, also causing health impacts. of the workers and people surrounding the production areas due to the frequent use of fertilizers.

The packaging of these products also represents a highly polluting factor since they contain large amounts of chemical agents; If these residues are mismanaged, (such as incineration) they can cause environmental damage, poor air quality and diseases to people close to the area.

Some small producers in the area generate soil contamination due to the improper handling of garbage and waste from the production processes, they do not adequately store and wash the packaging of the different fertilizers and pesticides they use for the crops, while others use a cellar especially for their handling, and do several washes to the packaging and waste, before being discarded; Although they try to reduce the amount of waste with the intention of minimizing the greenhouse effect and pollution; not all producers are aware of the damage they generate or how to mitigate them.

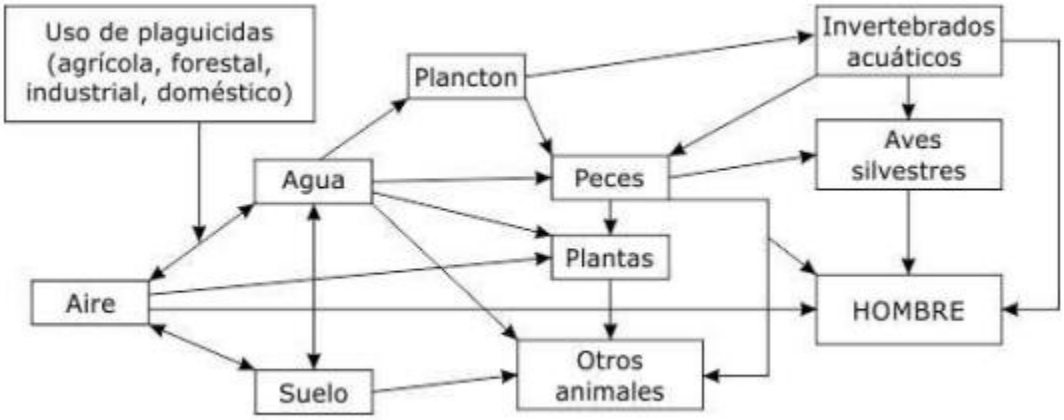



**Figure 7:** Distribution of pesticides in biotic and abiotic systems..

Source: (Del puerto, Suárez, & Palacio, 2014).

**Water consumption**

In most of crops it is essential to have an adequate water source to be used in all stages of crop production, as well as the climate also plays a very important role, since depending on it, the use of water must be intensified to maintain the necessary humidity in each of the avocado trees, in this case, if the rains do not fulfill with the expectations, it should be irrigated to obtain good production, since prolonged droughts cause the leaves to fall, thus reducing crop yield ; due to this it is important to have a correct control with optimal irrigation systems which can allow a better management and use of the water.

In the area of Eastern Antioquia for avocado production, the climate conditions fulfill with the irrigation expectations, the waters become permanent, they can be moistened and the good conditions and the water consumption is not as significant in this region.

**Pollution through the export of Hass avocado**

To transport the avocado to other countries, the main and most used way of transport is the maritime one. This one has a great environmental impact due to the large greenhouse gas emissions that they produce.

The factors that influence the pollution are mainly the discharge of bilge water (waste generated in the lower part of the ship, coming from the liquids of the main refrigeration system, filtration and steering system and pumps, which cause a mixtures are highly polluting substances), ballast water discharge, wastewater discharge, waste disposal, bio-incrustations (accumulation of algae and animals in the hulls of ships, which makes the ship more weight and decrease the speed resulting in higher fuel consumption), anthropogenic noise, air pollution, dumping of goods and falling containers to the sea from ships. (Eslava, 2019).

"Maritime freight transport is the fifth largest contributor to air pollution and carbon emissions; the growth rate of international trade makes the problem even more pressing. Regarding to the global CO2 inventory, maritime transport exceeds 1 billion MT - carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and if it were a country, it would be the sixth largest producer of emissions at the same time. air, according to Buhaug, Harrould-Kolieb and Savitz, cited by Eslava. “The third global study (IMO, 2015) indicates that international maritime transport represents approximately 2.2% of anthropogenic emissions of greenhouse gases (GHG) and estimates that annually produces 18.6 million MT of sulfur oxides SOx (as SO2) and nitrogen oxides NOx (as NO2), equivalent to 15% of global SOx and NOx emissions of anthropogenic origin ".(Eslava, 2019).

This does not mean that the problem is the export Hass avocado, since it also happens with any product exported by sea; the problem lies in not maintaining this way of transport in optimum conditions, and in breach of the quality standards for the protection of the oceans and the environment determined by the international maritime organization (IMO). For this reason, it is important that Hass avocado exporters become aware of the care of natural resources through due control and process regarding the hiring of shipping companies; demanding that they be responsible and take into account the high damages and impacts caused by the misuse of ships to the environment and what in the future may be generated to the planet if adequate measures and care are not taken to minimize these damages.


**Figure 8:** Atmospheric environmental impact of maritime transport.

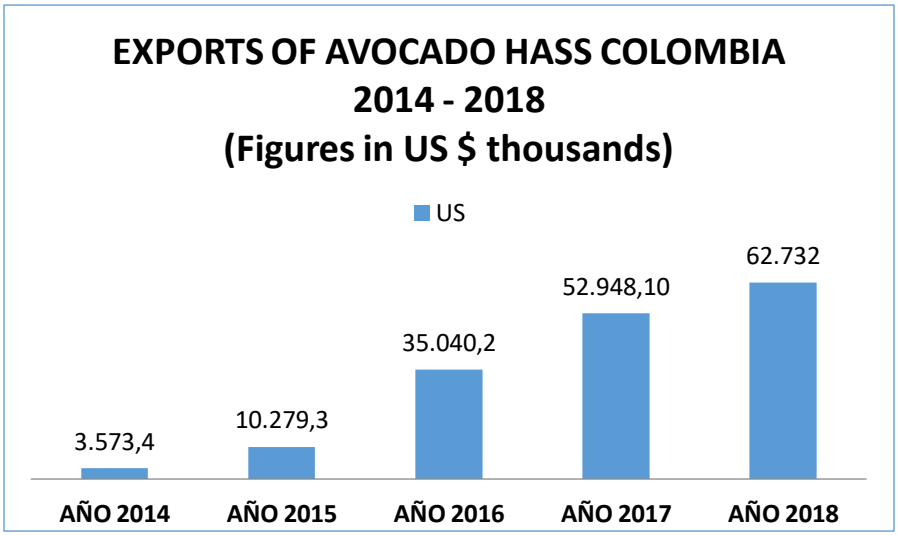
Source: (Pastor, 2019).

## 2.4 Economic impacts of the production, commercialization and export of Hass avocado in the Eastern Antioquia.

Antioquia is one of the main producers of Hass avocado in Colombia. This activity generates an important source of income for the agricultural sector and the economic development of the country.

The first harvests and productions of Hass avocado in Antioquia were about 15 years ago and exports began at the beginning of this decade, which makes it a still incipient issue, however, due to the great demand in the international market this product has had a slight growth in recent years.

According to Giovanny Andrés Gómez, Director of Economic Affairs of ANALDEX, which states that the production in 2018 was approximately 30 thousand tons dedicated to export, thanks to the avocado exports have had an important growth in the last year which added more than 62 million dollars, a profit that is distributed throughout the chain, one part for producers, another for exporters and another for marketers; indicating that it is a great opportunity that the field has to grow and strengthen its processes.




**Graphic 20:** Total exports of Hass avocado in Colombia (Figures US $ thousands).

Source: Own elaboration. Information taken from the newspaper El Colombiano (Suárez, 2019).

In 2014, Hass avocado sales in the country amounted to 3.573,4 million dollars and by 2018 these sales represented 62.732 million dollars. This indicates that, between 2014 and 2018, the market has increased its exports 18 times.

The Colombian countryside presents a problem regarding the high levels of investment it requires. Among the most important economic impacts is foreign investment, Hass avocado has been an attraction for different companies from abroad, countries such as Chile, the United States, Peru and some of the European continent have invested in the avocado sector of Colombia, allowing growth economic for all the agents related to it.

According to the producers, marketers and exporters interviewed, the poor state of the roads in the different producing areas has generated losses and breaches in the dispatch of the merchandise, deterioration of the fruit and economic losses that must be assumed in their entirety by them.

**Tree of social, economic and environmental impacts through the production, commercialization and export of Hass avocado.**

As a summary of the social, economic and environmental impacts generated in the Hass avocado supply chain for export, the problem tree is shown below. This methodological instrument was initially constructed with "supposed" impacts from the research done in the documentary sources and in the state of the art. And in the end it was validated and completed with the positive and negative impacts pointed out by the interviewees in the research to Primary Sources. The graphic shows the negative impacts in red and the positive impacts in green.

In general, it should be noted that the impacts reported in the works cited in the state of the art for other countries (especially Mexico), coincide in good measure with those found for the case of the Eastern Antioquia in Colombia. And although it is well known that there are very positive economic and social impacts, the graphic also shows that it is necessary to intervene the negative impacts generated by this activity, in order to achieve an environmentally and socially responsible supply chain that can contribute to the sustainable development of both the region of the Eastern Antioquia as all the department of Antioquia.

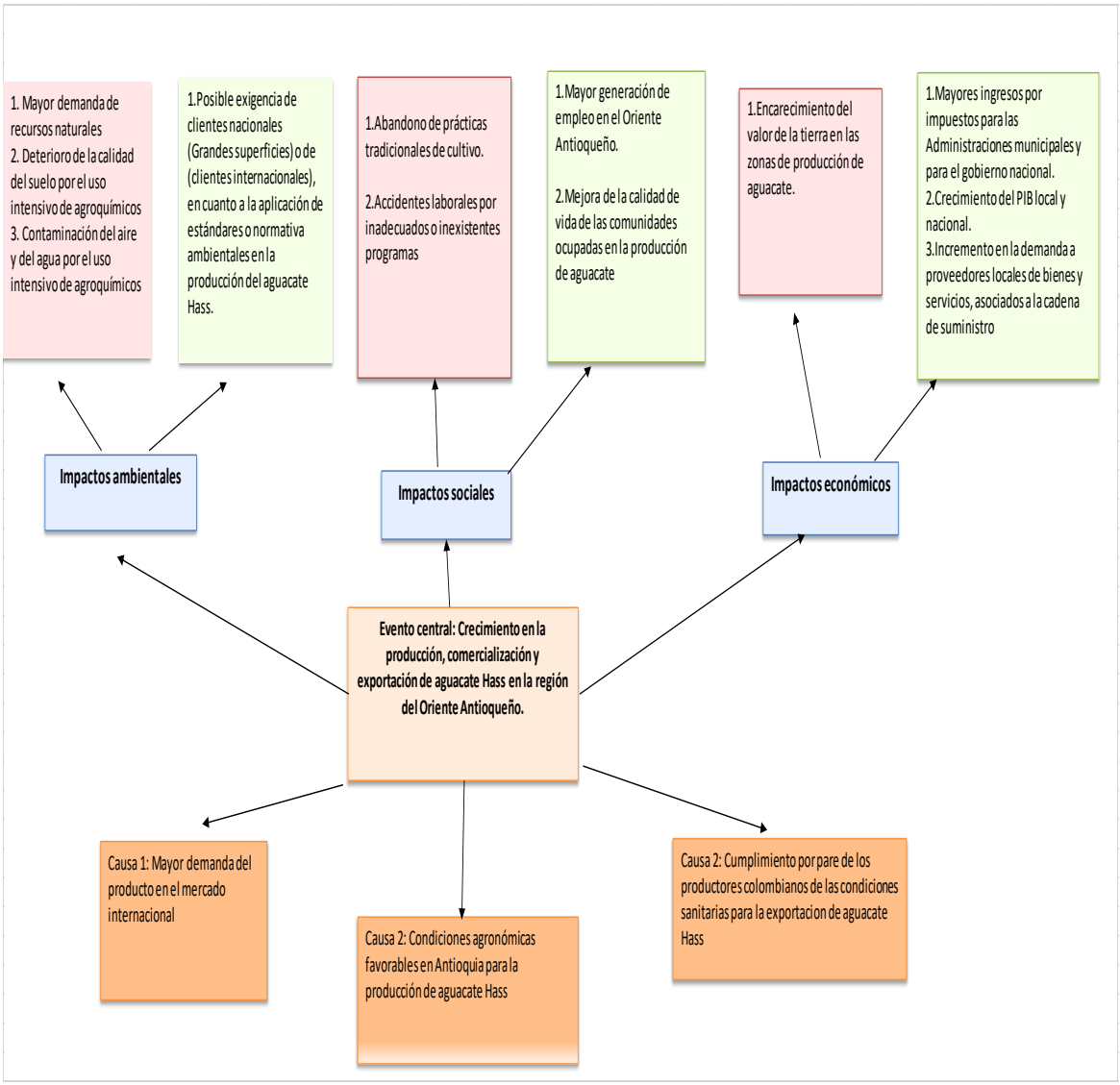



**Figure 9:** Tree of social, economic and environmental impacts.

Source: Own elaboration.

### 2.5 Strategies to mitigate negative impacts and enhance the positive impacts.

Next, the SWOT analysis is presented, as a methodological tool that allows proposing strategies against the impacts generated by the Hass avocado supply chain for export from the Eastern Antioquia.

**Table 14:** SWOT Matrix.

| CONTEXTO EXTERNO / CONTEXTO INTERNO | OPORTUNIDADES | AMENAZAS |
|---|---|---|
| | *En el Oriente Antioqueño hay una importante oferta de educación profesional en temas agrícolas. Por ejemplo, la Universidad Católica del Oriente ofrece programas de Agronomía y Tecnología Agropecuaria.<br><br>*Alta demanda en la compra internacional del aguacate Hass<br><br>*Formalización del empleo en el sector agrícola debido a los estándares de calidad que se requieren para exportar a los principales consumidores en el mercado internacional. | *Aparición de nuevas plagas o enfermedades.<br>*Gran competencia en el mercado internacional<br>*Falta de canales desarrollados para la comercialización del aguacate.<br>*Altas exigencias y estándares fitosanitarios y de calidad que deben cumplir los productores para poder exportar el aguacate Hass.<br>*Situaciones de orden público que interrumpan el transporte a puerto del producto exportable (paro camionero, minga indígena, bloqueos de vías).<br>* Contaminación de las exportaciones de aguacate Hass con narcóticos.<br>* Normativa ambiental y social cada vez más estricta, que obliga a hacer inversiones más cuantiosas en la producción, comercialización y exportación. |
| **DEBILIDADES** | **ESTRATEGIAS DO** | **ESTRATEGIA DA** |
| *Falta de conocimiento por parte los productores en cuanto al manejo del cultivo.<br>*Poco apoyo financiero de las entidades gubernamentales a los productores de aguacate Hass.<br>*Retrasos en los procesos de certificación de calidad por parte del ICA.<br>*Dificultad en el transporte nacional e internacional debido al ciclo de vida del producto por ser éste perecedero. | *Desarrollar programas de extensión universitaria que apoyen a los productores de aguacate Hass para mejorar las prácticas agronómicas.<br><br>* Promover una línea de crédito a los productores de aguacate Hass, que tenga como garantía los pagos por las exportaciones futuras. | *Promover para que las empresas exportadoras de aguacate Hass se certifiquen para ser OEA (operador economico autorizado), el cual permite un comercio ágil, transparente y seguro, asimismo, las entidades que otorgan la certificación en Colombia, como el ICA , Invima y Direccion de Antinarcóticos de la policia nacional, las cuales permiten a los exportadores tener una mayor confiabilidad en el mercado internacional. |
| **FORTALEZAS** | **ESTRATEGIA FO** | **ESTRATEGIA FA** |
| *Producción durante todo el año en comparación con los otros países que son los principales productores y exportadores de aguacate Hass a nivel mundial, pues la región del Oriente de Antioquia cuenta con óptimas condiciones en clima, altura y temperatura.<br>*Crecimiento económico y desarrollo en el sector Agrícola del Oriente Antioqueño y del país.<br>*Cercanía de los municipios del Oriente a la autopista Medellín-Bogotá, lo que facilita la salida de productos para comercialización y exportación. | *Diseñar un ordenamiento de la cadena de abastecimiento identificando las áreas que tienen un buen rendimiento productivo, para asi cumplir con la alta demanda de los mercados internacionales y lograr ser los principales exportadores de aguacate Hass en el mundo. | *Estimular la cadena de valor productiva para que las exportaciones de aguacate Hass sean un referente de seguimiento para todos lo productores, comercializadores y exportadores y puedan alcanzar así un mayor acceso a nuevos mercados, favoreciendo la participación del sector agrícola en el PIB y en el incremento de la economía del país. |

**Strategy 1: Develop a university extension program that supports Hass avocado producers to improve agronomic practices.**

Taking advantage of the fact that in Eastern Antioquia there are higher education institutions such as the Universidad Católica de Oriente or the University of Antioquia, which have the possibility of offering producers training and technical assistance services in agronomic matters, it is possible that in alliance with the Units Municipalities of Agricultural Technical Assistance (UMATA) of the municipalities can channel this institutional offer, strengthening the knowledge and skills of producers. Especially with a view to applying good agricultural practices that increase productivity, but controlling the negative environmental and social impacts generated by the crop.

**Strategy 2: Promote a line of credit for Hass avocado producers, with the guarantee of future export payments.**

Through state entities such as the Banco Agrario, it is possible and necessary to offer credit options at low and long-term rates, bearing in mind that -as has been said previously- avocado cultivation can take up to five years to start producing.

**Strategy 3: Promote AEO certification.**

The implementation of the Authorized Economic Operator model, with support from the entities responsible for this model in Colombia, such as DIAN, ICA and INVIMA, would not only facilitate avocado export procedures, but would also force the entire supply chain to adopt best practices and standards in labor and environmental issues that are correlative to the model.

**Strategy 4: Sort the supply chain.**

Either from the state institutions or from the association of the Hass avocado producers themselves, it is necessary to give an order to the supply chain that includes the standardization of agronomic practices aimed at improving productivity, the adoption of international standards in the field of quality and safety (for example, ISO22000), environmental management (for example ISO14001) and management of health and safety

at work (ISO45001, for example) and the definition of objectives common to the entire sector to make it more competitive.

**Strategy 5: Stimulate the productive value chain.**

The State should develop a package of specific incentives for this sector that includes, in addition to the credit and the technical assistance, measures to streamline procedures throughout the export chain, bring the institutional offer of specific services from relevant entities such as the ICA or INVIMA, and reduce the tax burden to stimulate investments, among other measures. These actions could be extended to the companies that are suppliers of goods and services for the chain of production - commercialization and export of the Hass avocado.

# 3. Conclusions and recommendations

## 3.1 Conclusions

- The Hass avocado represents a great opportunity for the economic growth and development of the agricultural sector of the country. Antioquia, especially the area of the East has optimal climatic conditions and land for its production, because this fruit can be grown during almost every month of the year, presenting an advantage compared to the main producing countries such as Mexico, Chile and Peru.

- Within the environmental impacts in the production stage the use of agrochemicals causes an irreversible deterioration to natural resources through highly toxic substances suspended in the air, causing serious damage to the environment and human health. Likewise, exports of Hass avocado are made by sea, a means of transport that generates a high environmental impact through pollution by emission of Greenhouse Gases (GHG).

- The economic growth with respect to the sector has been evidenced in exports; which exponentially showed an increase during the last years, going from 1.408 tons in 2014 to 35.000 tons exported in 2018. The main export destination of the Colombian Hass avocado is the European continent (Spain, France, Belgium, Netherlands) ), although Colombia has managed to export to the United States, it has been working hard on issues of sanitary eligibility with the aim of consolidating strongly in the North American market.

- In the East of the department of Antioquia, Hass avocado cultivation represents the most important agricultural activity; This has generated employment and opportunity for the peasants to be formally hired, with fair salaries, well paid and decent working conditions that have allowed a better quality of life for all the inhabitants of the region.

- Develop support programs for State entities to producers, traders and exporters, in order to provide support and advice to the different stages of the chain, so that their main

objective is to implement strategies for the technification and structuring of the sector and allow compliance with the phytosanitary requirements to gain access to the different international markets, as well as training in the management of good agricultural practices that guarantee processes that are friendly to the environment.

### 3.2 Recommendations

- Design a training program aimed at small avocado producers on crop management and the proper use of agricultural practices.

- Create alliances between producers, marketers and exporters to develop strategies to benefit all processes.

- Support from the State Institutions for the consolidation and growth of the sector, through financial aid to technify and structure in a more adequate way the entire productive chain.

- Advice to producers from the different entities of the sector in order to replace the use of chemical substances (agrochemicals, pesticides, fungicides and pesticides) by organic substances free of toxic substances that do not generate risk or harm to health and environment.

- It is recommended to apply the strategies proposed in the SWOT matrix in order to mitigate the negative impacts currently presented by the sector generated by the production, commercialization and export of Hass avocado.

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## 5. Annexes

**Annex 1:** Interview with producers of avocado Hass in the Eastern Antioquia (Colombia).

**INTERVIEW WITH HASS AVOCADO PRODUCERS IN ANTIOQUIA (COLOMBIA)**

**DATE: _____**

**INTERVIEWED NAME: _____**

**COMPANY / PLACE: _____**

**POSITION: _____**

*The following interview is performed with the objective of knowing some aspects regarding the Hass avocado production process in the Eastern Antioquia (Colombia).*
*The information provided in this interview is confidential and will only be used for the purposes of the investigation.*

1. How much does one hectare of avocado produce?

2. How long does it take to grow an avocado tree?

3. For Hass avocado planting there is some soil treatment? And how often is it done?

4. What kind of chemicals do you use to fertilize avocado crops? Are they organic or non-ecological substances?

5. Does the cultivation of avocado require a high consumption of water?

6. Do you consider that the high demand for Hass avocado has contributed to the improvement of the quality of life of the farmers?

7. Do you know that child labor is being used in the cultivation or commercialization of Hass avocado?

8. Do you know that Hass avocado cultivation or commercialization is using Venezuelan migrant labor? *(If the answer is yes, under what conditions?)*

**Annex 2:** Interview with Marketers / producers of Hass avocado in the East of Antioquia (Colombia)

**INTERVIEW TO HASS AVOCADO COMMERCIALIZERS / EXPORTERS IN ANTIOQUIA (COLOMBIA)**

**DATE: _____**

**INTERVIEWED NAME: _____**

**COMPANY / PLACE: _____**

**POSITION: _____**

*The following interview is carried out with the objective of knowing some aspects regarding the Hass avocado commercialization process in the Department of Antioquia (Colombia).*
*The information provided in this interview is confidential and will only be used for the purposes of the investigation.*

1. What impact has your company generated on society?

2. Do you consider that avocado represents an opportunity for growth in the agricultural sector and the economic development of Antioquia?

3. What difficulties have you seen in the Hass avocado commercialization / export process?

4. What are the quality and environmental standards that are required for the export of Hass avocado?

5. What consequences does the use of pesticides in avocado crops consider to the environment?

6. Do you think that Colombia could be as competitive as Mexico in the production and export of avocado?

7. For which destination is the avocado that you market or export?

**Annex 3:** Interview with Giovanny Andrés Gómez, Director of Economic Affairs ANALDEX.

**INTERVIEWED NAME:** Giovanny Andrés Gómez

**DATE:** March 29, 2019

**COMPANY:** ANALDEX

**POSITION:** Director of economic affairs

Antioquia is one of the main producers of Hass avocado in the country, it is an important income source for the Colombian export sector, which is helping the Colombian countryside to have higher income as other products did in the past years.

Colombia, after other sectors such as coffee, bananas, flowers that had their peak in the twentieth century with decades of production and export, has not had such an important product in the export process from the agricultural point of view.

The first Hass avocado plantings were about 15 years ago, the first productions were made 10 years ago and exports began at the beginning of this decade, it is still an incipient issue, however, due to the great demand in the international market it has had a growth that has not been so orderly, but is expected to be ordered in a few years. The production in 2018 was more than 30 thousand tons dedicated to export, which totaled approximately more than 72 million dollars, this profit is distributed throughout the chain, one part for producers, another for exporters and another for the marketers; It is a new source of wealth and a great opportunity for the Colombian countryside to grow in its cultivated areas.

The Colombian countryside has a problem, which requires quite high levels of investment and one of the issues needed to obtain resources is foreign investment, perhaps with only having had national investment the avocado sector would not have grown as the one of nowadays, lately has been negotiating with countries like Chile, the United States, Peru and some of the European continent which want to invest in Colombia in the avocado sector, so it is concluded that this has been a great attraction for investment, and at the time in which foreign investment is brought to the country the peasents can count on resources that help

grow the Colombian agro, the idea is that for the producers small there are some interesting returns, and we must also bear in mind that the avocado is a crop that, in order to be profitable, needs important land extensions; Foreign investment is a support for the Colombian producer and can stimulate idle lands or that are located in zones of armed conflict.

There is still a long way to go be in the same level of Mexico, since it has had an important development for several decades, it is also the main producer of Hass avocado in the world, but Colombia is on the way to development, it also has an important production not only of Hass avocado but also of other varieties that are consumed internally, we must continue working hard, structuring all the production processes to ensure that the product is exported more and more, and that the different difficulties in terms of quality, phytosanitary requirements, admissibility and transport are not barrier for the growth of the sector.

**Annex 4:** Interview with Mauricio López, General Manager WESTFALIAFRUIT.

**INTERVIEWED NAME:** Mauricio López

**DATE:** April 04, 2019

**COMPANY:** WESTFALIA FRUIT

**POSITION:** Commercial manager

Our company is dedicated to the production, commercialization and export of Hass avocado. Regarding the process that is done in the fruit we mainly check its quality and that it is in optimal conditions to export, then an application of fungicides is done to seal the fruit and cure it, then perform a drying and then a classification.

90% of our production is for export and 10% is for national commercialization; we have our own production farms in Sonsón, and we also buy from producers located in Oriente Antioqueño and in different areas of Antioquia.

The most difficult phytosanitary requirements to maintain is the issue of pests, but if there is good discipline, control and regularity these can be handled without difficulty. We would not like to apply any type of agrochemicals to avoid affecting the environment and have a clean production, an organic production, but really it is necessary to apply agrochemicals to control pests, everything is not to exceed the limits, good management is fundamental, not throwing waste to basins, waters and soils and rational use of permitted agrochemicals. Regarding the consumption of water in avocado production, nowadays it is done according to the climate (rainfall factor), in general terms the topic of irrigation in crops is not very developed.

Regarding the export of the Hass avocado, several difficulties have arisen; the lack of infrastructure, the conditions of the roads, the availability of transport and high costs, are problems that constantly present themselves, while Colombia is still very new in the market; so there is a lack of development in all stages of production, marketing and export.

**Annex 5.** Interview with Sebastián Rodríguez, Environmental Engineer HASS COLOMBIA.

**INTERVIEWED NAME:** Sebastián Rodríguez

**DATE:** April 05, 2019

**COMPANY:** HASS COLOMBIA

**POSITION:** Environmental engineer

I am a producer, marketer and exporter through the company Hass Colombia, within the main difficulties that I have evidenced in this process has been the lack of accompaniment to the producers, since the majority of these are farmers; approximately in the region of the Eastern Antioquia there are 80 producers who do not yet have ICA certifications to be able to meet the minimum requirements needed to export, also, they do not have a financial muscle that allows them to grow in their projects. I think that if we make a better accompaniment to these producers we would have more production to export and it would not be sold to the national market.

One hectare of avocado produces between 300 and 350 trees, per tree approximately 85 kg, to produce it takes 3 years and for export purposes at 4 years to have a better quality in the fruit, every 2 to 3 months the fertilization and pruning process.

The majority of crops require water consumption, but not all of them have an irrigation system. For the Hass avocado crop, especially we have what the nature of the area, the rainwater specifically, provides.

In general terms, we must formalize the Colombian agro, we have many opportunities in the field that we must take advantage of for the social development of the country; but much more government support is needed to be able to do an adequate production process especially, which is where the other processes start from.

**Annex 6:** Interview with Héctor Salazar, CARTAMA supply manager.

**INTERVIEWED NAME:** Héctor Salazar

**DATE:** April 06, 2019

**COMPANY:** CARTAMA

**POSITION:** Responsible for Supply

Producer and pioneer of the Hass avocado in Antioquia, currently in charge of the supply part of CARTAMA, Antioquian owners company and leader in the export of Hass avocado in Colombia, with very well established quality standards, so the fruit of our company It is being very much desired by international markets. Within the processes of quality that are made to the fruit to be exported, a protocol of dry matter is made, in which they analyze the fruit to verify that it is in the appropriate degree of physiological maturity, so that the taste, the percentage of fat are appropriate for consumption, is also a test that is of residuality, in which ten fruits are taken and sent to the laboratory to be examined and not going to have traces of any agrochemical with which has fumigated the crop; since in Europe, which is our main export destination, they demand quality standards which must be duly complied with for the fruit to enter, if this is not fulfilled, they do not allow the entry of this or if it is not, it is burned and the test of maturation in which twenty fruits are taken which are taken to the laboratories and the container trip is simulated to the destination, where the fruits are allowed to mature and if more than four fruits appear with some problem in ripening the fruit is not exported. These samples are sent to the main plant located in Pereira, where they are also sent all the fruits they collect to the different producers in the country.

Antioquia is a highly productive area, especially the Eastern region and the municipality of Urrao. The avocado sector is growing disproportionately in all aspects of the country; In fact, countries like Mexico, Chile, Peru are investing in Colombian land, due to the production conditions of them compared to ours, because they produce three months a year, contrary to us that the thermal floors we have produced eleven months; for a client it is much more interesting for someone to provide him with product eleven months, not three. The amount of land that these producing countries have bought during the last year in our country is incredible; so the sector will grow more than double what the sector is currently.

It has been a process of long time and learning, as a pioneer of the sector I know most of the production areas of the country, and I decided to join CARTAMA with the intention of sharing my knowledge with a Colombian company.

The intention of the company is to continue growing and reach 3.500 hectares, and we are in search of land to achieve it; But as the foreigners arrive, the lands are becoming absurdly expensive, although the arrival of them has generated economy for the country, implementation of technologies, and improvement in the living conditions of the employees. They come to look for people who know about the sector, offering them very good conditions with the intention of helping them grow and develop in the country.

At this moment our biggest export destination is Europe, but in itself, the most interesting market is the United States, if we have exported to this destination, but it is going at a slower pace, since the demands are greater. The field in Colombia is still underdeveloped. The ICA has to do some monitoring on the farms to declare them free of quarantine pests that is what the Americans demand, and it is a process that advances at a very slow pace. The government does not have the personnel capacity to make this review in all the producing areas and declare them free of these pests; without this you can not access the United States market. There are different private entities that support the sector, but without the help of the state it is not enough to manage to enter all the international markets.

For us to be able to export we have to have different quality certificates, not only because of the state of the fruit, but they also require us to formally employ all employees in the different producing areas, improve their living conditions and eventually retire. The field must be formalized not only in the avocado sector but in all the agricultural sectors of the country, and for this, much state support is needed. This is a product that gives dignified living not only to entrepreneurs and producers but also to all the peasants who are part of the different processes. Behind this come many positive things for the country, boosting the countryside, developing ports, economic growth, increased income for peasant families and social development in different areas and municipalities that have no strong economic and agricultural activity for their development.

**Annex 7:** Interview with Eugenio Valencia, Administrator of BITACO HASS.

**INTERVIEWED NAME:** Eugenio Valencia

**DATE:** April 20, 2019

**COMPANY:** BITACO HASS

**POSITION:** Administrator.

The company Bitaco Hass is located in the municipality of El Retiro, dedicated to the production of avocado for marketing purposes in the domestic market initially.

For the sowing of avocado we first implement a good soil treatment using fertilizers before sowing, more or less every 30 to 40 days depending on the humidity conditions, for this we use ecological substances such as: Native-R, Proteus-R and Oberon Speed-R.

The avocado tree begins flowering and production at 3 years. But the real reducible harvest will be from 5 years; we have found in the avocado an investment opportunity due to the high demand and consumption nationally and internationally. For the eastern zone this agricultural activity is very important due to the generation of employment and the quality of life that is being given to all families in the region.