



VIGILADA MINEDUCACIÓN

**Challenges that the avocado agroindustry in Antioquia in the areas of  
production and logistics in terms of circular economy to facilitate  
exports to the European Union.**

**Mariana Ospina Carmona**

**Maria Alexandra Castaño Muñoz**

**Ana María Vélez Obando**

Esumer University Institution  
Faculty of International Studies  
Medellín, Colombia

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**Mariana Ospina Carmona**

**Maria Alexandra Castaño Muñoz**

**Ana María Vélez Obando**

Degree work submitted to apply for the title of:

**International negotiator**

Tutor:

Federico Alonso Atehortúa Hurtado

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Esumer University Institution

Faculty of International Studies

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## **Akcnnowledgement and dedication**

Thanks mainly to God, for blessing us and giving us the opportunity to get to this point of the road, for giving us intelligence, wisdom, perseverance, and strength to achieve our goals.

Thank you to our parents for their support and unconditional love at each stage of our lives, for always guiding and motivating us to meet each of our goals.

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We dedicate this research project to each one of the people who are part of the Colombian agro-industrial sector who, with their day-to-day work, allow the growth of the country's economy and the improvement of the environment that we need so much.

## **Summary**

The main objective of this work is to identify the challenges facing the avocado industry in the department of Antioquia in the areas of production and logistics in terms of circular economy, identifying the requirements of the European Union in this area and determining the current state of the avocado sector in Antioquia against these requirements, also describes the strategies that can be implemented so that the production and logistics processes are aligned with the main circular economy processes. The purpose of this research is to guide the producers, exporters and logistics operators of the avocado supply chain, so that they implement good practices in their processes, in order to focus on mitigating the environmental impacts they generate and in anticipation of the implementation of circular economy processes that are subsequently required by the European Union.

**Key Word:** Circular economy, sustainable development, sustainability, environment, avocado.

## **Abstract**

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## **Introduction**

The circular economy is currently one of the main strategies that seeks to guide processes to care for the environment, specifically in areas of supply, production, packaging and comprehensive waste management, where producers must assume responsibilities regarding the collection of such waste. so they can be used again in their production processes. The European Union (EU) is one of the geopolitical agents that has the most interest regarding its implementation and, in addition, environmental and sustainability issues are included in its trade agreements as priority issues, taking into account that it is one Of the main importers of agricultural products in the world and that agriculture involves significant environmental impacts, this group of countries implements a series of restrictions for the entry of products into their territory.

Considering that the Hass avocado is a product belonging to the agro-industrial sector, which has had an important growth in exports to the European Union and that Antioquia is the department of Colombia that contributes the most to Hass avocado exports, the objective of This research towards the challenges facing the avocado agroindustry in Antioquia in the areas of production and logistics in terms of circular economy to facilitate exports to the European Union.

Since 1987, talk of sustainable development began with the aim of meeting current needs without compromising the future of the planet. In the 90s, economic, social and environmental issues began to be included, in addition, the market addressed the issue of circular economy at three different levels where the improvement of the internal processes of companies is focused, collaborative industrial networks are created in favor of environment and initiatives developed by the cities and regions of the countries, considering themselves as eco-cities. In 2015, the European Commission launches a circular economy plan, which seeks that all the Member States of the European Union commit to implement the regulation that focuses mainly on issues of ecodesign, eco-labeling, reuse, recycling and repair. ; being very important the issue of the use of waste and involving all the agents that participate in the product life cycle, including the importance of all the Member States establishing legal standards regarding the extended responsibility of the producer, so that it

is he who participates in a direct way with the collection of waste generated once his product reaches the end of its useful life.

This research identifies the challenges facing the avocado agribusiness in the department of Antioquia in terms of production and logistics, to facilitate exports to the countries of the European Union that implement the circular economy.

To carry out this research, information was taken from the last 10 years in order to identify how the subject has evolved both in Colombia and in the European Union and to learn about the regulations and requirements of both countries on both environmental and circular economy issues; It was also necessary to carry out interviews with experts on the subject, with avocado producers and marketers, in order to obtain more precise information and thus be able to determine how the industry is currently meeting the fulfillment of the requirements of the European Union to define what they are. the main challenges facing the Antioquia businessmen dedicated to the production and export of avocado to that international market.

Currently the European Union has implemented circular economy processes but has not developed specific guidelines on this topic for imports from the agro-industrial sector, however, this sector in Antioquia faces a challenge focused on getting ahead in the implementation of these processes, so that When the European Union establishes specific requirements, they are already prepared and it does not become a limitation for the growth of the sector and the opening of new markets.

This research work consists of three main chapters, the first chapter establishes and describes the general structure of the research (state of the art, problem statement, objectives, theoretical framework, conceptual framework, methodological framework), in the second chapter the development of the objectives set and the description of the findings obtained. Ending with the third chapter where the conclusions and recommendations are presented so that producers, exporters and logistics operators that are part of the Hass avocado supply chain in Antioquia implement strategies that allow them to anticipate the future demands of the European Union in regarding the most significant circular economy processes.

# **1. Project formulation**

## **1.1 State of art**

The circular economy is gaining strength every day as it is an element that has the cooperation of all the actors in the productive sector, including an active participation of the State as a promoter for the care of the environment; the issue is not new and is being implemented with force at a global level especially in the European Union where, since 2015, an action plan was adopted, according to the (European Commission, 2015), which sought to contribute to accelerating the transition from Europe to a circular economy, to boost global competitiveness, promote sustainable economic growth and create new jobs, the plan established 54 measures to “close the loop” on the life cycle of products: from production and consumption to management waste and the secondary raw materials market. It also identified 5 priority sectors to accelerate the transition throughout its value chains (plastics, food waste, critical raw materials, construction and demolition, biomass and biomaterials).

According to Prieto Sandoval, Jaca, & Ormazábal (2017), since 1987 people have started talking about sustainable development with the aim of satisfying current needs without compromising the future of the planet. In the 90s, economic, social and environmental issues began to be included, in addition, the market addressed the issue of circular economy at three different levels where the improvement of the internal processes of companies is focused, collaborative industrial networks are created in favor of environment and initiatives developed by the cities and regions of the countries, considering themselves as eco-cities, this could be verified through an exhaustive review of the literature on the subject, allowing the evolution of the circular economy to be identified.

In studies carried out by the Ellen MacArthur Foundation (2015), the circular economy is spoken of as one that is regenerative and restorative on purpose and that seeks to keep materials useful for as long as possible, including their technical and biological cycles; The model especially seeks to decouple economic development from the consumption of finite resources and emphasizes that if the processes migrate to the circular economy model, it could generate employment and reduce environmental effects, including carbon emissions.

After a search for documentary and statistical information, Arroyo, Bravo, & Rivera (2018) describe in their article a statement on the importance of the circular economy today and how

it should be implemented in industries, mainly Ecuadorian, to obtain sustainable economies prioritizing the care and use of resources with new technologies and applying business models based on the reuse of material resources, creating circular models and attractive to industries and thus obtain profitability, innovation and competitiveness in the markets, with this They were able to conclude that the circular economy not only proposes a different lifestyle and a more productive method within each of the companies, but also a general care for the environment.

García Caicedo (2017) refers to innovation as the main alternative for the transformation of the Colombian productive system; the idea is to move from a linear to a circular economy, where companies are interconnected to achieve the sustainability of processes, that is, to seek for the production chain to reincorporate waste and to be used as a resource in the same sector or others , in order to preserve and improve natural capital, optimize the use of resources and promote the efficiency of the system, through documentary review it was found that companies that have already incorporated these processes have reduced costs and generate a positive impact in social and environmental aspects.

Furthermore, Frérot (2014), after carrying out some documentary and statistical reviews, presented some recommendations to implement the circular economy, developing new technologies and specialized knowledge to reduce excessive consumption of energy, materials and water, thus achieving the transition to an economy with low levels. carbon emissions to achieve the key objective for the European Union to increase its energy independence, by reducing this dependency creates a return of economic growth and environmental conservation.

Pérez de las Heras (2016) states that the European Union is classified as a region highly dependent on external supply and as part of its Europe 2020 strategy, considers the efficient use of resources as a priority, since it is necessary to guarantee environmental protection , economic prosperity and social welfare; Based on the above, it strives to promote this initiative globally and especially in poor countries.

Through the documentary analysis of this investigation, both internal and external, it can be seen that the European Union has implemented different measures against the products it imports in order to contribute to a more sustainable and circular model.

Burgos, Gaitán, Yanez, Zambrano, Castellanos & Estrada (2019) based on the theory of business management or direction and assuming the hierarchy of Mintzberg principles under a basic, qualitative, quantitative and interdisciplinary methodology that have as common basis the Management processes speak of the circular economy as a new model that proposes to recover the durable parts of products, avoiding the loss of value due to the generation of waste, and the need for it to be implemented by companies to guarantee long-term economic sustainability. term, they mention that agriculture as an economic sector must be sustainable to be able to maintain itself, and explains that said sustainability is currently a development strategy for both the sector and nations, so a change in methods is essential Traditional agricultural development, in addition, emphasize that agriculture should represent one more column of the economy, and not It should be seen only as a support, for its influence both on ecological issues, due to the focus on maintaining diversity and productivity, and on economic and social issues, since it influences the local development of each community and region, what which leads to generate a great contribution to the economic growth of the country.

According to the above, the need to implement the circular economy model is evident in all productive sectors, including agriculture, a sector that is one of the most important for the economic development of the country, based on its bilateral relations with the European Union (EU), since, according to data consulted in the newspaper Portafolio (2019), Colombia's agricultural exports to the European Union grew by 12.8% for the first half of the year, with avocado being one of the products of Most successful exports with high growth rates (60.6%) and generating a total income of 44 million euros to the country.

Fernández Hurtado (2016), in his article entitled Opportunity for Economic Growth in Colombia: Export of Hass Avocado to the Netherlands, which is based on a descriptive study, talks about the increase in the participation of the agricultural sector, specifically Hass avocado, in the exports to European countries such as the Netherlands, the United Kingdom, Spain and France, also refers to the poor structure of the sector due to a lack of business

association that manages to promote or incentivize the production, marketing and export of the product, which limits the ease of The companies involved in this process for their international commercialization, also states that there are other difficulties such as: access and land tenure, low financial capacity, little implementation of technology and adequate tools and processes, to develop large production processes, also mentions that Antioquia is one of the main producing departments of ag Hass uacate, with a total of 2,300 cultivable hectares.

Finally, in her master's research work, Ana Cecilia Vélez investigated the sanitary requirements for a food safety system that integrates GMP, Hazard analysis and critical control points (HACCP), NTC ISO 22000 and the European Standards IFS ( International Food Standard) and BRC (British Retail Consortium), as requirements of the food industries to export to England and the European Union (Vélez Castro & Atehortúa Hurtado, 2017). This work allows establishing that within these sanitary norms some environmental or ecological requirements are introduced that should be met for food exports from Colombia to the European market. In particular, some related to the adequate disposal of solid waste and discharges from productive activities.

## **1.2 Problem Statement**

Due to climate change and environmental problems, governments have seen the need to become promoters of caring for the environment and natural resources, due to which the term circular economy has been developed as a strategy that involves the entire production process of companies, from the supply of raw materials to delivery to the end customer, their main objective is to reduce the waste generated and contribute to the reduction of carbon emissions that generate a great environmental impact.

Every day the risk of the environment is becoming more evident and it is a problem that affects the entire planet, forests are disappearing due to deforestation, natural resources are being depleted due to excessive spending and on many occasions Due to the amount of resources such as water that are used by all industrial sectors for their production process, it is increasingly difficult to try to control the masses of waste that are caused not only by companies but by all people in general, Temperature changes affect the planet's poles,

animals and humans, not to mention the fact that pollution causes hundreds of deaths each year from respiratory infections.

Taking into account the importance that the use of processes focused on a circular economy represents for the European Union, it becomes evident that for the Antioquia agribusiness the application of the requirements demanded in environmental issues represents a major challenge, and the importance is also evident in its adoption due to the growth of the sector and its increase in the participation of exports to said market.

But it should be noted that the lack of economic resources, which in turn generates little investment capacity and the need to satisfy demand at the lowest possible cost, are issues that lead to the question of whether Colombian agribusiness is capable of promoting environmental care. directly involving the production and logistics of all the companies that compose it, since these are the processes of the supply chain where the exporter and / or producer is allowed to significantly reduce their costs and it is there where, by reducing a final price, it is lost caring for the environment, costs are outsourced and the opportunity to create a circular economic cycle that facilitates trade with countries of the European Union that already implement and demand these processes is left aside.

According to the above, if companies focus on remaining competitive from the point of view of production costs and logistics costs, and do not directly bet on the transformation of their production system, they may lose access to markets as important as the European Union, generating decrease in sales of companies that have this destination as one of their main market objectives, which translates into future economic problems, since they would be lower income generated by exports and in the long run it would also generate unemployment, without mention that it is possible that Colombia being a country rich in natural resources will be depleted much sooner than countries that do not have this type of resources.

### **Trouble Question**

¿ What are the challenges facing the avocado agribusiness in the department of Antioquia in terms of production and logistics, to facilitate exports to the countries of the European Union that require implementation requirements of the circular economy from their suppliers?



## **1.3 Objectives**

### **1.3.1 General Objective**

Identify the challenges that the avocado agribusiness is facing in the department of Antioquia in terms of production and logistics, to facilitate exports to the countries of the European Union that require implementation requirements of the circular economy from their suppliers..

### **1.3.2 Specific Objectives**

- Identify the requirements of the European Union in terms of circular economy for the access of fruits to its territory.
- Determine the state of the agricultural sector in Antioquia, specifically avocado, to comply with the guidelines established by the European Union in terms of circular economy.
- Describe the strategies that can be implemented in the avocado agribusiness in the department of Antioquia so that its production and logistics processes can meet the standards of the circular economy.

## **1.4 Justification**

### **1.4.1 Theoretical Justification**

This research will focus on identifying the challenges of the agricultural sector in Antioquia, specifically avocado, when implementing the circular economy model, seeking to provide information and knowledge to entrepreneurs in the sector with the aim of proposing strategies that allow them to have easy access to the European Union, since this market is the main promoter of this model; In addition, it seeks to ratify the direct relationship that exists between sustainability, economic growth and innovation with the circular economy model and thus provide the government with tools that allow it to make investments or provide

economic support to the different sectors of its economy so that they can implement it and achieve a positive impact on the environment and society.

The focus of the project is in the line of business and international relations, since it aims to know the specific requirements of the European Union to make treaties, agreements or negotiations that generate notorious economic benefits when making exports from Colombia of processed products. in industries that have successfully implemented the circular economy.

#### **1.4.2 Social justification**

With this research project, important information was collected that will serve companies in the agricultural sector that have the European Union as their main target market, since it will allow them to know the elements to take into account so that they successfully achieve the introduction of Its products to that market, and also, can implement the circular economy model, which can be translated into cost reduction, job creation, internalization of social and environmental costs and an evident reduction of the negative effects on the environment.

This project will provide a series of improvements in production and logistics processes, so that through the implementation of the circular economy, it is possible to stop outsourcing costs that affect society, especially the most vulnerable in the country, those that by Lack of care for the environment presents a shortage of resources such as water or land to plant. The research may also be very helpful for people who wish to carry out a similar study in the future, since it will serve as a conceptual and reference framework.

#### **1.4.3 Personal justification**

As future professionals, this research contributes knowledge regarding how it is possible to positively influence environmental changes from the profession of an international negotiator, since it is possible to implement strategies and models in different areas of companies and in different economic sectors. that they are friendly to the environment and society.

In order to achieve the aforementioned, it is necessary to recognize that international trade in the framework of sustainable development is currently one of the main actors, and that its

contributions in terms of consumption of resources and generation of waste are becoming a worldwide problem, if it is seen from its application to a globalized world and the constant pressure for the elimination of trade barriers that allow borderless access to all markets around the world.

According to the above, having a knowledge of current problems allows you to become part of reality and at the same time be part of the solution, with the sole objective of making positive contributions to the environment and society.

## **1.5 Referential Framework**

### **1.5.1 Theoretical Framework**

Starting from the theory of the circular economy and its relationship with International Business, it is identified that both concepts currently point to sustainable economic development, since there are commercial relationships between countries interested in implementing strategies to reduce the environmental impacts generated by their businesses.

According to (Atehortúa Hurtado, 2019), International Business has part of the responsibility for environmental problems, problems that are largely generated by the transport of goods between countries, since greenhouse gases are produced that potentiate global warming. In addition, international maritime transport contributes to the disposal of pollutants to the ocean, through discharges of bilge water, ballast water and wastewater; Another effect of business is the demand for biofuels, which has served as an incentive for deforestation of large jungle areas in order to produce raw materials. Another point to be addressed is the impact that these environmental problems generate on international trade, for example, climate change has made more frequent and severe events such as hurricanes, heavy rains and tornadoes, which makes transport activities more risky and costly, additionally, restrictions have been imposed on international trade in order to mitigate these problems, but it should be noted that solutions to these problems have generated new business opportunities.

According to the Association of Environmental Sciences of Spain (2020), the term circular economy was used for the first time in western literature in 1980 to describe a closed system

of interactions between the economy and the environment, which seeks to migrate from a model linear economy, which, according to the author Cerdá (2015) is based on "take, do, throw" and it is understood that such a model is not sustainable for industrial development and this has generated a call for companies to change their models of production, with the objective of staying on the market as long as possible and thus reducing the environmental and social impact that its processes can generate, due to the use of finite resources; It is an attractive and viable alternative that favors the business world, since it involves the concept of sustainable development, which is made up of three main aspects: environment, economy and society.

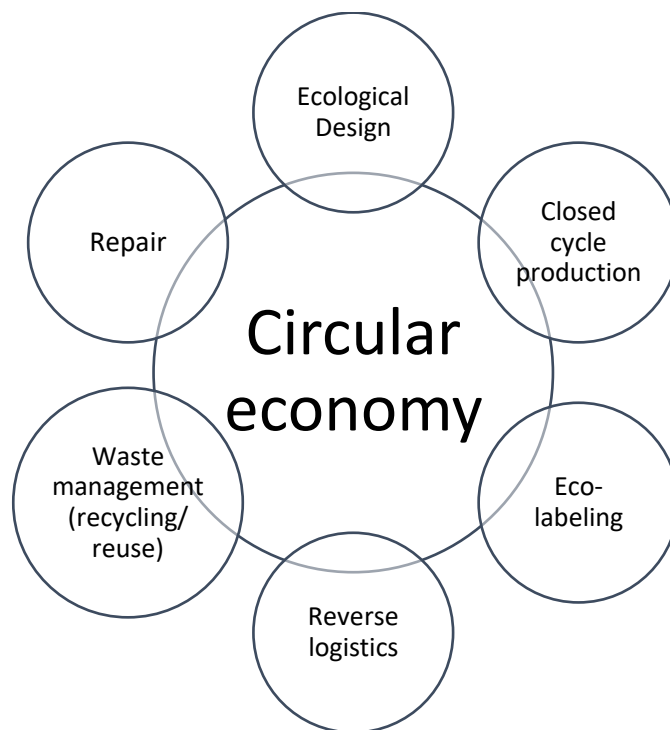
That said, and taking into account that the European Union is a pioneer in the subject, it is important to adopt the circular economy in companies, with the aim of strengthening negotiations with the European Union, since this economic bloc has been the first to implement an action plan focused on circular economy; plan that, according to the author Cerdá (2015), focuses on the production, consumption, waste management, promotion of the market for secondary raw materials and the reuse of water; and that it also seeks to promote innovation and investment.

The circular economy changes the methodology that for years had been becoming linear, within which the environmental, social and economic impacts that are currently being experienced were not abyssed, after a population that is increasingly majority, the consumption of products and services It has increased deteriorating our planet and also the health of people, therefore this model has a positive impact by leaving a comfort zone based on the unnecessary consumption of goods, raising awareness and promoting the participation of industries with the aim of eliminating the accumulation of the materials used to give a second life cycle to the product.

Based on the above, governments and companies around the world have seen the need to develop processes in their productive sectors that aim at the reuse of material resources, achieving an ecological design of products and services to maximize the use of these resources in favor of minimizing waste.

One of the processes involved in the circular economy is reverse logistics, which is an important aid in terms of a cyclical flow in the use and recovery of materials and energy of products and services, according to the article by Prieto Sandoval , Jaca, & Ormazábal (2017) in one of the fields of action of the circular economy, is reverse logistics, which basically consists of distributing the product or service that is delivered to the client, where companies must guarantee its traceability and efficiently reduce the environmental impact through different practices such as hazardous waste collection, packaging products and packaging that can be reused, in addition, it also involves the issue of receiving inventories that the customer has as surplus or obsolete.

The following illustration shows the circular economy processes that are of interest for this research.



**Graphic 1.**Circular economy process

Source: Own elaboration with information taken from (Prieto Sandoval, Jaca, & Ormazabal, 2017); (Comisión Europea, 2019)

### **1.5.2 Conceptual Framework**

As mentioned before, currently one of the main concerns in the world has to do with the protection of the environment, which was defined in 1972 by the United Nations Conference on the Environment in Stockholm, as “the set of components physical, chemical, biological and social, capable of causing direct or indirect effects, in a short or long term, on living beings and human activities ”(Marino Damián, 2011), currently and due to global warming a social approach to the production system and that is why it is important to implement economic and sustainable practices that allow progress in the task of recovering and conserving these environmental environments; Within this theme, it is worth noting a term that has been gaining strength and that of sustainable development, which has as its main objective intergenerational integrity and “recognizes the responsibility of each generation to be fair to the next generation, by delivering An inheritance of wealth that cannot be less than what they themselves have received and achieving this goal requires, as a minimum, to emphasize the sustainable use of natural resources for subsequent generations and to avoid any irreversible environmental damage. (Constitutional Court of Colombia, 2017)

In the different studies it has been said that the circular economy model is a new trend that seeks to reduce the negative impacts of the consumption of finite products and also seeks to promote the use of waste as part of other production processes; It is defined as a production and consumption model that involves sharing, renting, reusing, renewing and recycling existing materials and products, as many times as possible to create added value. In this way, the life cycle of products is extended. (European Parliament, 2015)

According to the aforementioned, it can be interpreted as the way in which the environmental, economic, social tools, etc., that are available without destroying them, are used to promote development and growth in these issues, but that is conserved over time to that they continue the same or can be potentiated by future generations.

All organizations must involve their different processes to establish the environmental impacts that are generated in all stages of the product life cycle, one of the areas that is directly involved is production, which can be defined as the manufacturing process. of products for sale, which involves different areas of the organization, which participate in the

transformation of raw materials and supplies, adding value in each part of the process and resulting in a final product.

A circular economy process directly related to production is closed cycle production, which involves the development of industrial or manufacturing processes in which materials are used that become valuable nutrients upon reaching the end of their production cycle. lifetime. (Organization of American States (OAS), 2014)

In order to provide a basis for closed-loop production, ecodesign can be established in an organization, which must take into account environmental aspects from the design phase, in order to reduce the environmental impact throughout the product life cycle (European Parliament and Council, 2009), what is sought is to guarantee that aspects of environmental care are taken into account from the point of view of product design, and how it involves its entire In this way, eco-labeling processes can be established, which seek, for example, to promote the commercialization of environmentally friendly products and raise awareness among consumers about sustainable consumption.

Within the investigations carried out on this model, the importance of logistics for the generation of value is mentioned, according to (Bohórquez & Puello, 2013), logistics is defined as the process that includes all the activities necessary to manage and synchronize merchandise Likewise, he leads the processes of supplying the markets in an efficient, effective and timely manner, and his job is to supervise everything that involves the transportation of a product or service. According to the above, it can be said that through logistics it is possible to establish a sustainable and sustainable process, which goes from the purchase of raw materials and packaging products to delivery to the final customer, which influences and adds value to the process to make it part of the circular economy.

One of the specific processes in the logistics area is distribution logistics, which, as its name implies, is in charge of the product distribution program from the manufacturer's plant to the final customer.

One of the processes of the circular economy that are directly related to the logistics area of an organization is reverse logistics, which “encompasses the set of activities for the collection, dismantling and dismemberment of already used products or their components, as

well as materials of different types and nature in order to maximize the use of its value, in the broad sense of its sustainable use and, ultimately, its destruction ”(Cabeza, 2012). In addition to generating value through waste collection, this concept also refers to creating added value to obtain customer loyalty and obtain a higher level of service.

Colombia has issued several resolutions by virtue of which it has imposed an obligation on manufacturers and importers (of pesticides, medicines, batteries and accumulators, computers and printers, batteries, used tires and used batteries with lead acid), to design, finance and implement selective return programs for these wastes. This obligation has been imposed by the National Government on manufacturers and importers under the protection of the concept of international environmental law called extended producer responsibility (Del Valle Mora, 2017).

In order to fulfill the objective of extended producer responsibility, an important concept is created for this topic and it is waste management where different processes are designated that allow the correct selection and completion of waste through recycling and reuse. Reuse is called as the process where a new job is given to those who are considered waste, in many occasions there is talk of redesigning or adapting waste and for recycling to exist, it must be taken into account that there must be certain qualities that allow this process to be carried out, since not all waste is apt to generate a reuse or recovery process for its use as raw material for other inputs (Lara González, 2008).

To fulfill the objective of leaving behind the linear model that exists in the world and changing it to the circular economy model, it implies that a repair process must be implemented, a process that is given to waste in order to restore and empower it. reuse again in the production process or simply provide a final product. (Parlamento Europeo, 2018).

### **1.5.3 Legal Framework**

The European Commission (2018) reports in a press release that the European Union approved a series of ambitious regulations aimed at adapting waste legislation to the challenges of the future, based on the Commission's proposal in 2015 and that it is part of the circular economy package.



The rules are focused on avoiding waste and when this is not possible, the recycling of municipal waste and packaging will be intensified significantly, they also focus on gradually eliminating the dumping of waste and promoting the use of economic instruments such as extended liability regimes. from the producer. This new legislation reinforces the "waste hierarchy", that is, it requires Member States to adopt measures to prioritize prevention, reuse and recycling ahead of landfilling and incineration, thereby achieving an economy that circular is a reality.

The rules belonging to the circular economy package were applied and are part of the EU regulatory code, for the purposes of this research, since it includes an environmental issue, is Directive 2008/98 EC of the European Parliament and of the Council of 19 November 2008, which establishes measures on waste management in all Member States.

The European Union also establishes a framework that contributes to the circular economy through sustainable product policies, some of the standards that belong to this initiative and are relevant to the purpose of this research are:

the French Grenelle Law, which establishes that the consumer must be informed, through marking, labeling, display or any other appropriate method, of the carbon equivalent content of the products and their packaging, as well as the consumption of natural resources or the impact about natural environments.

Council Regulation (EC) 834/2007 of June 28, 2007 that provides the basis for the sustainable development of ecological production methods.

Regulation (EC) 66/2010 of the European Parliament and of the Council of November 25, 2010, on the eco-label of the European Union, which was established as a voluntary tool to encourage companies to develop products with a low environmental impact throughout its life cycle, and to help consumers find the best organic products in their category.

Regulation (EU) 1169/2011 of the European Parliament and of the Council of October 25, 2011, which establishes the rules regarding the labeling of food products, with the aim of guaranteeing a high level of protection for consumers.

Regulation (EU) 2017/625 of the European Parliament and of the Council of March 15, 2017, which seeks to establish official controls throughout the agri-food chain, in order to protect human and animal health, in addition, it aims to promote plant health specifically on the subject of pests.

Directive 2009/125 / EC of the European Parliament and of the Council of October 21, 2009, which has a framework for establishing community ecodesign requirements applicable to energy-related products.

The packaging, although it is not an exportable product belonging to the agro-industry specifically, is strongly associated with the products and their international commercialization process, in addition, it is within the product categories with priority for the circular economy in the European Union, there There are a number of policies that address packaging directly or indirectly, but the main one is Directive 94/62 / EC of the European Parliament and of the Council of December 20, 1994, on packaging and packaging waste.

Common Agricultural Policy (CAP), which aims to provide affordable and safe food to the citizens of the European Union, guarantee a fair standard of living for farmers, conserve natural resources and respect the environment.

With the aim of calculating the environmental impact of products manufactured both in the European Union and those that are imported, a methodology called “the Product Environmental Footprint (PEF / OEF) is launched.

It is important to mention internationally recognized standards and certifications that seek to implement management systems focused on specific issues, in the case of this research the following are taken into account: GLOBALG.A.P. and some ISO standards, which are based on environmental care throughout company processes and the life cycle of products.

Colombia also has a legal framework for the responsible production of agricultural food with the objective of protecting human health, guaranteeing quality products and facilitating entry into different international markets.

ISPM 15, which regulates the international use of wood packaging, with the purpose of giving them a specific treatment to mitigate the concentration of pests in the wood in a greater percentage.

The Colombian Agricultural Institute ICA, is in charge of establishing norms with respect to agricultural products, for the purposes of this investigation, the following norms will be taken into account:

Resolution ICA 1558 of May 7, 2010, through which provisions are made for the import and export of plants, plant products, regulated articles, animals and their products.

Resolution ICA 448 of January 20, 2016, which establishes the requirements for the registration before the ICA of the production sites of vegetables for fresh export, the registration of exporters and the registration of packing plants of fresh vegetables for export.

Resolution ICA 3973 of February 14, 2016, through which the phytosanitary license for the mobilization of plant material in the national territory is regulated.

Resolution ICA 1507 of February 22, 2016, by means of which the official control pests in the cultivation of *Persea americana* Miller avocado in the national territory are declared, the measures for their management and control are established.

Resolution ICA 30021 of April 2017, through which the requirements for certification in Good Agricultural Practices in primary production of vegetables and other species for human consumption are established.

ICA Resolution 8461 of June 21, 2019, by means of which the phytosanitary plan for fruit flies is established on vegetable production sites for fresh export registered with the ICA.

Other government entities such as the Ministries and the Presidency of the Republic issue Laws, Resolutions and Decrees to control matters related to the objectives set forth in the government plans, regarding the activities carried out by each one; For the purposes of this investigation, the following were taken into account

Law 9 of January 24, 1979 by the Ministry of Health and Social Protection: Through which Sanitary Measures are issued

Decree 1071 of May 26, 2015 by the Ministry of Agriculture and Rural Development: Through which the Single Regulatory Decree of the Agricultural, Livestock, Fishing and Rural Development Administrative Sector is issued

Decree 1076 of May 26, 2015 by the Ministry of Environment and Sustainable Development, through which the Single Regulatory Decree of the Environment Sector and sustainable development is issued.

Decree 1843 of July 22, 1991 by the Ministry of Health and Social Protection, which partially regulates the use and management of pesticides.

Resolution 1407 of July 26, 2018 by the Ministry of the Environment and Sustainable Development, by means of which the environmental management of waste packaging and packaging of paper, cardboard, plastic, glass and metal is regulated and imposed obligations on the different actors in the chain.

Resolution 1675 of December 2, 2013 by the Ministry of Environment and Sustainable Development, which establishes the elements that must be included in the Management Plans for the return of post-consumer pesticide products.

## **1.6 Methodological Framework**

### **1.6.1 Research Method**

The method that will be used will be the deductive one, because it will start from the general requirements of the European Union for the export of agricultural products to its territory, to the specific that is the production and logistics of avocado in Antioquia for export to the European Union.

- **Research Focus**

The research was carried out with a qualitative approach, where different newspaper articles and scientific magazines, books, news, export reports, interviews and / or research inquiries from the agricultural sector, regulatory sector and export sector were explored, quality information was sought and reliable to establish different criteria on the actions and alternatives that farmers and the production and logistics areas must implement to achieve the export of avocados to the European Union.

- **Type of Study**

In accordance with the objectives set, this research corresponds to a descriptive type, since it allows us to describe what the European Union's environmental requirements are and how the agricultural sector is, specifically the avocado production in the subject, with the objective of being able to identify the challenges they face when exporting this product to the European Union.

### **1.6.2 Research methodology**

To obtain the aforementioned, the legal requirements, certifications and / or standards that the European Union seeks to be applied for marketing to its territory with the aim of achieving a circular economy were identified, later it was determined how the Antioquia agricultural sector is located. Faced with this and in turn, this information allowed the description of different alternatives that must be executed, in order to strengthen the challenges facing agribusiness in the areas of production and logistics, in order to be able to market with countries of the European Union that implement the circular economy.

Said information was obtained from different primary and secondary sources consulted in official sources such as databases from universities and government entities, bibliographic databases, books, newspaper articles, scientific magazines and interviews with experts on the subject, exporters and producers.

The information obtained from the aforementioned sources was classified by its content, clarity and timeliness, based on a detailed analysis where important, relevant, objective, truthful and verifiable information for the research was identified, this in order to have a final result. complete and essential so that those involved can make the respective corrections or improvements in their different processes.

- **Techniques and instruments for collecting information**

For the development of the research, primary sources were used through interviews with experts on the subject and exporters of the product to the European Union, with the aim of identifying what the requirements are in terms of circular economy.

Information was collected from secondary sources such as the ICA, the European Commission, the Ministry of Agriculture, Icontec, among others, with the aim of learning

about environmental regulations in both the European Union and Colombia, in order to describe how the sector in this regard.

- **Selection and analysis of the information**

For the analysis of the requirements, comparative matrices were made to identify the common requirements for each of the processes of the circular economy. And for the definition of the strategies, the main instrument that was used was the DOFA matrix, where all the information obtained was grouped, and it was possible to identify how the agro-industrial sector (specifically avocado) is in Colombia facing both internal requirements like those of the European Union.

This matrix is constructed in the following way:

- • Internal weaknesses
- • External opportunities
- • Internal strengths
- • External threats

- **Control of Bias**

In order to reduce bias, it was sought that the information obtained was from reliable sources, such as government pages, newspapers, both scientific magazines and recognized and reliable magazines in the country, in addition, interviews were conducted with various reliable experts in order to to compare their opinions.

## **1.7 Reach**

This project established the challenges in terms of production and logistics faced by the avocado agroindustry in Antioquia when making a change or improvement to the methodologies implemented to be able to migrate from the linear economy model to the circular economy model, in relation with the requirements that avocados have in order to have easier access to the European Union and enable exporters to obtain long-term and stable trade relations with these countries.

Information was taken from the last 10 years in order to identify how the issue has evolved both in Colombia and in the European Union, and how the industry is currently doing in this regard to define what are the main challenges facing the Antioquia businessmen dedicated to exporting avocado to the European Union.

## **2. Investigation Development**

### **2.1 Requirements in terms of circular economy**

#### **2.1.1 European Union Requirements**

The European Union (EU) is an economic and political association that is made up of 27 countries and covers a large part of the European territory, has contributed to raising the standard of living of Europeans, has created a single currency and is currently seeking to build it a single market in which goods, capital, services and people can freely circulate, as if it were the same territory; Initially it was constituted as a purely economic structure, but it has progressively evolved to become an active geopolitical organization on all fronts, covering topics ranging from the political and commercial to the establishment of an environmental policy. (Government of Spain - Ministry of Foreign Affairs, European Union and Cooperation., 2020)

According to data from the Banco de la República de Colombia, avocado is the fifth most important tropical fruit in the world in terms of volume and cultivated area, in addition, the Hass avocado has emerged as one of the non-mining export products with increased growth; For the first half of 2019, product exports increased by 37.6% and new markets opened with destinations in Europe and Asia.

Antioquia is one of the leading departments in avocado production, with a sales representation of USD 27 million, a figure that indicates a growth of 20.7%. (Money Magazine Writing, 2019).

Approximately 25% of production is established in the Hass variety, which can currently be exported to China, Japan, Argentina, the European Union, the Emirates, the United States and Peru. (Drafting W Radio, 2019)

In 2013, the Free Trade Agreement (FTA) between Colombia and the European Union entered into force, which generated between 2013 and 2017 a growth of 24.3% in non-mining-energy exports; Due to this growth, the EU became Colombia's second trading partner, with exports representing 14.7% of the country's foreign trade (Castiblanco, Sepúlveda, & Rivas, s.f)



According to the above, the EU market is of interest to Colombian Hass avocado exports.

The final text of the trade agreement speaks of “the parties reaffirm their commitment to sustainable development, for the well-being of present and future generations. In this sense, the parties agree to promote international trade, in order to contribute to the objective of sustainable development and work to integrate and reflect this objective in their commercial relationship. In particular, the parties highlight the benefit of considering labor and environmental issues related to trade, as part of a comprehensive approach oriented towards trade and sustainable development ”(Republic of Colombia. Ministry of Commerce, Industry and Tourism, 2013)

Among the existing rules in the EU on food and circular economy issues we can find the following:

- **Law No. 2010-788 of July 12, 2010, on national commitments to the environment or Grenelle Law 2**

Based on the European Union strategy on sustainable development, the Grenelle Law was established in France, with the aim of dealing with important issues for the establishment of an "ecological democracy", these issues are divided into different segments among which are buildings and urban planning; transport; Energy; biodiversity; health, risk and waste; and ecological governance.

In the chapter referring to health, risk and waste, important aspects are taken into account regarding a more effective waste management and the fight against pollutants in the air, seeking to preserve human health and maintain permanent care for the environment.

As of January 1, 2011, it is established that the consumer must be informed by marking, labeling, exhibition about the conditions of the product and the content equivalent to carbon, the consumption of natural resources or the impact on the environment that said product had throughout its manufacturing process; In this way, the consumer has access to clear, sincere and objective information that allows them to make decisions according to their consumption preferences. The Law also seeks to offer greener, more visible, more credible and more accessible products.

- **Council Regulation (EC) 834/2007 of June 28, 2007, on the production and labeling of organic products.**

The regulation provides a basis for sustainable development, focusing production towards ecological methods that can guarantee at the same time the correct functioning of the Union market; It establishes controls, objectives and principles that must be applied to organic products throughout their life cycle, including mechanisms such as labeling and advertising that demonstrate their ecological nature.

It is applicable to agricultural products that are intended for human consumption, animal feed and even includes material for vegetative reproduction and seeds for cultivation, it applies to operators that participate in any stage of the production chain, such as production, preparation and relative distribution to the products mentioned above.

For the production of organic products, it seeks that there are good practices regarding the care of energy; Water; soil; organic material and air, that exacting standards regarding animal welfare are met and that it contributes to achieving a high degree of biodiversity, thus ensuring a viable agricultural management system that respects natural life cycles, ecosystems and guarantee care for the environment.

It seeks to maintain the natural stability of the soil, its fertility, its biodiversity and that the nutrition of vegetables is carried out with nutrients that come mainly from the edaphic system, that the use of non-renewable resources is minimized, that waste is recycled and by-products of plant origin for reuse as resources for agricultural and livestock production, among others.

Regarding plant production standards, cultivation and cultivation practices must be incurred that maintain or increase the organic matter of the soil; fertility and biological activity must be maintained through multi-year crop rotation; establishes the use of fertilizers and soil conditioners that are authorized and production practices that are focused on reducing their contribution to pollution and promoting environmental care must be guaranteed.

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This legislation regarding labeling and production as organic products, in addition to being applicable to European producers, is also taken into account for products imported from non-EU countries.

Starting in 2021, the regulation will be replaced by Regulation 2018/848, which reviews and strengthens the measures regarding the issue of production and ecological labeling, reinforcing issues such as control systems, the commercial regime and production standards.

- **Regulation (EC) 66/2010 of the European Parliament and of the Council of November 25, 2010, regarding the ecological label.**

It was established since 1992 as a voluntary tool that seeks companies to develop products with a low environmental impact throughout their life cycle, and also seeks to help consumers to easily recognize products that are manufactured with environmental responsibility and They are considered organic in the market of the European Union.

The objective of the regulation is to provide a basis for the scheme of the European eco-label, which promotes the design, production and consumption of products and services that are considered to have low environmental impact, sets the standards for the establishment of a system voluntary eco-labeling for products supplied for distribution, consumption or use on the Union market.

The guidelines to be followed by companies interested in using the eco-label in their products are established, which are mainly based on the environmental behavior of their production

throughout the production chain, also influences their technical cycle and the social criteria applicable to products in which the social aspect is relevant.

The EU Ecolabel offers a benchmark of environmental excellence; It is an ISO 14024 Type I label, which means that it is a multiple criteria, based on scientific evidence and a life cycle-based approach, certified by third parties and regularly reviewed to follow technological developments.



**Figurea 1:** European Union Ecological Label

Source: (Comisión Europea, 2020)

- **Regulation (EU) 1169/2011 of the European Parliament and of the Council of October 25, 2011, on food information provided to the consumer.**

The regulation is applicable to all food business operators and to all food destined for the final consumer, it sets the rules regarding the labeling of these products, based on the criterion that all consumers have the right to know as much information as possible about the product they are buying.

In 2011, the Commission carried out a study on the feasibility of developing criteria for the EU Ecolabel for food and feed, requested the opinion of the Council and based on the contributions it decided not to develop criteria for the Ecolabel for foodstuffs, but stated that it could be reconsidered in the framework of future food-related strategies, particularly in light of developing methodologies and other tools to measure the environmental impact of products. The ongoing study on the identification of elements for a strategic approach to the

European Union eco-label, among other things, is considering what product groups should be implemented in the future and will also consider food, beverages, feed, food services , among others(Comisión Europea, 2019)

- **Regulation (EU) 2017/625 of the European Parliament and of the Council of March 15, 2017, on organic production and labeling of organic products.**

With this regulation, official controls are established throughout the agrifood chain with the aim of protecting human and animal health; It aims to promote plant health specifically due to pests that can be harmful to the environment, against the risks posed by some genetically modified organisms or some plant protection products.

They also establish specific rules applicable to official controls in relation to the samples that must be taken, and the production, transformation and distribution phase in which they are taken so that the required laboratory analyzes are carried out, and thus verify the residue levels. present in products entering the European Union.

- **Directive 2008/98 / EC of the European Parliament and of the Council of November 19, 2008, on waste management**

It establishes a legal framework with respect to the key issues regarding waste management throughout the European Union, the fundamental objective is to promote care for the environment and human health, emphasizing the importance of using appropriate management techniques. of waste, within which is recycling to reduce pressure on resources and manage their use.

Within the general requirements, the establishment of an extended producer responsibility mechanism is discussed, which basically focuses on producers or operators who are responsible for marketing, importing or distributing products in the territory of the European Union, having responsibility for the management of the waste generated by its products and the financial responsibility derived from said activities; The measures may also include offering information accessible to the public about the extent to which the product is reusable or recyclable.

This norm establishes that the Member States must adopt measures in order to encourage ecological design in products, which can make an important contribution to mitigate the environmental impacts that may be generated at the end of the useful life, measures can be focused , among other things, to the development, production and commercialization of products suitable for multiple uses, technically durable and which, after having become waste, are adapted to an adequate recovery, without risks and with a disposal that is friendly and compatible with the environment. environment.

Another of the mechanisms that must be implemented within the proper management of waste is that of reuse or recycling, which seeks that the Member States actively promote high-quality recycling, involving all the actors participating in the chain of the life cycle of products, so that effective recycling activities can be established, friendly to the environment and that meet the quality criteria necessary for the corresponding recycling sectors.

Regarding the disposal of waste, it seeks that the Member States ensure that when a correct recovery is not carried out, all waste must be subjected to safe disposal operations that comply with the provisions of the directive on the protection of health human and environmental.

With regard to repair, the reuse of products and the installation of systems that promote repair activities are encouraged, particularly with respect to electrical and electronic equipment; Textiles and furniture, as well as packaging and construction materials and products, must also promote, as appropriate and without prejudice to intellectual property rights, the availability of spare parts, instruction manuals, technical information or other instruments, equipment or programs. computers that allow products to be repaired without compromising their quality and safety.

Repair is a key issue that contributes to the circular economy, however, it is not currently fully regulated and there are several points that make its regulation complex, among them it can be mentioned that technological products are becoming increasingly complex and contain a large number of electronic elements make it difficult to repair, in addition, labor can make repair less attractive than replacing the product; Independent repair shops are at a disadvantage with repair shops that work for original manufacturers, particularly in the

electronics sector; Another point is that there is a perception that manufacturers encourage consumers to replace broken devices rather than repair them, using mechanisms such as high prices for spare parts or repair services.

Repairability measures should be systematically considered when preparing or reviewing ecodesign measures, which should help support repairers and provide consumers with more repair options.

Article 22 of the directive talks about the management of bio-waste, in which it is specified that the Member States must adopt measures to promote the separate collection of bio-waste with a view to composting and digesting it; the treatment of bio-waste, in such a way that a high degree of protection of the environment is achieved; and the use of environmentally safe materials produced from biowaste.

This directive had an amendment through Directive (EU) 2018/851, which goes a little deeper into the extended responsibility of the supplier and the issue of repair.

- **Directive 2009/125 / EC of the European Parliament and of the Council of October 21, 2009, on ecodesign for energy-related products.**

It establishes standards for the elaboration of energy-related products under an ecological design, which takes into account all the environmental impacts that can be generated by the product throughout the life cycle, promoting sustainability and, in addition, guaranteeing its free circulation in the European Union market while increasing the security of the energy establishment.

The ecological design parameters determine the environmental aspects that must be taken into account in all phases of the product life cycle, such as selection and use of raw materials; production; packing; transportation and distribution; installation and maintenance; use and end of life; environmental aspects such as emissions to the atmosphere, water or soil must be evaluated in each phase; material consumption; consumption of natural resources; pollution that can be generated by physical effects such as noise; vibration; radiation; generation of

electromagnetic fields; generation of waste and, an important part of the design is to establish to what extent it is possible for the materials to be reused, recycled or repaired.

The standard also establishes requirements on the importance of offering information to the consumer on issues related to the manufacturing process; environmental characteristics and behavior; information regarding the process of installation, use and maintenance of the product to minimize the impact on the environment and ensure optimal life expectancy; Indications should also be given on the availability of spare parts and the possibility of improving the product, and information should also be given on recycling or disposal at the end of its life cycle.

The legislative framework for ecodesign and energy labeling has the dual purpose of ensuring that more energy-efficient products (through ecodesign) reach the market while at the same time encouraging and empowering consumers to purchase the most efficient information-based products regulated (through energy labeling)

Both the ecodesign directive and the energy labeling directive apply to energy-related products, however, as part of an evaluation carried out in 2014, the need and feasibility of expanding its scope beyond these types of products was considered, but the final report proposes to postpone the extension of the scope until overcoming a series of methodological obstacles, in order to be able to evaluate the extensions on a case-by-case basis.

Another priority issue in terms of circular economy is based on the management of packaging waste, which according to the directive that regulates them, also refers to everything related to the packaging of cargo for transport.

- **Directive 94/62 / EC of the European Parliament and of the Council of December 20, 1994, on packaging and packaging waste.**

To ensure high protection of the environment, the Directive establishes requirements regarding the management of packaging and packaging waste; It is applied to all packaging and packaging waste that reaches the European Union market, regardless of whether it is used or produced in industry, commerce, offices, commercial establishments, services, homes or anywhere else.



Container definitions also include those related to packaging or “transport packaging or tertiary packaging” which refers to all packaging designed to facilitate the handling and transportation of several sales units or several collective packages for the purpose of to avoid its physical manipulation or inherent damages to the transport.

One of the alternatives that all Member States can establish to promote quality packaging waste management is to set up projects to include this issue as part of the expanded responsibility of the producer, to minimize impacts environmental that these containers can generate.

It is established that the container must indicate the nature of the material used for its elaboration, with the aim of facilitating its collection, reuse, recovery and even recycling of this type of product, this information must be supplied by means of a marking, either directly on the container. or with a label that is clearly visible, legible, persistent and of adequate durability, even after the container has been opened.

The European Commission will promote, when appropriate, the development of European standards on criteria and methodologies applicable to the life cycle of packaging; methods of measuring and verifying the presence of heavy metals and other dangerous substances in packaging, and their dispersion in the environment; criteria applicable to the minimum content of recycled material in packaging; criteria applicable to recycling methods; criteria applicable to composting methods and produced compost and criteria applicable to the marking of packaging.

- **Common Agricultural Policy (CAP)**

This policy aims to ensure that consumers in the European Union are provided with affordable and safe food, while ensuring the care of natural resources, respect for the environment and an adequate standard of living for farmers.

It is based on facing challenges related to food security for EU citizens; volatility in world market prices; preserve prosperity in all rural areas; use natural resources in a more sustainable way and contribute to the mitigation of climate change.

In 2018, the European Commission presented legislative proposals on the common agricultural policy beyond 2020, which aims to lead a transition towards more sustainable agriculture and make it more receptive to current and future challenges, such as change climate, environmental degradation or generational renewal while continuing to support European farmers for a sustainable and competitive agricultural sector.

- **Product environmental footprint (PEF / OEF)**

It is a methodology that consists of calculating the carbon footprint that a product can generate throughout its value chain, which seeks to evaluate 16 possible environmental impacts based on existing standards and methodologies, it can be applied to any type of product or organization in order to measure its environmental profile.

Its objective is to calculate the total environmental impact of the products and thus allow the supply of truthful and comparable information on the products, promoting a single market in the EU for organic articles.

**Table 1.** European Union standards, against circular economy processes

PROCESS OF THE CIRCULAR ECONOMY ↓	EUROPEAN UNION RULES								
	Directive 2009/125/CE	Regulation (CE) 66/2010	Directive 2008/98/ CE - Directive (UE) 2018/851	Regulation (UE) 2017/625	Lse N°2010-788 "Law Grenelle"	Regulation (CE) 834/2007	Regulation (UE) 1169/2011	Product environmental footprint (PEF/OEF)	Directive 94/62/CE
<b>Ecological Design</b>	It establishes requirements for the ecological design of energy-related products.  The ecological design parameters of the products are established, which determine the significant environmental aspects in the different phases of the product's life..	Voluntary tool to promote green product design and development, with reduced environmental impact throughout its life cycle, and to help consumers find the best green products.	Member States may take appropriate measures to incentivize the design of products and product components to reduce their environmental impac.	There's no requirement.	There's no requirement.	Organic production will be based on the ecological design and management of biological processes based on ecological systems that use their own natural resources.	There's no requirement.	Alternatives to establish applicability of ecological design and energy labeling in solar photovoltaic systems are being evaluated	It requires that packaging be designed, manufactured and marketed in such a way that it can be reused or valued, including recycling, and that its impact on the environment be minimized when packaging waste or remnants of activities are removed. packaging waste management.

<p><b>Ecological tags</b></p>	<p>The energy label is established, called "CE marking, which must be carried by all energy-related products that meet the requirements of ecological design, with the aim that they can be entered into the internal market and allow their free movement.</p>	<p>Sets rules for the establishment of a voluntary EU eco-label system, which is applicable to products and services supplied for distribution, consumption or use on the Community market.</p>	<p>It establishes a series of measures that can positively affect the phase of consumption and use of products, among which the promotion of credible ecological labels stands out.</p>	<p>Establishes specific rules on official controls in the field of labeling of organic products.</p>	<p>It establishes that as of January 1, 2011, the consumer must be informed, through marking, labeling, display or any other appropriate method, of the carbon equivalent content of the products and their packaging, as well as the consumption of natural resources or the impact on the natural means that are attributable to these products throughout their life cycle.</p>	<p>Defines how organic products should be labeled and which imported products can use the ecological logo of the European Union.</p>	<p>The regulation establishes the rules regarding the labeling of food products, with the aim of guaranteeing a high level of protection for consumers</p>	<p>Alternatives are being evaluated to establish the applicability of ecological labeling in solar photovoltaic systems</p>	<p>Guidelines are established for the marking of packaging, with the aim of knowing the nature of its components and facilitating collection, reuse and recovery, including recycling.</p>
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<b>Close circle production</b>	Requirements for ecological design, which increases eco-efficiency in this type of production.	It promotes ecological design and development, which leads companies to implement closed production cycles that increase the eco-efficiency of products.	Member States should take measures to promote and support sustainable production and consumption patterns, also promoting the manufacture and use of products that are efficient in the use of durable, repairable, reusable and upgradeable resources.	It establishes specific rules on official controls in the field of organic production.	There is no requirement	It establishes the principles, objectives and general rules of organic production, which is a general agricultural management system that combines best environmental practices, a high level of biodiversity and the preservation of natural resources.	There is no requirement	There is no requirement	The containers must be manufactured in such a way that they can carry out various circuits or rotations under normal conditions of use.
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<b>Inverse logistic</b>	There is no requirement	There is no requirement	Through the expanded responsibility of the producer, it is sought that they assume the operational or financial responsibility of the final phase of their products, that is, that they incur the costs of separate waste collection, transportation and treatment.	There is no requirement	There is no requirement	There is no requirement	There is no requirement	There is no requirement	Member States shall take the necessary measures to establish systems for the return or collection of used packaging or packaging waste from the consumer, any other end user or the waste stream, in order to direct them towards the most appropriate management alternatives.
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<p><b>Waste management recycling / reuse</b></p>	<p>There is no requirement</p>	<p>There is no requirement</p>	<p>It establishes requirements for Member States to take measures to promote high-quality recycling; They must promote the reuse of products and the implementation of systems that promote repair and reuse activities. The generation of waste must be reduced, particularly waste that is not suitable for preparation for reuse or recycling.</p>	<p>Specific rules applicable to official controls and measures taken by the competent authorities in relation to residues of certain substances in food and feed</p>	<p>Seeks more efficient management of waste, which contributes to maintaining respect for the environment.</p>	<p>It establishes principles to promote the recycling of waste and by-products of plant and animal origin as resources for agricultural and livestock production;</p>	<p>There is no requirement</p>	<p>There is no requirement</p>	<p>Measures are established, as a first priority, to prevent the production of packaging waste and, in accordance with other fundamental principles, the reuse of packaging, recycling and other forms of recovery of packaging waste and, therefore, to reducing the final disposal of such waste.</p>
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<b>Repair</b>	There is no requirement	There is no requirement	Member States should take measures to promote repair in particular with regard to electrical, electronic, textile, furniture and packaging appliances, as well as construction materials and products. They should promote the availability of spare parts, instruction manuals, technical information or other instruments that allow the repair and reuse of products.	There is no requirement	There is no requirement	There is no requirement	There is no requirement	There is no requirement	There is no requirement
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Source: Own elaboration with data from related standards.

Regarding food, the European Union has comprehensive policies and laws on agriculture; food and feed safety; animal nutrition, health and welfare and plant protection and health. These policies aim to reduce the environmental and climatic impact on natural resources and seek to protect the health of plants, animals, and humans, as well as that of the environment.

Policies aim to prevent contamination of the food chain, promote more efficient food production and at the same time reduce food waste.

### **2.1.2 Voluntary requirements**

At the international level, a series of requirements are also established that are implemented by companies from all industrial sectors of the European Union that seek alternatives to guarantee that their stakeholders throughout the value chain, which includes national and foreign suppliers, comply with requirements regarding environmental issues, since the EU is implementing mechanisms that are aligned with the Sustainable Development Goals (SDGs); some of the requirements that best fit the criteria in the areas of circular economy and care of the environment are:

- **GLOBALG.A.P.:**

It is a registered trademark and a voluntary standard focused on promoting good agricultural practices, with the aim of guaranteeing safe and sustainable agricultural production, leaving food security to the producers; safety; sustainability and care for the environment, guaranteeing traceability and transparency to consumers and offering safer and more sustainably grown products.

The Integrated Farm Assurance (IFA) establishes requirements in terms of history and site management; record keeping and internal self-assessments / inspections; hygiene; worker health, safety and welfare; subcontractors; waste and pollutant management, recycling and reuse; conservation; claims; procedures for withdrawal / recovery of products from the market; food protection; use of the logo; traceability and product segregation; mass balance; statement of food safety policy and food fraud mitigation.

The base module for crops is the one that includes fruits and vegetables and establishes control points and compliance criteria focused on traceability issues; plant propagation material; soil management and conservation; fertilization; Water management; integrated pest management; plant protection products and equipment.

Specifically for the fruit and vegetable module, control points and compliance criteria are established regarding site management; soil management; substrates; pre-harvest and harvest and post-harvest activities (product handling), in addition, establishes a guide for microbiological hazards during cultivation and handling. (GLOBALG.A.P., 2017)

- **ISO 14001:2015**

It specifies the requirements for an environmental management system that can be implemented by an organization with the aim of improving its environmental performance, adding value to the environment, to the organization itself and to its stakeholders.

This international standard is applicable to any organization, regardless of its size, type and nature, and applies to the environmental aspects of its activities, products and services that the organization determines can control or influence them, considering a perspective of the lifetime.

Within this standard, it is considered that the organization must determine the relevant stakeholders to the environmental management system and the needs and expectations of those stakeholders and which of them become legal requirements and other requirements, in addition, an environmental policy must be implemented. and environmental objectives that are compatible with the strategic direction and context of the organization.

Within the defined scope of the environmental management system, the organization must determine the environmental aspects of its activities, products and services that it can control and those that it can influence and the environmental impacts that it can generate from a life cycle perspective of the product.

The organization must determine and have access to the legal requirements and other requirements related to environmental aspects, must determine how these legal requirements and other requirements apply to the organization and take these requirements into account

when establishing, implementing, maintaining and continually improving the system. environmental management. (Colombian Institute of Technical Standards and Certification (ICONTEC), 2015)

There are different options that contribute to development by protecting the environment using prevention; mitigation of environmental impacts; mitigate side effects according to the environmental conditions of the company; It helps the company to comply with the legislation and helps to control the way the products and services offered by the organization are designed.

The standard requires compliance with all legal requirements in environmental matters related to the purpose of the supply contracted with them. (Atehortúa Hurtado F. A., 2019). In this sense, if a potential customer of Hass avocado in the EU is certified in this standard, it is expected that it will require its suppliers in Colombia - or in any other part of the world - to comply not only with the legal requirements of the EU. but even of that client's own requirements in terms of circular economy.

- **ISO 14040:2007**

This international standard describes the principles and the framework for life cycle analysis (LCA), which refers to a compilation and evaluation of the inputs, outputs and potential environmental impacts of a product system through its life cycle.

The life cycle inventory analysis (LCI) phase is included, which involves the collection and quantification of inputs and outputs for a product system throughout its life cycle.

The life cycle impact assessment phase (EICV) is focused on knowing and evaluating the magnitude and how significant are the potential environmental impacts of a product system throughout its life cycle.

In the interpretation phase of the life cycle, the findings of the inventory analysis or the impact assessment, or both, are analyzed and evaluated in relation to the defined objective and scope to reach conclusions and recommendations.

Other reports included in the standard are: the critical review of the LCA; the limitations of LCA; the relationship between the phases of the LCA, and the conditions of use of value judgments and optional elements.

Product life cycle analysis can help identify opportunities to improve the environmental performance of products at different stages of the product life cycle, it also provides the option of providing information to decision makers in industry, government organizations or not. government (for example, for strategic planning, prioritization, design and redesign of products or processes; you can contribute to marketing, for example, by implementing an environmental labeling scheme, developing an environmental claim, or implementing an environmental product declaration .

The LCA addresses environmental aspects and potential environmental impacts, for example, the use of resources and the environmental consequences of emissions from discharges throughout the life cycle of the product, from the purchase of raw material, through production, use , final treatment, recycling, until final disposal (that is, from the cradle to the grave) (Instituto Colombiano de Normas Técnicas y Certificación (ICONTEC), 2007)

- **BS 8001:2017**

It is a British standard that seeks to explore how applying the principles of the circular economy can save costs, unlock new sources of income and strengthen itself in the face of threats and uncertainties of sustainability worldwide.

It is a voluntary orientation standard, it is not suitable for certification purposes, that is, its compliance cannot be certified. It was developed based on the ideas of experts in circular economy and part of the experiences and lessons learned from a variety of organizations, both large and small, that are already trying to be more circular.

Its application is intended for any organization, regardless of size, sector and type, and is of great help to those with different levels of knowledge and understanding of the circular economy; provides practical ways to ensure small “quick wins”, helping organizations to rethink holistically how their resources can be managed to enhance financial, environmental and social benefits. (British Standards Institution (BSI), 2017)

- **Estándar XP X30-901**

It is a voluntary standard of French origin published on October 15, 2018 in the Association française de Normalisation (AFNOR) collection, it proposes a matrix that covers the three dimensions of sustainable development (environment, economy and society) and the seven areas of action of the circular economy (sustainable acquisition, ecological design, industrial symbiosis, functional economy, responsible consumption, extension of the service life and the effective management of materials and products at the end of their life cycle).

This standard could also inspire a label or certification, as it aims to become an international standard, and seeks to make it evident when an organization applies all aspects related to sustainable development and the circular economy.

The member countries of the International Organization for Standardization have approved the creation of a technical committee on the subject of circular economy (ISO TC 323) under French leadership, with the aim of bringing together professionals who wish to develop the international standard on the basis of the text developed in French; therefore, France is leading the strategic issue and together with this country, all economic actors who saw it as an opportunity to review the model in light of the climate and ecological crisis. (Afnor Groupe, 2018)

- **NIMF 15**

International Standards for Phytosanitary Measures (ISPMs) are the standards adopted by the Commission on Phytosanitary Measures (CPM), which is the governing body of the International Convention on Plant Protection (IPPC). The IPPC is the only standard setting organization for plant health according to (FAO, 2020). This standard is used internationally as a regulation of wood packaging. ISPM 15 provides guidance to importers and exporters on how wood should be used in all types of packaging, be it pallets, boxes, pallets, among others, with the aim of mitigating pests in a greater percentage and being able to carry out a correct phytosanitary transport of products.

In Colombia, the ICA is the one that has the function of the National Organization of Phytosanitary Protection, therefore, it must ensure compliance with this standard, although

in some countries exporters are required to comply with the requirements indicated by the destination countries .

The wood used in export packaging must be debarked, that is, the wood must be in its largest volume free of the bark of the tree, considering that ISPM 15 only allows up to 3 centimeters of bark.

Two types of treatments can be given to provide sufficient protection for the wood to be used in the packaging, by means of a thermal treatment that involves applying lime to the wood for a certain time or by means of a fumigation treatment with methyl bromide ; Both will allow to eliminate the pests that exist in the wood at the time of treatment and will protect for a longer time the probability of subsequently acquiring some type of pest.

The standard allows the reuse of wooden packaging as long as it has not had any alteration in the wood from its manufacture to the end of its life cycle, including ISPM 15 allows the free movement of the packaging for as long as desired without need to give it a mark or treatment again, if from the beginning it was assigned the correct processing for both issues.

Repaired wood is considered to be wood that has undergone during its life cycle an alteration in at least one third or less in its entire structure and as long as wood (marked again) is used during the treatment to be given. If in the middle of the life cycle of the wooden packaging in the same proportion of the previous one it is replaced by other wood, it will be considered as recycled packaging.

ISPMs are a label, and although their focus is essentially sanitary, they also have an ecological component aimed at preventing the introduction of invasive species into packaging. What the standard establishes in this regard is that "Yes, the brand must conform to the model of the international standard and must include the following information:

The IPPC symbol in English (IPPC).

The ISO code of the exporting country. The letters CL correspond to Chile.

The code of the accredited third party treatment chamber that is assigned by the SAG (000).



The applied phytosanitary treatment (YY) code, which may correspond to any of the following abbreviations:

HT = 56 ° C heat treatment for 30 minutes.

HT KD = oven drying heat treatment.

MB = fumigation with methyl bromide

**Table 2.** International standards, facing circular economy processes

CIRCULAR ECONOMY PROCESS ↓	INTERNATIONAL RULES			
	GLOBALG.A.P.	ISO 14001:2015	ISO 14040:2007	NIMF 15
<b>Ecological Design</b>	There is no requirement	Controls the way the organization's products and services are designed, with the aim of minimizing environmental impacts.	Provides the opportunity to make decisions regarding the design of products or processes, which may lead to opting for ecological designs that help minimize environmental impacts.	There is no requirement
<b>Ecological Tag</b>	There is no requirement	It could include it if it is taken into account that the legal requirements of the interested parties must be considered	Provides an opportunity to develop marketing strategies, for example with the development of environmental labels.	NIMF15 es una etiqueta, y aunque su enfoque es esencialmente sanitario también tiene un componente ecológico dirigido a prevenir la introducción de especies invasoras en los embalajes.
<b>Closed cycle production</b>	There is no requirement	It could include it if it is taken into account that the legal requirements of the interested parties must be considered	One of the alternatives that the company may have is to opt for a closed production cycle, with the aim of improving processes in order to minimize the environmental impact.	There is no requirement
<b>Reverse Logistics</b>	Establishes procedures for withdrawal / recovery of products from the market	It could include it if it is taken into account that the legal requirements of the interested parties must be considered	There is no requirement	There is no requirement
<b>Waste management recycling / reuse</b>	Establishes requirements for waste management and polluting agents, recycling and reuse.	It could include it if it is taken into account that the legal requirements of the interested parties must be considered	Includes aspects such as waste management and final dispositions of the product, including the evaluation of recycling and reuse policies.	Wooden packages have an indefinite time in their life cycle and are not required to carry out a remarking or treatment, so they can continue to be used once

				they are shipped with the product.
<b>Repair</b>	There is no requirement	It could include it if it is taken into account that the legal requirements of the interested parties must be considered	There is no requirement	Wood packaging can be repaired with more wood, but bearing in mind that there must be a marking process and treatment must be assigned to eliminate pests.

Source: Own elaboration based on related international standards.

### 2.1.3 Requirements of the Republic of Colombia

- **Colombian Agricultural Institute ICA**

The Colombian Agricultural Institute ICA, is one of the Colombian entities that within its functions as established by Decree 4765 of 2008 must ensure the coordination, creation of strategies and guidelines to achieve the improvement, insurance and prevention of crops, the ICA it generates a series of good practices that farmers must comply with in order to continue operating their agricultural activities; This is done seeking the protection of both human and animal health, plants and natural resources, allowing a sustainable development of production and marketing of agricultural products.

In order to comply with the aforementioned, the Colombian Agricultural Institute ICA establishes resolutions, however, those presented below are applied directly to the subject matter, in these you can find the regulations that must be followed for the correct processing of crops of vegetables and foods for human consumption such as avocado.

- **ICA Resolution 1558 of May 7 of 2010**

It is necessary to know what are the sanitary requirements demanded in the country to which the plant products are going to be exported, since only after compliance, the ICA will be able to issue the phytosanitary export certificate, otherwise it will not do so; In case the country of destination does not require this certificate, ICA will generate it at the request of the interested party.

- **ICA Resolution 448 of January 20 of 2016**

The ICA not only takes care of plant products that are for national consumption but also those exported in order to guarantee the safety of the products, for this reason every exporter of fresh vegetables must be duly registered with the ICA indicating that it is in charge of This economic activity and even the crop infrastructure must have approved certain requirements imposed by the ICA.

This resolution specifies the processes and requirements that must be met to be able to register farms producing vegetables for fresh export; to register as an exporter of fresh vegetables and to register vegetable packing plants for fresh export.

Both the producer and the exporter and the vegetable packing plant must meet a series of requirements in order to acquire these records, some of which are good phytosanitary management; pest monitoring and reports of crop production; including the export of vegetables that come from properties registered with the ICA; the safety and phytosanitary quality of the vegetables to be exported must be ensured, in order to maintain a quality product and mitigate the risks of pest dispersal.

- **ICA Resolution 3973 of April 14 of 2016**

Taking into account that the mobilization of plant material is one of the main factors of pest dispersal, phytosanitary measures must be taken that contribute to the care of crops and the reduction of the spread of pests to prevent them from entering healthy fruits.

In order to have a good practice of the previous topic, you must have a phytosanitary license for the mobilization of plant material in the Colombian territory, which is regulated by this resolution, and for this, it is necessary to comply with certain requirements such as, have clear information on the products and routes by which they will be mobilized; phytosanitary certificate signed by the technical assistant of the property; and have established official control pest management plans. This license is valid for a single journey, a single means of transport or a batch of plant material, not exceeding any 3 calendar days, except in the event of a case of force majeure or fortuitous event. The license must always be carried and upon arrival at the phytosanitary control posts, officials can request a second inspection of the plant material.

- **ICA Resolution 1507 of February 22 of 2016**

The ICA, being a National Organization for Phytosanitary Protection (NPPO), must ensure the plant health protection of the country and that is why, by means of resolution 1507 of February 2016, it seeks to exercise preventive actions, control and eradication of pests that may appear in crops, this time focusing especially on the avocado *Persea americana* Miller.



**Figure 2.** Avocado *Persea americana* Miller

Source: Ministry of Agriculture and Rural Development of Mexico, cited by (DANE, 2015)

The ICA generates this resolution in order to prevent specific types of pests that directly affect this class of avocado, these pests are the seed borer (*Heilipus lauri* Boheman and *Heilipus trifasciatus*) and the borer of fruit, seeds and branches ( *Stenoma catenifer* Walsingham), these not only involve crop damage but also directly affect international trade in fruits like this, since many markets, such as the European Union, restrict the entry of products contaminated by pests in general and even more With these due to their high risk of dispersal, it is for this reason that certain phytosanitary measures must be established to keep crops out of the reach of these pests.

This resolution establishes some phytosanitary measures through pest monitoring plans that help prevent them. Pest management and control must be carried out by planting with healthy

material and duly authorized by ICA and maintenance must be carried out according to the crop's requirement, using pesticides with prior registration with ICA.

- **ICA Resolution 30021 of April of 2017**

ICA Resolution 30021 of April 2017 becomes a more updated version of ICA Resolution 20009 of April 2016

This resolution allows farmers to know the good practices that they must exercise in their crops of primary production of vegetables and other foods for human consumption, it is carried out in order to prevent, eradicate or manage diseases, pests or other circumstances that directly affect crops and in turn allow the protection of natural resources. When speaking of vegetables, the ICA refers to all agricultural products that as primary production can be consumed immediately without the need for processing for consumption, including, these products are usually raw materials for the creation of processed products, an example of This is avocado as a primary product and guacamole as a processed product.

This resolution allows farmers to certify that good practices are established in their crops for the proper functioning, production and marketing of vegetable crops or primary production for human consumption. This certification must be processed by means of a written request (form 3-189) with the appropriate annexes before the Sectional Management corresponding to the jurisdiction of the property, however it must be taken into account that in some cases as established in Decree 3930 2010 (Decree different provisions related to the uses of the water resource, the ordering of the water resource and the discharges to the water resource, the soil and the sewers) will require the water use permit or at least the filing of the permit application . After requesting the ICA, it will have 30 working days to review the documentation, they will carry out a technical visit with a checklist established by this entity that must be signed by both parties, stating that it is already certified, postponed if it needs corrections or not. certified. After this, the Sectional Management within the following 30 business days may issue the certification giving a validity of 2 years, which must be renewed 60 business days before its expiration. The respective certification may have modifications, monitoring follow-ups and cancellation in case of non-compliance.

Within the manual of good agricultural practices it indicates that the areas and facilities must remain clean, separated from each other, well ventilated and with good lighting, especially the area of dumping of excess water should be away from sources of drinking water, in order to take care of them. It is important to keep traceability of all crops, and records of all processes carried out on crops, especially following the indications of the following environmental items:

Environmental component: The characteristics and resources of the area of the property, risks that the soils have and sources of water that may affect the products must be identified, in addition to knowing the productivity, areas and facilities of the crops by means of a sketch.

Identify water sources and carry protection processes for them. In case of having a risk system, a rational use plan must be implemented, always keeping a documentary record of water consumption.

Pesticide containers must be washed three times, do not destroy their label and do not use them until they can be returned to the manufacturer or importer with whom the return mechanism has been established.

Keep crops clean of plant material resulting from phytosanitary pruning in order to avoid pests.

Soil management: Perform crop rotation when possible, establish soil drainage systems to avoid water saturation, and also implement practices that help prevent soil erosion.

Selection of propagation material: All the materials used in the sowing must comply with the current rules issued by the ICA, the seedlings must be purchased in registered nurseries and the use of genetically modified material must be authorized. If the propagation material is obtained from the farm, you must have a procedure for this, always keeping a record of the processes used with them.

Plant nutrition: Design a fertilization plan for crop nutrition by the technical assistant, using organic inputs and fertilizers registered with the ICA and acquired in commercial establishments duly registered with the entity.

There must be a procedure for preparing the fertilizer on the premises and a record of the procedures must always be kept. No input or material that presents microbiological contamination must be incorporated.

Crop protection: It is important that farmers have a plan for the phytosanitary protection of the crop and that it be carried out by the technical assistant, this should be based on the principles of Integrated Pest Management (IPM), which consist of a scheme that uses biological, cultural, physical and chemical tools to regulate them, in order to mitigate crop damage and economic, environmental and human health related risks.

- **ICA Resolution 8461 of June 21 of 2019**

Flies are a kind of pest that affects plant products for export and because of this it can generate negative impacts on the economy as it cannot export these fruits to other countries.

Due to the aforementioned, it is of utmost importance that the owners of the properties registered as growers of vegetable products for fresh export, implement a surveillance system for fruit flies, for this they must install traps such as the Jackson trap and the trap. McPhail that facilitate the control of flies; Likewise, fruit fly trapping service control cards must be kept, in order to consolidate the data of the services performed on the traps.



**Figure 3.** Jackson Trap

Source: (Instituto Colombiano Agropecuario ICA, 2011)



**Figure 4.** McPhail Trap

Source: (Instituto Colombiano Agropecuario ICA, 2011)

The plants where the traps are located must be identified by means of plastic tapes.

This resolution provides basic instructions on where and how the traps should be installed, however, the ICA periodically visits the properties to verify that the processes established for the traps are being carried out as directed.

The owner of the property registry must comply with the control of resolution ICA 001 of 2011, which provides information on how to control fruit flies throughout the Colombian territory, in addition, must guarantee the correct operation and maintenance of the traps, carry register these and monitor them with the respective formats for such.

**Table 3.** ICA standards, against circular economy processes

RESOLUTIONS OF THE COLOMBIAN AGRICULTURAL INSTITUTE - ICA						
Circular Economy Process	Resolution ICA 1558	Resolution ICA 448	Resolution ICA 3973	Resolution ICA 1507	Resolution ICA 30021	Resolution ICA 8461
<b>Ecodesign</b>	There are no national requirements, it is necessary to know and comply with the	It is required that the vegetable products produced, packaged and exported must	There are no requirements .	Pest management and control must be carried out by planting with healthy material	All the materials used in sowing must comply with the current	There are no requirements .



	requirements of the exporting country where the product will be shipped.	be products that use raw materials authorized by the ICA from the raw material, always keeping quality vegetables and without using chemicals or inputs that are not allowed.		and duly authorized by ICA, in order to use less impactful materials and supplies for product quality and the environment.	rules issued by the ICA, in order to use less impactful materials and supplies for product quality and the environment .	
<b>Etiquetado ecológico</b>	There are no national requirements, it is necessary to know and comply with the requirements of the exporting country where the product will be sent .	There are no requirements .	There are no requirements .	There are no requirements .	There are no requirements .	There are no requirements .
<b>Producción de ciclo cerrado</b>	There are no national requirements, it is necessary to know and comply with the requirements of the exporting country where the product will be sent .	There are no requirements .	There are no requirements .	There are no requirements .	Within the manual of good practices it mentions as an environmental component the generation of a plan for the rational use of water consumption .	There are no requirements .
<b>Logística inversa</b>	There are no national requirements, it is necessary to know and comply with the requirements of the exporting country where	There are no requirements .	There are no requirements .	There are no requirements .	It informs that the return of pesticide containers must be implemented, either directly to the manufacture	There are no requirements .

	the product will be sent .				r or to the importer, so that they can make use of these containers .	
<b>Reciclaje / Reuso</b>	There are no national requirements, it is necessary to know and comply with the requirements of the exporting country where the product will be sent .	There are no requirements .	There are no requirements .	There are no requirements .	There are no requirements .	There are no requirements .
<b>Valorización de residuos</b>	There are no national requirements, it is necessary to know and comply with the requirements of the exporting country where the product will be sent .	There are no requirements .	There are no requirements .	There are no requirements .	There are no requirements .	There are no requirements .
<b>Reparación</b>	No existen requisitos nacionales, es necesario conocer y cumplir los requisitos del país exportador a donde se va a enviar el producto.	There are no requirements .	There are no requirements .	There are no requirements .	There are no requirements .	There are no requirements .

Source: Own elaboration based on related standards.

- **Standards of different Ministries in Colombia**

Norms of different Ministries in Colombia In this section, Laws, Decrees and Resolutions issued by different governmental entities to the Colombian Agricultural Institute ICA are related.

- **Law 9 of January 24, 1979 by the Ministry of Health and Social Protection: "By which Sanitary Measures are issued ".**

This law emphasizes the authorization of the Ministry of Health and delegated authorities to comply with the proper use of the law where norms for said activity are established and to avoid contamination of the corresponding raw materials or the same that are produced, handled, elaborated, transformed, divide, conserve, store, transport, sell, consume, import or export.

It must have a sanitary license to produce, transform, fraction, manipulate, store, sell, import or export food, they must have sufficient spaces for the operation and maintain the product in a hygienic way.

The equipment and utensils must allow and remain clean and disinfected to avoid hygienic and sanitary problems, as well as the workers who handle the products. This should be used for the raw material, packaging, packaging, wrapping, finished product and stored so that the product is not contaminated and thus ensure its proper conservation. All actors involved in the production and logistics of the product, such as transporters, must comply with certain rules of personal hygiene and sanitary practices.

They must contain information intended for sale to the public such as: Product name; Name and address of the manufacturer; Net content in units of the International System-SI; Registration of the Ministry of Health and Ingredients.

The vehicles destined for the product must have a suitable temperature for the preservation of the product until its final destination. The product cannot be deposited on the transport floor, as this can bring risks to the consumer's health, and it cannot be transported with dangerous substances that can contaminate the food.

The Ministry of Health applies the regulation so that the containers, packages or wraps of food or beverages and prohibits packaging in deteriorated containers or that have been previously used for dangerous substances, the reuse of containers or packages that have not been used for dangerous substances , they can be reused once washed, disinfected or sterilized, they can be used in food and beverages, the commercialization of food and drinks whose packaging has information or brands that correspond to other factories or products is prohibited.

- **Decree 1071 of May 26, 2015 by the Ministry of Agriculture and Rural Development: "Through which the Single Regulatory Decree of the Agricultural, Livestock, Fishing and Rural Development Administrative Sector is issued"**

This decree lists some entities that provide certain financial collaborations to the agricultural sectors. However, they are monitored by the Ministry of Agriculture and Rural Development in order to provide protection to rural peasant development.

Financial intermediaries must establish the mechanism that ensures that the producer beneficiary of the credit authorizes that the disbursement of the credit be made directly to the supplier of inputs, who must issue certification of the payment made.

Peasant reserve areas aim to promote and stabilize the peasant economy, overcome the causes of social conflicts that affect them and create conditions of peace and social justice in rural areas. Farmers must adapt to a specific time for planting, and deadlines for the completion of crops, destruction of residues, cultivation of crops, destruction of plantations and others related to the matter when these measures are necessary to prevent eradication and control pests, diseases or other harmful organisms of quarantine importance.

- **Decree 1076 of May 26, 2015 by the Ministry of Environment and Sustainable Development.**

This decree seeks to ensure the sustainable development of the country, for this it relies on entities such as the National Authority for Environmental Licenses, which is responsible for ensuring compliance with the standard.

The decree deals with issues about forest plantations and how to provide the correct conservation, eradication, and valorization processing, among others, of the plantations, in order to establish protective areas in the direct and indirect use of these, including conditions for maintenance. of its resource protection effect.

The decree defines the implementation of risk management plans for the management of dumping, in order to detect risks, prevent and reduce them, without neglecting the development of activities that allow the possibility of reducing pollutants in these dumping sites. of the environment. In addition, it promotes the management of information on the water resources that are being treated, with the purpose of taking care of the country's water sources.

The classification of waste wastes must be implemented, in order to exclude hazardous wastes from non-hazardous wastes, the manufacturer or importer must take charge of the hazardous wastes until they are converted into inputs used for the use of other processes or totally eliminated.

The decree makes distributors of pesticide containers responsible, such as natural or legal persons who are responsible for environmentally responsible management and their waste. Distributors must establish plans to return packaging.

- **Decree 1843 of July 22, 1991 by the Ministry of Health and Social Protection, which partially regulates the use and management of pesticides.**

The use of pesticides in Colombia in the agricultural sector has become a frequent practice for the control and surveillance of this spread, with the purpose of caring for crops, handling of pesticides, are subject to the provisions contained in the Law 9 of 1979 Decree 2811 of 1974, International Health Regulations, the International Code of Conduct for the Distribution and Use of Pesticides of the United Nations Food and Agriculture Organization (FAO).

This decree refers to what care must be taken by workers involved in the application of pesticides. One of the important regulations is that the producer must know that when buying

a pesticide it must have the safety seal and the label where all the information on the way of use is found.

The farmer must carry out a series of tasks and procedures to execute good practices for the use and handling of pesticides to ensure that the product is safe and of good quality, and the protection and health of plantation workers must also be ensured by ensuring the human health and environmental protection.

The packaging or empty containers of pesticides cannot be reused, since they are considered as dangerous substances, however if you want to use them you must obtain a permit from the Ministry of Health.

- **Resolution 1407 of July 26, 2018 - Ministry of the environment and sustainable development**

Poor waste management causes pollution of the environment, so this resolution seeks to provide a process that helps sustainable development and mitigation of environmental pollution, specifically soil and water, making this process goes from being a linear economy process to a circular economy process.

In order to generate a correct process for the management of packaging waste, it is necessary to meet the goals of using packaging waste according to the percentages defined by the Ministry of Environment and Sustainable Development that must be carried out as of 2021. This resolution implements in packaging, innovation and ecodesign of these through the use of recyclable compostable materials, incorporation of materials from renewable natural resources and implementing the least use of packaging on the market.

It is the obligation of the producer and merchant not only to generate management plans for packaging waste but also to generate strategies that help the implementation of this waste within the circular economy, such as generating completely natural and / or recyclable packaging or return plans packaging.

- **Resolution 1675 of December 2, 2013 by the Ministry of Environment and Sustainable Development**

This resolution implements management plans for the return of post-consumer products of pesticides to manufacturers and importers of pesticides, for this standard there are several actors that will help the circulatory chain of these pesticide residues, that is, the manufacturer or the producer This is responsible for sending the importer, then the final consumer and surveillance agents such as ICA and INVIMA.

The definitions of compliance with this resolution are adopted in action to collect the products discarded or discarded by the consumer at the end after the useful life of the product, it is subject to post-consumer product return plans.

Containers of pesticides such as bottles, boxes, tablets, cartons, hand pumps, or cans of the products, may be delivered to the facilities of points of sale, municipal collection centers and collection campaigns, the products for agricultural use must be subjected to triple wash.

Post-consumption is a product or service that contains substances dangerous to health and the environment and for this it must be managed safely, for that reason, post-consumption waste programs were implemented to ensure that the collection of said waste is effective and can be adapted to the environment.

The actors involved in this management are:

Producers, who formulate and implement programs for the collection, transportation, storage, use, recovery and final disposal phases.

Suppliers: they must temporarily store the post-consumer waste at no cost to both the consumer and the producer.

Consumers: they must deliver the post-consumer waste according to the instructions supplied by the products.

The municipal and environmental authorities: must inform consumers of post-consumption programs and the obligations of the parties. Post-consumer waste management chain: collection, transport, storage, classification and treatment and final disposal.

Post-consumer programs are part of the concept of circular economy, they include the principle of extended producer responsibility, which requires manufacturers and / or importers of pesticides to collect pesticide containers once they have been used, to make use and / or recovery, treatment and / or controlled final disposal.

**Table 4.** Regulations of different Ministries regarding circular economy processes.

<b>Circular Economy Process</b>	<b>Law 9 of January 24, 1979</b>	<b>Decree 1071 of May 26, 2015</b>	<b>Decree 1076 of May 26, 2015</b>	<b>Decree 1843 of July 22, 1991</b>	<b>Resolution 1407 of July 26, 2018</b>	<b>Resolution 1675 of December 2, 2013</b>
<b>Ecological design</b>	There are no requirements.	There are no requirements.	There are no requirements.	There are no requirements.	The development of the implementation of packaging with innovation and eco-design is implemented through the use of recyclable compostable materials and the incorporation of materials from renewable natural resources.	There are no requirements.
<b>Etiquetado ecológico</b>	There are no requirements.	There are no requirements.	There are no requirements.	There are no requirements.	The final packaging (material) must be ecological, however, during the entire production process, a circular economy process is not required.	There are no requirements.



<b>Circular Economy Process</b>	<b>Law 9 of January 24, 1979</b>	<b>Decree 1071 of May 26, 2015</b>	<b>Decree 1076 of May 26, 2015</b>	<b>Decree 1843 of July 22, 1991</b>	<b>Resolution 1407 of July 26, 2018</b>	<b>Resolution 1675 of December 2, 2013</b>
<b>Producción de ciclo cerrado</b>	There are no requirements.	There are no requirements.	There are no requirements.	There are no requirements.	There are no requirements.	There are no requirements.
<b>Logística inversa</b>	This implements a collection process for containers that can be used as indicated by law where it reports that the only ones that can be reused with containers that have not contained dangerous substances and that have undergone a cleaning and sterilization process for their use..	There are no requirements.	Distributors must adapt collection plans for pesticide containers used by end consumers, in order to give them a new use.	There are no requirements.	Implementation of plans for the return of packaging waste delivered by the end customer is carried out.	Post-consumption programs are implemented, making pesticide producers and importers generate collection plans for the containers in order to put them to use again and take care of the environment against waste such as bottles, boxes, tablets, cartons, hand pumps, or cans of the products.
<b>Manejo de residuos reciclaje/reuso</b>	The law allows the reuse of containers as long as they have not contained dangerous substances and have been completely sterilized.	There are no requirements.	The decree implements discharge management plans so that there is less pollution for the environment. In addition, a careful disposal process of hazardous waste	There are no requirements.	If packaging waste management is not implemented through reverse logistics, the containers must be manufactured with materials so that they can be	Containers of pesticides such as bottles, boxes, tablets, cartons, hand pumps or cans of the products, may be delivered to the facilities of points of

Circular Economy Process	Law 9 of January 24, 1979	Decree 1071 of May 26, 2015	Decree 1076 of May 26, 2015	Decree 1843 of July 22, 1991	Resolution 1407 of July 26, 2018	Resolution 1675 of December 2, 2013
			must be carried out.		recycled and / or reused in other processes.	sale, municipal collection centers and collection campaigns, the products for agricultural use must be submitted to triple washed.
<b>Reparación</b>	The washing, disinfection or sterilization plan must be implemented in order to provide a repair plan for the containers, so that they are used as the final product for the same content they had before or a new one such as food and beverages.	There are no requirements.	There are no requirements.	There are no requirements.	Packaging is handled in detail, so that the materials are adaptable for recycling.	Pesticide importers or distributors after collecting the respective containers are offered a process of, treatment, use, recovery and / or final disposal for another new product.

Source: Own elaboration based on the aforementioned standards.

Since 2014, Colombia is carrying out programs focused on promoting the circular economy; in late July and early August of that year, within the framework of the Energy and Climate Alliance of the Americas (ECPA), the Organization of American States (OAS) held workshops on closed-loop production and economy in Colombia circular, during which around 370 businessmen, public officials and students from the cities of Medellín and Bogotá were trained in innovative closed cycle and circular economy methodologies; The initiative aimed to employ renewable energy and energy efficiency, eliminate the use of toxic chemicals, and eradicate the generation of waste through the intelligent design of products

and services to improve environmental performance, as well as the productivity and competitiveness of companies - including micro, small and medium (MSMEs) - to facilitate the comprehensive development of Colombia and its transition to a sustainable, competitive and circular economy. (Organization of American States (OAS), 2014)

In November 2018, President Iván Duque launched the National Circular Economy Strategy with which Colombia is expected to be by 2030, one of the three most competitive countries in Latin America.

To get to that point, the participation of a large part of the population is needed and the government is aware that the work belongs to everyone and, therefore, the Ministry of Environment will work hand in hand with the Ministries of Commerce, Education, and Housing. , Transport, Agriculture and Mines, as well as with the unions of the productive sector, the academic sector and more than 50 businessmen.

Among the main strategies implemented under this initiative is the Plan for the Sustainable Management of Single-Use Plastics, adopted by the plastics sector, which seeks to gradually replace all the products made with this material such as, plastic bags; mixers; supports for pumps; Copitos, among others, for products that are reusable or biodegradable; In addition, it also seeks to include in the extended liability scheme of the producer of packaging for glasses, dishes, cutlery and similar products, with goals to increase recycling to a higher extent; This measure also includes other actions related to labeling, ecodesign, studies on microplastics and promotion of research, responsibility and coordination with municipalities for collection and use. (Redacción Portafolio, 2019)

#### **2.1.4 Requirements of the European Union for the entry of fruit into its territory**

According to information from Colombia's Trade Agreement with the European Union, taken from (Procolombia, 2020), regarding the agribusiness business opportunity for fresh fruits, the main requirements are:

Sanitary and phytosanitary

The general requirements for the import of food into the territory included in the General Food Law must be met, whose main objective is to guarantee safe and nutritious food and

feed that guarantees a high degree of health and well-being of animals, plants and clear information such as origin and content, labeling and use of food. (European Commission, 2020).

Regulations on hygiene in food products must be complied with through each and every phase of the production chain, and the general implementation of procedures based on HACCP principles, which have food safety and control objectives. sanitary, these principles are:

- Principle 1: Carry out a hazard analysis and identify the respective preventive measures.
- Principle 2: Determine the critical control points (CCP).
- Principle 3: Establish critical limits.
- Principle 4: Establish a control system to monitor CCPs.
- Principle 5: Establish corrective actions to be taken, when monitoring indicates that a certain CCP is not under control.
- Principle 6: Establish verification procedures to confirm whether the HACCP system is operating effectively.
- Principle 7: Establish documentation for all procedures and records appropriate to those procedures and their application.

(Panamerican Health Organization, s.f)

Regulations related to maximum levels of pesticide and contaminant residues must be followed; microbiological and radioactive contamination. Quality standards for the marketing of fresh fruit and special considerations for organic fruits.

- Tagging

Food products entering the European Union must comply with established labeling rules to ensure that consumers have all the information required to make an appropriate purchase

decision; product labeling must meet requirements such as those set out in the following table:

**Table 5.** Labeling requirements for food entry into the European Union

<b>Product name</b>	t must be included in the specific name of the product and if it has any special type of treatment such as pulverized, lyophilized, frozen, smoked concentrate or others..
<b>List of ingredients</b>	Preceded by the word "Ingredients", including all ingredients in descending order according to their weight at the time of manufacture and in the case of containing ingredients that can generate allergies, the word "Contains".
<b>Net amounts</b>	Must be specified in net weight, metric units and units of measure for liquids.
<b>Date of minimum duration</b>	The expiration day, month and year must be specified, preceded by the word use "Before".
<b>Special conditions</b>	Specify if the product should be kept in any special condition or should be used in a particular way.
<b>Commercial name</b>	Name, address of the importer, packer or manufacturer established in the European Union.
<b>Place</b>	Place of origin or origin.
<b>Marked lot</b>	For packaged products specify the batch preceded by the letter "L".

Source: (Procolombia, 2020)

Fresh fruits with optional certifications such as:

- GLOBALG.A.P. la cual se refiere a buenas prácticas agrícolas como se explicó en el punto 2.1.2
- Rainforest Alliance: It is an international certification that seeks to ensure that production farms meet criteria that cover the three pillars of sustainability: social,

economic and environmental; the standard is built on important principles of sustainable agriculture as conservation of biodiversity; improvement of livelihoods; Conservation of natural resources; effective agricultural planning and management systems.

- International ILO standards: These are legal instruments prepared by the ILO's constituents (governments, employers and workers) with the aim of stating the fundamental principles and rights at work and regulating other areas of the world of work. (International Labor Organization, s.f)
- Fair Trade: It is an international label that seeks to change the way trade works and promote fair trade. It focuses on offering it at better prices, guaranteeing better forms of work and a fairer agreement for farmers and workers in developing countries; a product with the FAIRTRADE seal shows that producers and companies have complied with internationally agreed standards.

**Figure 5.** Fruit with FAIRTRADE seal



Source: (Bretherton, 2011)

As a result of the comparative analysis of the different standards applicable to the export of fruit (and especially Hass avocado) to the European Union, it is concluded that producers and logistics operators must meet the following requirements:

- a. The products must have an ecological design that determines the significant environmental aspects in the different phases of the product life cycle, from the acquisition of raw materials to their final disposal, in addition, this design must also

focus on the products being recyclable, reused, valorised and that its repercussions on the environment are reduced when waste is eliminated.

- b. It is preferable that the products have an ecological label, with which the consumer is indicated that they are manufactured providing special care for the environment, and must also indicate the nature of their components so that at the end of their cycle life can facilitate collection, separation, reuse, recovery and even recycling.
- c. Member States could take measures to promote sustainable production, that is, to encourage the manufacture and consumption of products that are resource efficient, repairable, reusable and recyclable.
- d. Producers must assume operational or financial responsibility for the final phase of their products, that is, they must carry out separate waste collection activities, their transport and treatment.
- e. For industrial activities, products must be more recyclable, reusable or repairable and the generation of waste that cannot meet these characteristics must be reduced; Regarding agricultural production, recycling of waste and by-products of plant and animal origin is promoted as resources for production.
- f. In terms of wood packaging, certain treatments must be implemented in order to avoid and eliminate existing pests in the wood to reduce the probability that there will be a transfer of these pests to the importing country. In addition, with the use of these treatments, reuse processes can be implemented and therefore repair of each of the wooden packages to use them indefinitely.

## **2.2 Current state of the avocado sector in Antioquia, to comply with the circular economy guidelines**

### **2.2.1 Importance of Hass avocado for the economy and exports of Antioquia.**

According to a survey carried out by (Álvarez Vélez, Monsalve, & Atehortúa Hurtado, 2019) in their research on the social, environmental and economic impacts through the production, marketing and export of Hass avocado in the Antioquia region, 100% of the respondents agrees that avocado is a business that represents significant growth in the agricultural sector and a significant contribution to the economy of Antioquia.

As mentioned in section 2.1.1, according to the analysis by departments, Antioquia leads exports of Hass avocado in Colombia. Furthermore, according to Jorge Enrique Restrepo, director of Corpohass, the interest in growing this fruit arose in the department and the first Crops were grown there, which is why Antioquia is one of the main destinations for foreign investment and packing plants and planted hectares have increased; Due to the importance of the department in the sector, in May 2019 the Antioquia Government and Corpohass decided to make an agreement to benefit thirty Hass avocado producing companies in the east, southwest and northeast of Antioquia, to be certified in standards international and can more easily access markets such as the United States, the European Union and Japan. (Drafting Blu Radio, 2019)

There are contributions made by different managers of development entities, by employees of strategic units of the flower exporting SMEs of eastern Antioquia where they give specific guidelines from the management that these organizations must implement to succeed in the export activity, traders from financial institutions , directors of unions and logistics operators at the service of these (Restrepo Restrepo, 2014), so it could be inferred for the present investigation that the competition of these entities and institutions could also be relevant to develop circular economy capacities in avocado exporters Hass, many of which are also found in eastern Antioquia.

### **2.2.2 Analysis of the internal and external context for the application of the circular economy in the production and logistics of Hass avocado for export to the European Union.**

Next, the DOFA analysis is presented, which is used as a methodological tool that allows determining how the Hass avocado sector is in the department of Antioquia to comply with the guidelines in circular economy.

- **Strengths**

- 1. In Colombia there are regulations that regulate various processes related to circular economy:** As described in Chapter 2.1 of this investigation, in Colombia there is already a regulation that regulates several of the processes related to the circular economy, in



relation to the management of solid waste, efficient use of water, post-consumption plan for packaging of pesticides, among others.

2. **The avocado sector has been implementing more conscious and responsible practices:** In Colombia, the sector has been implementing more conscious and responsible practices, since it has identified the positive impacts that this has with the environment and with society; One of the sustainable initiatives is that a large part of the land where Hass avocado cultivation is taking place, used to be part of paddocks for the breeding and fattening of cattle, which means that land is being reused in which before the forest cover had disappeared, in addition, internationalization also promotes competitiveness in the sector and allows alternatives to be found to continue growing, which is why certification processes are being carried out for fruit crops in the country. (Portafolio, 2020)

3. **Around 1000 hectares of cultivation have already been certified in good practice programs that seek more sustainable processes:** According to an article in (Redacción Portafolio, 2020), with the certification of around 1000 Colombian hectares of Hass avocado cultivation in programs such as GLOBALG.A.P. and the Rainforest Alliance, the objective is to make the cultivated fruit cleaner in terms of both product quality and sustainable issues, because these programs focus on good agricultural production practices that promote fair trade and favor society and the environment. ; In an agreement established between the Government of Antioquia and Corpohass, it was sought to support thirty Antioquia companies of Hass avocado so that they could be certified in seven months in international standards, with the aim of increasing their competitiveness in foreign markets. (Redaccion Blu Radio, 2019)

- **Weakness**

1. **Farmers and logistics operators do not have sufficient knowledge and / or resources on how to comply with the regulatory requirements applicable to the circular economy.** As explained by the chemical engineer Natalia Osorio at the conference "Circular economy as an enhancer of green entrepreneurship: sustainable business opportunities" held at the University of Antioquia on April 16, 2020, in Colombia it is

necessary to strengthen the culture in all the actors of the supply chain (producers, marketers, consumers) in order to effectively implement the circular economy. (Osorio, Gaviria, & Morales, 2020)

2. **Some producers and logistics operators may not be in a position to make the required investments:** To meet regulatory requirements applicable to the circular economy, producers and logistics operators in the avocado supply chain for export have to make significant investments that some of them may not be in a position to assume. This ranges from adapting farms and packaging plants to meet the required standard (Delgado, 2020), to the cost of containers for waste separation at production, storage or transport sites and the implementation of reverse logistics measures to the recovery of containers and packaging.
3. **Lack of awareness regarding the importance of investing in certifications:** Average avocado producers (small and medium) find it difficult to understand the importance of investing in these validations that allow them to reach better markets. (Prieto Toro, 2020)
4. **Avocado crops generate great environmental impacts:** Any monoculture, including avocado, has strong environmental impacts such as loss of biodiversity, since the tropic conditions imply that per unit area and under normal conditions, there is a large quantity of both plants, animals and microorganisms that generate frameworks for give balance to the ecosystem through relationships of mutualism, commensalism, depredation, etc. The inclusion of a crop with a single species breaks this balance and supposes the appearance of pests and diseases that must be controlled with chemical or biological inputs, making the environment and the soil a productive means and not a productive system that interweaves different production variables. and that takes advantage of biodiversity as a control element, an indispensable regulation in terms of sustainability. Other environmental impacts may be, breaking of natural biological cycles, high demand for water and nutrients, use of synthetic fertilizers, fertilizations; expansion of the agricultural frontier with loss of natural areas and forests, and eutrophication of waters. (Atehortúa Hurtado C. , 2020)
5. **In Colombia there is no specific regulation focused solely on issues of circular economy:** Although there are good agricultural practice programs and land and water use

plans, there is no specific regulation regarding circular economy for the agricultural sector that is responsible for promoting the care of these resources.

**6. Agricultural production policies rarely consider the environmental factor relevant:**

One of the greatest difficulties is found in issues of agricultural production policies, since these are governed by the market economy, that is, they favor trade according to the contribution of the GDP chains in particular, without addressing elements of sustainability. and conservation, this means that due to culture and state guidelines, the environment is secondary to the issue of production. The implementation of environmental requirements would need a paradigm shift where the conservation of ecosystems and rurality is prioritized. It should be noted that the vast majority of export crops are governed by land grabbing by national or foreign businessmen for whom the capital problem for the implementation of measures to meet requirements is not a problem. , the problem is concentrated in monoculture production practices that can hardly hide a management reality with an unfavorable environmental footprint. (Atehortúa Hurtado C. , 2020)

- **Oportunities**

- 1. In Colombia there are institutions and professionals who are knowledgeable on the subject of circular economy:** Specifically in the city of Medellín, there are institutions and professionals who are knowledgeable about the issue of circular economy, which could eventually guide agro-industrial entrepreneurs in the avocado sector to implement the compliance requirements demanded by the European Union. In addition to the universities that have specialized programs (such as the EIA University with its specialization program in Sustainable Business or the University of Antioquia with its specialization, master's and doctorate programs in environmental engineering), there are also consulting companies (Taxia, Incyclo, Cleaner Production Center), which can provide advice and training to producers and logistics operators.
- 2. The current Colombian government seems to have an interest in stimulating circular economy issues:** There seems to be interest from the government of President Iván Duque in stimulating the circular economy in the country. According to the

ICONTEC Standards and Quality magazine, “In Colombia, under the government of Iván Duque, who took office in August 2018, this model has been promoted, which is part of the goals that the president set in his first hundred management days. ” (Alzate Rubio, 2019) This is an opportunity for producers and logistics operators of the avocado export chain to articulate themselves with the policies established by the national government regarding the circular economy.

- 3. Certifications such as Globalgap and Rainforest Alliance are required by the European Union for being more effective in caring for the environment:** Entrepreneurs and producers agree that some clients in the European Union require certifications such as GLOBALG.A.P. and Rainforest Alliance that are more effective in terms of environmental care, since these standards seek to ensure the conservation of the environment and natural resources in a more controlled manner. (Prieto Toro, 2020); (Arango, 2020)
- 4. Alliances between government entities and private companies to support producers in international certifications:** Another issue that allows determining the progress of the sector in issues of environmental care, are alliances between government entities and private companies that provide support to the producers of this fruit, which become an important alternative for producers to include the factor environmental and begin to think in a sustainable way, with the aim of being prepared in advance for the possible implementation of a circular economy plan for the food sector, within which, more demanding aspects may be included in the producer extended liability issue.
- 5. Cost reduction through the implementation of circular economy processes:** Implementing the circular economy can allow small farmers to reduce costs in their production processes, making them more profitable processes, since the circular economy allows them to make use of closed-loop production and the use of reverse logistics to turn their crops into more productive and environmentally sustainable ones.
- 6. Take advantage of the implementation of circular economy that other sectors are carrying out:** Take advantage of the implementation of the circular economy by the government in other sectors, so that when it begins with the management of rules that regulate the circular economy in agricultural issues, a series of strategies can be established among all sectors, with the purpose of creating a circular economy network

where all industries are participating, exploring alliance options where, for example, some work with reverse logistics and support the return of material that can be used as raw material in other industries.

- **Threats**

- 1. Greater demand from the European Union for compliance with circular economy requirements:** As the European Union makes increasingly stringent compliance with circular economy requirements for avocado exports to its territory, Colombian producers who have not been adequately prepared could be left out of that market.
- 2. Economic recession due to the COVID-19 pandemic:** The economic recession that is expected to occur on the occasion of the COVID 19 pandemic in the world, could reduce the capabilities of producers and logistics operators of the avocado supply chain for export, to allow them to meet the circular economy requirements demanded by the European Union.
- 3. Government initiatives in circular economy are not taking place in the agricultural sector:** The government is currently developing circular economy initiatives in sectors other than agriculture, which means that the efforts and aid that the government can provide are directed at the sectors of greatest interest for the initial implementation of the model in the country, and prevent initiatives in the circular model in agriculture are strengthened due to lack of resources and regulations.
- 4. Problems for producers in terms of land use due to global warming:** Global warming can generate a change in the conditions of the land where the avocado is currently grown, making it more difficult to continue with its production in the areas where the crops are established, which could imply greater investments for producers in acquisition and certification of new lands and greater difficulty in meeting the requirements of the European Union.
- 5. Reduction in Colombian exports if competitors in the international market first implement circular economy practices:** If Hass avocado producers in countries like Mexico (the world's largest avocado producer) take advantage of implementing circular economy strategies on production and logistics issues, it makes them more attractive to

the European Union market, which would entail to a reduction in the share of Colombian exports destined for said market.

- 6. Loss of new markets due to the lack of environmental certifications in the fruit producing estates:** If there are no environmental or social certifications on the farms from which the exporters receive the fruit, it will not be possible to access better markets and at times when other countries have their harvest, there will be no options. (Prieto Toro, 2020)

### **2.3 Strategies that can be implemented in the avocado agribusiness in the department of Antioquia so that its production and logistics processes can meet the standards of the circular economy.**

Based on the weaknesses, opportunities, strengths and threats that were detected in section 2.2.2 of this investigation, the DOFA matrix is carried out as shown in the following table, in order to define the strategies that can be implemented so that it is possible to meet the circular economy requirements.

**Table 6. DAFO Matrix**

DEFINITION OF STRATEGIES		INTERNAL CONTEXT (OF THE SECTOR)	
		WEAKNESSES	STRENGTHS
INTERNAL CONTEXT (OF THE SECTOR)	OPPORTUNITIES	<p>O-D strategies::</p> <ol style="list-style-type: none"> <li>1. Implement an institutional program from the State, to give advice and training to producers and operators of the avocado supply chain on issues of the circular economy. (O1-D1)</li> <li>2. Implement and strengthen the circular economy regulations in Colombia, so that the government can allocate economic resources for avocado farmers who need to design or strengthen circular economy processes in their crops. (O2-D1)</li> <li>3. Cultivate and raise awareness of the avocado agroindustry in terms of good practices that lead to adaptability and easier implementation of a circular economy process. (O2-D3)</li> <li>4. Generate supply and production plans with raw materials and ecological inputs that intervene in the processes, allowing a higher percentage of reuse of these, making it possible to reduce costs in both stages and promoting environmental care (O5-D4)</li> </ol>	<p>O-F strategies::</p> <ol style="list-style-type: none"> <li>1. Implement circular economy plans and strategies in all sectors based on processes they have in common, so that all economic sectors are equally involved in a circular economy transition. (O6-F1)</li> <li>2. Make supply alliances with groups of producers with the same interest in circular economy and who have similar volumes of fruits to propose group certification, since this is a good opportunity to obtain them at a lower cost. (O3-F3)</li> </ol>
	THREATS	<p>T-W Strategies:</p> <ol style="list-style-type: none"> <li>1. Raise awareness of avocado producers and distributors in Antioquia on the requirements to be met. (A1-D3)</li> <li>2. Establish circular economy processes in the avocado agroindustrial sector in Antioquia, in order to mitigate the planet's climatic changes that may be caused during production processes. (A4-D5)</li> <li>3. Implement and strengthen the regulations for the circular economy in Colombia, in order to make the avocado agroindustrial sector more competitive with regard to these issues and thus avoid losing participation in the international market.. (A6-D5)</li> </ol>	<p>T-S Strategies:</p> <ol style="list-style-type: none"> <li>1. From the Hass avocado sector, in association with the state and academic institutions, implement an observatory of the regulations of the European Union, to harmonize the Colombian regulations on circular economy. (A1-F1)</li> <li>2. Strengthening regulations and the sector against the restrictions of the circular economy abroad, in addition to promoting the creation of networks between different. (A1-F1)</li> </ol>

- **O-W Strategies**

**Strategy 1: Implement an institutional program from the State, to give advice and training to producers and operators of the avocado supply chain on issues of the circular economy**

Despite the fact that the circular economy is an issue that has been trying to be implemented in the economy for some time, many countries, especially the underdeveloped ones, have tried to use some of its stages, but it must be borne in mind that moving from a process from linear economy (such as the one currently implemented) to one from circular economy is not easy, this requires time, knowledge and investment not only by governments but also by each of the actors who are impacted by this change.

Therefore, it is important that the State begins to generate institutional programs where farmers, specifically avocado farmers in Antioquia, begin to relate to the issue of circular economy.

So far, there are different private entities and public universities in Antioquia that give conferences or talks on these topics, but for a real change to take place, it is necessary that from the government begin to contextualize all entrepreneurs and that later assign regulations for this, in order to be able to participate in a market like that of the European Union where trade is increasingly focusing on circular economy processes.

**Strategy 2: Implement and strengthen the circular economy regulations in Colombia, so that the government can allocate economic resources for avocado farmers who need to design or reinforce the circular economy processes in their crops:**



In order to encourage trade, especially the export of Colombian products to other parts of the world, the government makes aid such as export subsidies or subsidies to different sectors of the industry, such as the coffee and banana sector.

Although the government has been contextualized with circular economy issues, regulations have not yet been created that position the use of circular economy processes in all the industrial sectors of Colombia, therefore it is necessary to implement and subsequently strengthen the regulations on circular economy for all sectors, considering the agriculture sector as one of the most important, because the country is one of the most competitive in this area due to its production capacity.

With the generation of this regulation, not only will the agroindustrial sector be forced to adapt its processes to issues of circular economy, but it will also allow the actors in this sector to have foundations to demand that the government incorporate in the departmental and national municipal development plans, programs tending to provide soft loans and so that the government, as its own initiative, begins to allocate certain subsidies that help to cope with the changes that are necessary so that farmers and fruit exporters can design or reinforce processes that help care for the environment through activities such as the reuse, recycling and repair of materials and even that can save costs from a closed cycle production plan and be more competitive in the international market.

Even the addition of this topic in Colombian regulations would allow current and subsequent governments to introduce in their government plans an item that enables the strategic allocation of public resources in favor of the environment and trade of the country through the circular economy.

**Strategy 3: Cultivate and raise awareness of avocado agribusiness in terms of good practices leading to easier adaptability and implementation of a circular economy process.**

Every day the planet deteriorates before the eyes of all, for this reason the people of the world have generated consumer cultures such as the one with the green seal and especially for the production and logistics processes the issue of the circular economy, both in search of people in the world they begin to become aware that caring for the environment is important both

for their own health and for the planet in general, even the affectation due to climate change means that appropriate land for avocado cultivation is lost.

Sometimes producers (especially small and medium-sized ones) find it difficult to understand the importance of making changes to their processes, starting with the fact that these require an economic investment that was not planned, so it is important to be able to begin to raise awareness and cultivate to the avocado agribusiness in environmental care through good practices, not only in the care of their crops but also in the entire production and distribution process so that when the government is obliged to start implementing processes of circular economy in the agriculture sectors have a basis that contributes to them to pass the transition without being economically battered, that is, it is easier to implement small adaptability processes to be ready for a stage of change that is very close to arriving.

The generation of good practices implies that the agribusiness sector in the department of Antioquia begins to implement development and research plans that allow them to add different stages of the circular economy to their production and logistics processes, such as ecological design, ecological labeling , closed-loop production, reverse logistics, waste management (recycling / reuse) and repair.

**Strategy 4: Generate supply and production plans with raw materials and ecological inputs that intervene in the processes, allowing a higher percentage of reuse of these, making it possible to reduce costs in both stages and promoting environmental care.**

The Colombian culture has considered for too many years that buying raw materials and economic inputs makes them more competitive in the market, but with the trends that are currently being experienced, importers and consumers seek to be able to buy products that are friendly to the environment and that contribute to the health care of the human being, even without caring about its value.

Therefore, it is important to start generating supply and production plans where farmers can implement ecological inputs that help them create sustainable products. In addition, it is

important that these inputs allow agribusiness in general to save costs through the reuse of these raw materials, that is, the idea is to generate processes that contain stages of the circular economy, for example a product based on design ecological with raw materials that can be reused several times for planting avocados, this in order to save the purchase of products that can continue to be used in the production process.

- **Strategies O-S**

**Strategy 5: Implement circular economy plans and strategies in all sectors based on processes they have in common, so that all economic sectors are equally involved in a circular economy transition.**

The transition from any process other than those that have always been managed is usually complex, especially when these processes create a complete reform of the productive or logistical stages that companies use on a daily basis, even more difficult when the economic sectors are not aligned with information, that is, while some comply with the implemented processes, others continue to carry out the same actions that changed the way of doing things.

Therefore, it is considered necessary to create strategies with prior planning that allows all sectors of the country to be in the same tune, by this it is meant that adaptability processes are managed on the same topic but for the economic sector in general.

Usually, the government implements norms by economic sectors, but if instead of applying the regulations to a single sector, it is applied directly to an issue where most of the sectors intervene, the adaptability to this transition will be easier, because all will work for the same benefit and the process will be even faster for everyone to assimilate, since it will be possible to solve similar problems that arise during the change from production and logistics processes to the circular economy.

**Strategy 6: Make supply alliances with groups of producers with the same interest in circular economy and who have similar volumes of fruits to propose group certification, since this is a good opportunity to obtain them at a lower cost..**

Currently the Hass avocado is one of the agricultural products that has been most exported in Colombia, based on this, many producers in Antioquia who have exported are aware of the specific certifications required by the European Union, however, the more demanding the product is. Its production becomes more expensive in terms of the rigor and demands of certifications such as the Rainforest Alliance.

The circular economy is a development plan that provides the reuse of waste and care for the environment. In the Hass avocado production chain, alliances should be implemented between producers with the same production volumes, create an association between them and present it to the regulatory body as a single organization managed by several groups, in order to obtain the respective certifications of production and logistics processes, since carrying out this process can be more economical for farmers. In addition, if groups are established between producers and distributors, it is possible that the purchase of inputs and goods for the implementation of the circular economy will result in a reduction in costs.

- **Strategies T-W**

**Strategy 7: Raise awareness among avocado producers and distributors in Antioquia about the requirements to be met.**

Taking into account the demands of the European Union regarding the imports of fruit that they make to their territory, it is necessary that all Hass avocado farmers in the department of Antioquia, begin to raise awareness about the issue of circular economy and the opportunities that provides compliance with the requirements to open markets abroad or strengthen them.

Therefore, it is necessary to implement as a strategy a plan to advise producers and distributors on the requirements of the European Union, through individual technical consultancies, interactive workshops, trainings and seminars where they can acquire sufficient knowledge regarding the importance of for the international market, compliance with these requirements and the benefit it can offer them in order to generate growth in the sector.

**Strategy 8: Establish in the agro-industrial avocado sector in Antioquia the processes of circular economy, in order to mitigate the climatic changes of the planet that may be caused during the productive processes.**

In the production processes of avocado crops, different actions are generated that can pollute the environment and cause climatic changes on the planet, therefore, issues such as the use of crop pruning residues, reuse of organic fertilizers and composting are good practices for circular economy processes, in addition to using natural resources such as water and energy through closed-loop production processes, for example, rainwater can be reused for crops. If farmers acquire this good practice of the circular economy, they are helping the environment, agribusiness and also mitigating the impact of global warming, since the consequences of high temperatures cause damage to crops that lead to loss of productivity. agricultural.

**Strategy 9: Implement and strengthen the circular economy regulations in Colombia, with the aim of making the avocado agroindustrial sector more competitive in the face of these issues and thus avoid losing participation in the international market.**

Currently in Colombia, Resolution 1407 of July 26, 2018 of the Ministry of Environment and Sustainable Development was adopted, which focuses on strategic plans for the circular economy of the 9 R: rethink, reuse, repair, restore, re-manufacture, reduce, re-propose, recycle and recover, but even so, this is not enough for a complete circular economy process to be established in the economic sectors of Colombia.

For this reason, it is important for Colombia to define clear regulations focused on promoting a circular economy in all sectors of the economy, including agriculture, so that all requirements abroad are met and economic sectors are leveled with the sectors that export the same products from other countries, allowing them to be more competitive through added values through the circular economy.

- **Estrategias T-S**

**Strategy 10: From the Hass avocado sector, in association with the state and academic institutions, implement an observatory of the regulations of the European Union, to harmonize the Colombian regulations on circular economy**

Knowing in advance about the circular economy issue and observing how other countries such as the European Union are implementing it, is essential not only to acquire knowledge but also with the aim of being able to focus the internal avocado market in Antioquia towards the requirements that the countries to which these products will be exported.

For this reason, it is important that the issue of circular economy begins to be socialized among the avocado agroindustrial sector in Antioquia and that observatory-type research processes are created within new entities, entities that are experts in the subject, and an entity in which to this day They implement conferences and talks on the circular economy, since these entities and their research results will be a great contribution for farmers in their process of transformation to a circular economy, not only for the benefit of them and the environment, but with the purpose of gain market and be more competitive in the European Union.

**Strategy 11:Strengthening regulations and the sector against the restrictions of the circular economy abroad, in addition to promoting the creation of networks between different.**

The European Union for several years has begun to implement different regulations on the so-called green seal and some processes of the circular economy, which is why if you want to be competitive in this market you must adapt to the restrictions that arise for the entry (export) of products such as avocado.

The government must strengthen the agro-industrial sector in these terms, but the same sectors of the Colombian economy have in their hands the possibility of being able to make different contributions that they could make together, which is why it is important to promote the creation of networks among those belonging to the economic sector of the country, especially the department of Antioquia, in order to establish common processes where the different sectors begin to act as if they were a single group, that is, to seek the possibility of

creating a flow of economic processes circulate where it involves them in such a way that the productive processes of the sectors are unified.

The aforementioned could occur from the cultivation of avocados to their delivery to the client or final consumer, for example, for the moment it is being implemented within avocado crops that after the use of pesticides, these containers are returned to the distributors or importers to later reuse them, seeing it in this way, a reverse logistics and reuse process is being implemented between two different sectors, the agricultural sector and the agrochemical sector; The idea is to promote this type of action, but throughout the supply chain, even some waste could be used as raw material for others.

### **3. Conclusions and Recommendations**

#### **3.1 Conclusions**

- Despite the fact that the European Union already has regulations focused on circular economy processes, currently there is no specific regulation regarding its implementation in agriculture or the food industry, they demand when entering foods such as fruits to its territory sanitary, phytosanitary and good agricultural practices requirements that promote environmental care.
- The agro-industrial sector of the department of Antioquia has not developed circular economy processes, however, certification processes in good agricultural practices are being carried out, which allows having a knowledge base that can be implemented in each of the economic processes. circular.
- The government must implement regulations in circular economy without the need for there to be requirements in the European Union regarding this issue and that, in addition to that, farmers must be aware of the importance of the implementation of these processes for economic growth , the mitigation of environmental impacts and the generation of new opportunities in the international market, including, making them a more competitive sector compared to the competition that has not implemented this type of process.
- Taking into account that the European Union does not have the circular economy requirements for the agro-industrial sector fixed, the challenges facing this sector in Antioquia should focus on how to anticipate this process, so that when the European Union establishes the requirements does not become a limitation when it comes to exporting to that market and that, on the contrary, it can offer a punctual, quality product developed with circular economy processes.



### **3.2 Recommendations**

- The government must make producers and distributors aware of circular economy issues
- There must be an integration between the government, private entities and universities to provide timely guidance to the circular economy to the main actors in this process in the agro-industrial sector.
- Strategies that support circular economy projects must be implemented within municipal and departmental development plans.
- The government must implement regulations regarding the circular economy related to all sectors equally.
- The entire agro-industrial sector, from the production part to the distribution part, can implement circular economy processes to generate cost reductions due to the reuse of materials and supplies, and at the same time help to mitigate the environmental impacts that can be generated in some of its production or logistics processes.
- Farmers must individually or group implement certifications in international standards that point to good agricultural practices, which are focused on environmental issues that are important for circular economy processes.

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## 5. Anexos

### Anexo 1. Entrevista a Juan Carlos Arango, Productor en Avocrop Aguacates.

**Empresa:** Avocrop Aguacates, dedicada al cultivo de aguacate Hass en Antioquia

**Nombre:** Juan Carlos Arango

**Cargo:** Productor

#### **Preguntas.**

**1. ¿Cuáles son los principales requisitos del mercado europeo para la compra de aguacate?**

El principal requisito para exportar a la Unión Europea es el requisito del ICA, que es el predio y se encuentre registrado como exportador de fruta fresca, esta es indispensable para la empresa exportadora. Hay otros certificados que son opcionales para el mercado europeo como Global Gap, SMETA, Rain Forest.

Es muy importante todo lo que tiene que ver con la residualidad y la materia seca para poder exportar el aguacate a la Unión Europea, la materia seca debe de estar entre el 23% o 24% hasta el 28% más o menos debe estar la materia seca de la fruta que se va a exportar y la fruta debe de contar con un análisis de residualidad que debe de estar por debajo de los límites máximos de residualidad de la Unión Europea, esto es un requisito que se pide en la Unión Europea.

**2. ¿Considera usted que estos requisitos realizan un aporte significativo al cuidado del medio ambiente desde el sector agrícola, especialmente del aguacate?**

Si, estos requisitos o las certificaciones son indispensables para la producción del aguacate, en condiciones que no afecten de una manera tan grave al medio ambiente, siempre va a haber una afección, pero estas certificaciones ayudan a mitigar un poco los impactos ambientales que se pueden generar, entonces si ayudan a disminuir el impacto.

**3. ¿Cuáles podrían ser las dificultades para el sector a la hora de implementar los requisitos ambientales exigidos por el mercado europeo?**

Sobre el tema de economía circular, lo único que nosotros producimos en la finca que se pueda utilizar en ella misma son los abonos orgánicos de resto todos los insumos vienen de afuera, si el cultivo es un sistema la mayoría o casi el 90% de los insumos para el cultivo vienen de afuera, parte de la mano de obra es mano de obra familiar entonces eso de pronto hace parte de la economía circular, de resto todo lo que se produce en el cultivo se vende es decir el aguacate se vende entero, el compostaje se hace con todos los residuos de poda del cultivo.

**4. ¿Considera usted que estas dificultades limitan el crecimiento de la empresa y el acceso a nuevos mercados?**

Hasta el momento dificultades no hemos tenido, solo hay que hacer los trámites que son un poco engorrosos desde el punto de vista ambiental con la autoridad ambiental de cada región, nosotros donde estamos en este momento tenemos que entendernos con la autoridad ambiental que es CorpoUraba, porque el cultivo se encuentra en Urrao Antioquia, CorpoUraba exige tener al día la concesión de aguas, tener al día todo los permisos de vertimientos y de pronto problemas ambientales que se han tenido con la apertura de vías internas para los cultivos, en esto la autoridad es muy exigente y hay que cumplir con la reglamentación que ellos disponen para poder abrir esas vías dentro de las fincas.

**5. Desde su experiencia en el sector ¿cuáles considera usted que pueden ser las estrategias que deben implementar como empresa para cumplir con los requisitos ambientales de la Unión Europea en el tema?**

Las estrategias de implementación es seguir al pie de la letra la normatividad que nos impone el ente de control que en este caso es CorpoUraba, si uno se apega a la norma y a la ley no tiene ninguna dificultad para cumplir con estos requisitos ambientales.

**Anexo 2.** Entrevista Carolina Prieto Toro, Gerente General, Green West S.A.S

**Empresa:** Green West S.A.S, dedicada a la exportación de frutas y vegetales.

**Nombre:** Carolina Prieto Toro

**Cargo:** Gerente General

**Preguntas.**

**1. ¿Cuáles son los principales requisitos del mercado europeo para la compra de aguacate?**

- Depende del país y del momento del año nos hacen solicitudes de algunos calibres específicos, en algunos momentos calibres del 12-24 y en otros calibres del 26-32, esto varía mucho respecto a qué tipo de fruta están recibiendo de los otros países (Perú, México, Sudáfrica, Kenia, Israel, etc.).
- Certificaciones de la fruta y la empacadora: la tendencia es que cada vez nos piden más certificaciones, en especial de tipo social como GRASP y SMETA.
- Tener buena calidad en el empaque y en la maduración de la fruta, esto se garantiza teniendo un buen manejo postcosecha en planta y teniendo un buen manejo en campo de las plagas.
- Cumplimiento de los LMR que aplican para la UE.

**2. ¿Considera usted que estos requisitos realizan un aporte significativo al cuidado del medio ambiente desde el sector agrícola, especialmente del aguacate?**

Si, dentro de las certificaciones que nos exigen como: BPM, Global Gap y Rain Forest están incluidos módulos de buen manejo ambiental.

**3. ¿Cuáles podrían ser las dificultades para el sector a la hora de implementar los requisitos ambientales exigidos por el mercado europeo?**

El costo de su implementación pues a los productores de aguacate promedio (pequeños y medianos productores) les cuesta entender la importancia de “invertir” en estas validaciones que permiten llegar a mejores mercados.

**4. ¿Considera usted que estas dificultades limitan el crecimiento de la empresa y el acceso a nuevos mercados?**

Influyen directamente ya que si no tenemos certificaciones ambientales o sociales en los predios de los cuales recibimos la fruta, no podremos acceder a mejores mercados y en momentos que otros países tienen su cosecha, no tenemos opciones.

**5. Desde su experiencia en el sector ¿cuáles considera usted que pueden ser las estrategias que deben implementar como empresa para cumplir con los requisitos ambientales de la UE en el tema?**

- Capacitaciones con los productores para explicarles la importancia de tener estas validaciones ambientales que nos permitan mejores retornos.
- Hacer alianzas de suministro con grupos de productores con el mismo interés y que tengan volúmenes de fruta similares para plantearles la certificación en grupo ya que esta es una forma de obtenerlos a un menor costo.

**Anexo 3.** Entrevista Viviana Delgado, Jefe de Calidad / Quality Manager, Cartama

**Empresa:** Cartama, cultiva y comercializa y exporta aguacate Hass de excelente calidad

**Nombre:** Viviana Delgado

**Cargo:** Jefe de Calidad / Quality Manager

**Preguntas.**

**1. ¿Cuáles son los principales requisitos del mercado europeo para la compra de aguacate?**

Cumplir los MRLS del país, etiquetado correcto, peso y características de piel reguladas por la UNECE, fitosanitariamente apto (libre de plagas y enfermedades), uso de estibas certificadas, contenedores con sellos de botella.

Existen otros requisitos, pero dependen de cada cliente en particular.

**2. ¿Considera usted que estos requisitos realizan un aporte significativo al cuidado del medio ambiente desde el sector agrícola, especialmente del aguacate?**

Sí, principalmente por los plaguicidas utilizados y sus dosificaciones. Ahora, cuando un cliente requiere certificaciones como Global Gap of Rainforest Alliance, este aseguramiento es más efectivo, pues dichos estándares buscan asegurar la conservación del medio ambiente y recursos naturales, de una manera más controlada.

**3. ¿Cuáles podrían ser las dificultades para el sector a la hora de implementar los requisitos ambientales exigidos por el mercado europeo?**

El dinero que se debe invertir para adecuar las fincas y plantas de empaque, para alcanzar el estándar requerido.

**4. ¿Considera usted que estas dificultades limitan el crecimiento de la empresa y el acceso a nuevos mercados?**

No, de hecho, estos son requisitos que también sugieren los entes nacionales para poder exportar y mantener una planta de alimentos responsable.

**5. Desde su experiencia en el sector ¿cuáles considera usted que pueden ser las estrategias que deben implementar como empresa para cumplir con los requisitos ambientales de la UE en el tema?**

- A. La concientización de las fincas y empacadoras respecto a los requisitos a cumplir.
- B. Evaluar y analizar responsablemente qué desviaciones se tienen al respecto, para poder generar un plan de acción que corrija o implemente las actividades ejecutadas.
- C. Realizar un seguimiento planificado y continuo de la regulación y renovaciones que éstas puedan tener.



**Anexo 4.** Entrevista Camilo Atehortúa Hurtado, Médico veterinario y tecnólogo en desarrollo rural, profesional al servicio de la administración municipal de Alejandría.

**Nombre:** Camilo Atehortúa Hurtado

**Profesión:** Médico veterinario y tecnólogo en desarrollo rural, profesional al servicio de la administración municipal de Alejandría.

**Preguntas:**

**1. ¿Cuáles son los impactos ambientales de la producción del aguacate Hass?**

En general, cualquier monocultivo incluido el aguacate, tiene fuertes impactos ambientales que se pueden resumir así:

- Pérdida de biodiversidad: la condición de trópico implica que por unidad de área y en condiciones normales, se encuentre una amplia cantidad tanto de plantas, animales y microorganismos que generan entramados para dar equilibrio al ecosistema a través de relaciones de mutualismo, comensalismo, depredación etc. La inclusión de un cultivo con una sola especie rompe este equilibrio y supone la aparición de plagas y enfermedades que deben ser controladas con insumos químicos o biológicos, haciendo del entorno y del suelo un medio productivo y no un sistema productivo que entrelaza distintas variables de producción y que aprovecha la biodiversidad como elemento de control, regulación indispensable en términos de sostenibilidad.
- Rompimiento de los ciclos biológicos naturales
- Alta demanda de agua y nutrientes, utilización de fertilizantes de síntesis fertilizaciones
- Desplazamiento de campesinos
- Ampliación de la frontera agrícola con pérdida de áreas naturales bosques
- Eutrofización de las aguas

**2. ¿Cuáles requisitos ambientales de la Unión Europea conoce usted para la compra de frutas?**

Los requisitos son básicamente de orden fitosanitario y van ligados a la aplicación de las Buenas Prácticas Agrícolas que garantizan, en el proceso de exportación, la trazabilidad del producto. Estos requisitos los determina la “EUREPGAP se refiere a un programa voluntario de certificación creado por EUREP - Grupo Europeo de Minoristas, conformado

por 24 cadenas de supermercados con operaciones en algunos países de Europa Occidental. El propósito de EUREP es aumentar la confianza del consumidor en la sanidad de los alimentos, desarrollando “buenas prácticas agrícolas” (GAP) que deben adoptar los productores. A diferencia a los otros programas de certificación, EUREP hace énfasis en la sanidad de los alimentos y el rastreo del producto hasta su lugar de origen. Hasta el momento, EUREP ha desarrollado un conjunto de buenas prácticas agrícolas para la producción de frutas y vegetales frescos. El énfasis de las reglas de EUREPGAP no está en los aspectos ambientales o sociales, pero en la sanidad de los alimentos y en el rastreo de los productos, es decir, que se pueda rastrear el origen del producto hasta la parcela de la finca donde fue producido. Sin embargo, también se refieren a los requisitos sobre el uso de plaguicidas, la seguridad de los trabajadores, el cumplimiento de las leyes laborales nacionales, etc. Los requisitos de EUREPGAP sobre sanidad y rastreo de los alimentos exigen al productor establecer un sistema completo de control, para que todos los productos sean registrados y pueda rastrearse dónde fueron producidos. Además, se deben mantener registros, por ejemplo, sobre el uso específico que se le dio a la tierra, los tratamientos con plaguicidas y la rotación de cultivos a lo largo del tiempo. Los requisitos de EUREP son relativamente flexibles en cuanto a la fumigación de suelos, el uso de fertilizantes, la protección de cultivos, etc., pero son estrictos en cuanto al almacenamiento de plaguicidas y la necesidad de documentar y justificar la manera en que se cultivó el producto y qué uso se le dio al terreno.

**3. ¿Sabe cuáles de esos requisitos están asociados con normas colombianas existentes, y cuáles son esas normas?** No respondida.

**4. ¿Cómo se enfocan estos requisitos para promover la implementación de una economía circular o sustentable en la industria de alimentos?** No respondida.

**5. ¿Cuáles podrían ser las dificultades para el sector colombiano a la hora de implementar los requisitos ambientales exigidos por la Unión Europea?**

Las políticas de producción agropecuaria en Colombia se rigen por la economía de mercado, es decir, favorecen el comercio de acuerdo con el aporte en particular de las cadenas al PIB sin atender elementos de sostenibilidad y conservación (léase impactos del



cultivo de palma de aceite, banano, cultivos forestales comerciales, etc.), esto hace que por cultura y por lineamientos de estado, el medio ambiente sea secundario al tema de producción. La implementación de requisitos ambientales necesitaría un cambio de paradigma donde se priorizará la conservación de ecosistemas y de la ruralidad campesina. Debe anotarse que los cultivos de exportación, en su gran mayoría, se rigen por el acaparamiento de tierras por parte de empresarios nacionales o extranjeros para los cuales, el problema de capital para la implementación de medidas en pro del cumplimiento de requisitos no es un problema, el problema se concentra en las prácticas de producción en monocultivo que difícilmente pueden ocultar una realidad de manejo con una huella ambiental desfavorable.

**6. ¿Considera usted que estas dificultades son una limitante para el crecimiento del sector?**

La huella ambiental cursa con ensayos en países como Méjico, aun no se han definido exigencias para mercados como el colombiano en cultivos de aguacate y se espera que una vez se instauren cumplan precisamente con ese objetivo, limitar el crecimiento desmesurado de un cultivo ambientalmente insostenible.

**7. ¿Cómo cree usted que puede el gobierno apoyar a los pequeños empresarios para cumplir con los requisitos ambientales exigidos por la Unión Europea?**

- Préstamos blandos para implementación de cultivos y de BPA
- Extensión agropecuaria-asistencia técnica estatal sin costo, para pequeños y medianos
- Apoyo estatal para la implementación de BPA en predios de pequeños y medianos productores.
- Implementación de políticas de comercialización para pequeños y medianos productores desde esquemas de comercio justo, agroecológico, orgánico con exenciones arancelarias y sin intermediarios.

• Creación de cooperativas u otro tipo de agremiaciones que coordinen todo el proceso de producción y exportación de productos agropecuarios.

• Pago por servicios ambientales generados por sistemas de producción sostenibles en predios de pequeños y medianos productores.

**8. Desde su perspectiva y conocimiento, ¿cuáles considera usted que deben ser las estrategias que debería implementar el sector productor de fruta para cumplir con los requisitos ambientales de la Unión Europea en el tema de alimentos?**

La proliferación de semillas estériles, no reutilizables, y la eventualidad de cualquier revés natural, económico, político o bélico llevaría a un trágico dilema para estos países dependientes: el hambre, que se supone que es lo que las empresas biogenéticas dicen que quieren erradicar, o el desembolso de enormes sumas para comprar dichas semillas a las corporaciones transnacionales. Es decir, la eterna historia: supeditación del sur al norte, más subdesarrollo, más pobreza y, como consecuencia de ello, mayor degradación ambiental y expolio creciente de sus recursos naturales.

Sin embargo, como reacción contra los crecientes procesos neoliberales de globalización, liberalización comercial, sacralización del mercado y del productivismo, expansión de la agro genética y privatización de la materia viva y de la naturaleza, los campesinos de muchas áreas latinoamericanas se han organizado para llevar a cabo diversas formas de agricultura sostenible basadas en el desarrollo de los cultivos orgánicos y en la recuperación de su inmensa riqueza genética, ya que ésta es la única manera de sobrevivir al desastre total: humano, rural, agrario, cultural, biológico y ecológico.