

**MODEL OF SUSTAINABLE RURAL ASSOCIATIVE  
ENTERPRISE: THE CASE OF COFFEE AND COCOA  
PRODUCTION IN THE MUNICIPALITY OF VALLEDUPAR  
(COLOMBIAN CARIBBEAN)**

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## ABSTRACT

The purpose of this work is to show how the rural associative company model is used for the production of Coffee and Cocoa in the Department of Cesar, Colombia, for which it was necessary to identify the factors that led to its creation; the characterization of its organizational structure; the description of its value chain and alliances. The data were taken from the social and participatory interaction through a structured interview with members of the board of directors of 10 associative companies, five cocoa producers and 5 coffee producers who voluntarily agreed to participate in the research. A review of documents provided by each company was also carried out. As a common factor for the creation of the 10 participating associations, the initiative of a group of producers interested in seizing the opportunity of a business stands out. The value chains of the five coffee associative companies are made up of primary and post-harvest production managed by their associates; transformation infrastructure to obtain dry parchment coffee; three companies have roasted and ground threshing infrastructure; and only two companies have coffee-based beverage marketing points managed by the boards of directors. On the other hand, in the value chain of the five cocoa companies, primary and post-harvest production is carried out by the associates and the association is responsible for marketing cocoa almonds.



**Key words:** Sustainable development; Primary production; Postharvest; Agroforestry System.

## INTRODUCTION

According to Urcola (2018), producer organizations are formal rural organizations constituted by organized members in order to increase their income through the improvement of their production, marketing and product development activities at the local level. That is, they have in their social purpose the function of organizing relations with the outside. They are interrelation structures that, as the case may be, can be a means to facilitate or accelerate the integration of the rural population in the market and in the global society. They can also be a means to improve the relations of rural societies with their environment constituted by market and society in general. Peasant organizations are or want to be intermediation structures between rural producers and the other parties that intervene in their economic, institutional and political environment.

In that sense, peasant associativity is the product of a series of actions or strategies for progressive improvement that allow us to achieve harmony with local and regional economic development processes (Tilzey, 2017). They are linked groups of people with different ways of thinking, which must be efficient in business development, without losing their purpose in the social and community (Ndubuka & Rey-Marmonier, 2019). The associative character becomes the motivational engine for collaborative participation, decision making, control of its leaders, the functioning of its committees and its organizational entities from the general assembly of partners, manager and / or legal representative (Colnago & Dogliotti, 2020). Associativity is related to cooperation, social capital and trust. In more specific terms it relates to business entrepreneurship and the existing incentives to initiate and develop collaborative economic actions (Mahzouni, 2019).

The feasibility of the study lies in demonstrating whether aromatherapy manages to reverse or significantly improve the behavior of the side effects that occur after treatment with either radiotherapy and / or chemotherapy in women with breast cancer and the symptoms produced by the disease itself. , since the results on the symptomatology presented by the patients are benefits, it could be suggested the implementation of these alternative therapies, not only in a patient with breast cancer, but in any type of cancer, in order to offer an option to improve their quality of life in the course of their illness.

In line with FAO (2015), it is difficult to quantify the importance of Small Agricultural Production in the region due to the absence of systematized information, but if an approximation is possible based on the size of the farm. For this, small units of agricultural production were defined as units from 5 to 20 ha, except in those



countries where small property is defined differently. For Latin America, of approximately 17,300,000 agricultural units that existed around 1990, 85.8% could be considered as peasant units and 14.2% as business units.

Small agricultural production is important in all sub-regions of Latin America and in almost all countries. In Central America and in the Andean countries it is where it has a relatively minor weight, given the predominance of the smallholding. It is more difficult to perform a quantification that takes into account the subsistence or capitalized nature (Ruiz et al., 2019). This requires information on the fate of production, the workforce, technological change, etc. Small agricultural producers play an extremely significant role in agricultural production in most countries (de Grammont, 2010). This is due both to the importance that these types of producers give to subsistence, and to the effect of public policies that sought to make them the fundamental suppliers of food for large cities (FAO, 2015).

According to the National Federation of Coffee Growers - FNC, Colombia is the world's largest producer of soft washed Arabian coffee. In May 2019, it reached a production of 1.1 million bags of 60 kilos harvested in 955,000 hectares planted with coffee located between 1,100 meters above sea level and 2,000 meters above sea level. Coffee is the main agricultural export product. The income received from coffee exports is distributed among more than 574 thousand families, dispersed in more than 590 municipalities of the country, in 21 departments, which represents about 25% of the rural population (FNC, 2019; MADR, 2019; MADR, 2018).

Similarly, in Colombia "Special Coffee" is produced, which is a different type of coffee than conventional coffee. The National Federation of Coffee Growers considers a special Coffee "when it is perceived and valued by consumers for some characteristic that differentiates it from conventional coffees, for which they are willing to pay a higher price". In addition, this special feature generates an overpayment paid by the consumer that represents an added value for the benefit of the producer (FNC, 2019).

Parallel to the above, in Colombia the Cacaotero sector is developed in 422 municipalities in 30 departments. Approximately 38,000 producing families benefit from it throughout the country. Of which 95% are small producers and mostly located in areas with public order problems such as the foothills of the Perijá mountain range and the Sierra Nevada de Santa Marta in the department of Cesar, Magdalena and Guajira, between others. Producers have an average of 3 Hectares, with low levels of technification and productivity, which only allows them their own self-support. In some areas of Colombia, cocoa cultivation has been used as a successful alternative to replace illicit crops in different projects of initiatives of both the National Government and international cooperation.



The production of cocoa in Colombia for 2018 reached a production of 56,000 tons, which evidences an average growth of 6.48% in the last 10 years, with a yield per hectare of 460 kilos / hectare. According to FEDECACAO, this year it is expected to reach a production of 60,000 tons with a growth of between 6% and 8% (González, 2019).

As you can see, coffee and cocoa are presented to Colombia as engines of development of its agricultural economy, its production and commercialization generate multiple Agribusinesses and opportunities; Coffee generates approximately 900,000 direct rural jobs and approximately 2 million between direct and indirect (MADR, 2019). For Cocoa, the productive agricultural unit in its cultivation is three (3) hectares and generates an average income of two monthly minimum wages to the producer or family. Every three (3) hectares of cocoa generate direct employment (1) and one and a half (1.5) indirect jobs. In a high percentage, the workforce is contributed by the family nucleus linked to the farms of the family cocoa farmers (Granados & Muñoz, 2018). For everything heretofore exposed in this work is rural associative company model is used for the production of Coffee and Cocoa in the Department of Cesar, Colombia.

## **MATERIAL AND METHODS**

The orderly procedure to know the model of rural associative company used for the production of Coffee and Cocoa in the Department of Cesar, Colombia, was carried out during the year 2018 from an analysis of quantitative and qualitative data under the mixed, type approach descriptive, field, transectional and non-experimental based on the precepts proposed by Vargas et al. (2019).

The information was taken from the social and participatory interaction with members of the board of directors of 10 associative companies, five cocoa producers and 5 producers of Special Coffee who voluntarily agreed to participate in the research, for this it was used as a data collection technique a structured interview applied in three meetings with the board of directors of each association led by its legal representative; The 10-question interview was aimed at gathering the information of each associative company taking into account the main aspects that led to its creation; the conformation of its organizational structure for decision making and the description of the components of the value chain and the alliances of each associative company.

Five meetings were also held with private public entities involved in the dynamics of these associations such as City Halls, Regional Autonomous Corporation and Community Boards. Likewise, a review of documents provided by each company was carried out in order to validate and verify the data obtained in the interview. The information was systematized in a document analysis matrix developed in the Excel



spreadsheet, of the Microsoft Office version 2013 package, from there the content was analyzed to interpret and theorize the information of each associative company linked to the objectives proposed in this work.

## RESULTS AND DISCUSSION

Below are the analysis of the main results.

*Factors linked to the creation of cocoa associative companies in the Department of Cesar:*

The first factor highlighted by the associations linked to the study refers to the opportunity present in the region to develop these crops. The coffee and cocoa production area in the Department of Cesar is located in the municipalities that are part of the Sierra Nevada de Santa Marta and Serranía del Perijá, its inhabitants are made up of settlers, merchants, farmers and indigenous communities, who around to the agricultural agricultural vocation specially formed in formally constituted associations they dedicate a large part of their productive activities generated by the exploitation of these crops. Municipalities such as Pueblo Bello, Valledupar, Manaure, San Diego, La Paz and Codazzi, among others, are home to countless coffee and cocoa producers that take advantage of climatic and edaphological conditions to grow these products.

Another important aspect refers to the socioeconomic context lived in the area, between 1985 and 2015 the phenomenon of violence caused by armed participation of Guerrillas and Paramilitaries manifested itself in this region in an exacerbated way that had no distinction with its inhabitants. The lands of Cesar have been the subject of an intense dispute. In comparison with other departments of Colombia, the economy of Cesar is of livestock farming tradition and has deteriorated in the last thirty years due to the actions of these illegal groups that left behind a number of victims in all social strata, among they, thousands of small agricultural producers or peasants who abandoned, badly sold or were forced to leave their farms which resulted in the low productivity of thousands of hectares, abandonment of the countryside and the degradation of the family in all aspects.

The aforementioned aroused interest and the need to move the agricultural productive unit forward, use its “farm” as a means of economic sustainability for its family nucleus. The collaborative and associated strategy is presented as an option for the small agricultural producer in order to find a way to mitigate the aforementioned impact. Today, more than 80% of the members linked to Coffee and Cocoa associations are visible in the Unique Registry of Victims of the Government of Colombia.



Another factor expressed by the associative leaders is the accompaniment developed by the National Federation of Coffee Growers - FNC and the National Federation of Cocoa Growers - FEDECACAO; These two entities are the legally constituted unions to represent and defend the interests of Colombian producers in order to implement strategies in research, rural extension and commercialization to contribute to the strengthening of the links that make up the productive chains.

*Characteristics of the organization of some associations of Coffee and Cocoa in the Department of Cesar:*

According to the analysis of the field information, it was determined that the associations linked to the study are formally established and registered in the Chamber of Commerce since 2000, 80% have offices and other infrastructure in the urban area of the municipal headwaters ; while the remaining 20% have them in rural areas. Of these, 60% of associative companies have less than 100 associates, 30% have between 100 and 200 associates and only 10% have more than 500 partners.

In that order, all these companies have a vertical organizational structure, where the highest authority is the General Assembly, to which the active and peace partners are presented and except to exercise their vote towards decision-making. In second order of hierarchy is the Board of Directors, its members are elected in general assembly for a period between 2 to 4 years, it is made up of 5 to 7 members, who meet between 1, 3 or 6 months or extraordinarily when present a need that requires general assembly decisions.

In addition to the above, the board of directors of the participating associative companies are made up of a president who acts as legal representative and manager; a Vice President; a Secretary, members, alternates and fiscal reviewer. They have statutes, books of Assembly Minutes, book of minutes of meetings of the Board of Directors and financial statements among others. It was observed that the functions of the members of the Board of Directors are clear and well defined in the bylaws, but sometimes they are very poorly identified and known by the people who hold a specific position and who have the responsibility. It was found that in some associations an membership fee ranging from \$ 20,000 to \$ 200,000 is charged, as well as an annual support fee for the same value, this fee is sometimes paid by the associate in installment or with the production of his unit productive.

In all the associations it was determined that there are delinquents with contributions of these quotas or other monies of activities carried out, which is cause for withdrawal of the association in some. Likewise, only 10% of the participating associative companies have a revolving fund as a structured savings and capitalization strategy based on a small percentage of the profits of their production to provide economic resources and help their associates with their needs.



On the other hand, in the hierarchical order established in the statutes of the participating associative companies are the operation of technical, social and oversight committees in order to support the administrative processes of the board of directors. These committees operate in 40% of these associations, while the remaining 60% are created in the "paper" but do not operate according to their statutes. Likewise, in 30% of the associations it was observed in the field that the legal representative is the one who assumes the different organizational, contact and convocation efforts of the associates, in fact 20% of the associations have communication problems due to their location in rural areas. Without a cell phone signal, however, all associations have an important territorial presence in the area and maintain good relations with other associations present in the area; In addition, some share the same spaces with the community council or indigenous communities.

In addition, 60% of associative companies provide direct technical assistance to their associates, in addition to that carried out by trade unions. The remaining 40% depends on other union entities, territorial entities or projects that come to the area sometimes as support to the association or independent participation by the associate. Also, the dialogue with the members of the boards of directors allowed to establish that the majority of the associates do not keep accounts or records of their production and sales; they present difficulties in identifying units of measure, some keep labor records, but not input costs or records of expenses that have been generated in the productive year. Some are not clear about the cultivated areas or number of established plants, they confuse household expenses with the expenses of inputs and raw materials of the productive unit.

From the above, it can be seen how the creation of Associative Coffee and Cocoa Companies aligns with the proposals in the SDGs; its 17 objectives towards the search for economic, environmental and social development in a participatory and inclusive way. In this case, by favoring the organization of small producers with limited economic resources, displaced by the phenomenon of violence, they take advantage of their knowledge, peasant vocation and specific skills around Cacao to generate decent employment, work together with the family and their community, in style of own governance, adjusted to the Colombian legal framework to formalize its productive enterprise, be part of the business network and take advantage of the conditions and opportunities of the land resource in its small productive units.

#### *Structure of the special coffee value chain in the department of Cesar:*

The Department of Cesar is located to the north of Colombia, in its agricultural production one of the best soft coffees in the country stands out, recognized with the designation of origin "Sierra Nevada", it is produced on the slopes of the Sierra Nevada de Santa Marta and Serranía del Perijá by small coffee growers located above



1200 meters above sea level in 19 coffee municipalities of the Department of Cesar. This crop is the means of subsistence of 8,595 coffee families that obtain it through agroforestry systems in an area of approximately 29,034 hectares (González et al., 2018).

According to the information collected, the production chain of specialty coffees benefits 2,605 coffee families located in rural and indigenous communities that cultivate 10,462 hectares in their small production units through an agroforestry system, of which 57% are certified in organic production. Likewise, 94% have fair trade certification. The estimated annual production of special coffee in kilograms of dry parchment coffee CPS is 7,436,695 kilos equivalent to 46.5% of the estimated production for the department of Cesar and the production of special coffee provides a harvest value of 48,658 thousand million pesos (USAID - CORPORACIÓN PBA and PTDR, 2017).

In that sense, the value chain of specialty coffees starts with the small producers that are part of the associative companies, their productive units have an average of 2 to 3.5 hectares planted in the Agroforestry System, with planting densities between 3500 to 6000 coffee plants per hectare; in soils with wavy to broken topography, the water is taken from natural water sources coming from hacheries on the slopes of the farms, or from currents that cross them. In these communities they sow coffee in a traditional way according to the rain regime; the vast majority establish their crops without a soil analysis and their availability of money is low to establish a fertilization plan that guarantees an adequate supply of nutrients from the beginning that allows to reach the expected productivity and productions (1,100 Kg / ha from the fourth year).

The cultivation of special coffee in the region belongs to the Arabic species, it is harvested when the grain is ripe between week 32 and 33 after flowering, approximately between the months of September to November. The coffee producers openly express their generational vocation, their love, optimism and commitment to produce the best coffee in the world, also express having differential aspects in their cultivation that everyone has and that makes their coffee unique, is something cultural linked to the good practices of the coffee grower in his productive unit, which makes the new client attracted by the history of that coffee, wants more information or connection with his cup of coffee and satisfy more than a bodily need.

Following the harvest comes the benefit of coffee, it is very important in the quality of the special coffee in its physical and sensory characteristics, it requires manpower with knowledge in its process to avoid problems in each of its operations such as pulping, fermentation and washing.





The pulping is done immediately the grain is harvested and the quality of the cup depends on its process, after the harvesting the grains are transported to the benefit to start the pulping before entering the pulping machine, the cherry float is made to remove the cherries brocades or with grains that pass to an independent process. This selection continues to maintain the quality of the grain. Pulping is the separation of the husk and pulp from the grain. This process is done with a calibrated machine that does not split the grain. It is also taken into account that the fruits without pulping and the pulp in the grain increase the ferment that affects the quality. Within good agricultural practices, maintenance and cleaning of the pulping machine is key to preventing damage to the grain and loss of quality.

Fermentation begins once the pulping work is finished, the special coffees seek in this work to enhance the flavors and aromas of the grain. During this process the mucilage degrades from the action of yeasts and bacteria that break down sugars through enzymes of the mucilage. The producers recognize the importance of this process as a determining factor in the physical and sensory quality of coffee, they know that it can be affected by temperatures and volumes used. They are also aware that the ideal fermentation enhances the fruity, sweet and chocolate notes of coffee. Inadequate fermentation will result in vinegar, metallic and dry flavor. Once the mucilage has been degraded, this allows the grain to be washed to remove the mucilage easily and go to the drying stage. The fermentation is carried out between 12 and 16 hours, if this time is exceeded the grain is stained, weight is lost and the almond loses quality. To conserve quality, clean water should be used and no batches of pulped coffee from different days should be mixed in the fermenter tank.

After fermentation, the grain is washed to completely remove the mucilage with clean water to avoid defects such as staining, dirty, ferment and contaminated. It is also classified by flotation in the fermentation tank. After the wet benefit process, the drying process that requires labor for this activity continues, this process is to reduce the humidity of the grain up to 12%, to allow safe storage without acquiring bad odors and fungi. According to what was observed, the small coffee producer performs a pre-drying in adapted drying patios or in canopies of 2m x 10m on average. This last option is the one that is generally implemented in the coffee farms of Cesar, but they fail to cover the requirements of the harvest and therefore many producers lower their coffee to the populated centers to finish this process in drying yards or silos.

Of the associations participating in this work, 80% have drying silos with a processing capacity of 2500 to 6000 kilos per production lot, these silos work in the urban area of the town of Pueblo Bello and process batches work for a period of 30 hours. Likewise, all the associative companies buy their dried associates and have collection centers to properly store the dry parchment coffee to proceed with the commercialization, only 20% commercialize independently to foreign buyers, it has its quality laboratory, it buys and sells for rate quality. The rest markets with



Caficosta, buys and sells according to the aroma, color, size, humidity and texture of dry parchment coffee.

Immediately, all impurities, moldy grains, splittings and spans are removed, by a manual process or with zarandas, leaving only the healthy and dry grains. The selected grains are packed in 50 kilos bags, new or second in perfect condition, washing them to prevent contamination. Finally, a quality test is made that consists of taking a grain and making a longitudinal cut to the grain, separating the two cotyledons to observe the characteristics of the grain, in order to adjust beneficial practices and improve quality.

As it was observed, the strength of the associations focuses on the commercialization of parchment coffee according to the attributes of the aroma, color, size, humidity and texture of the coffee obtained. Also, none of the associations markets roasted and ground coffee, only one recently acquired through a productive alliance project a threshing plant with threshing and ground dry parchment coffee in order to take advantage of its surpluses and venture into this market.

*Structure of the Cocoa value chain in the department of Cesar:*

Like Coffee, through the information gathered in the participating associative companies, the Cocoa value chain starts with small cocoa producers linked to associative companies constituted on average by 72 members who have an average area of 2 to 2, 5 hectares planted and its production does not exceed 350 kilograms per year. Activities that provide competitive advantage or operations from cultivation to commercialization are described below.

The productive units mostly have cocoa plants planted between 1999 and 2003 by Plan Colombia projects through "Animar Mission", currently the cultivated areas are in an agroforestry system composed of timber and fruit trees themselves the region creating a suitable environment from the shade, microclimates and temperatures suitable for the cocoa tree to express its best physiological characteristics. The farms or small productive units are located between 500 and 1200 meters above sea level.

There are very few productive units that meet 1100 trees per hectare, this aspect is very variable in many cultivation lots, just like the established varieties, only some hectares planted in the last three years meet this planting density. Its production is marketed in the "current" cocoa market. However, cocoa almonds are produced with a great diversity of own and differential sensory characteristics that potentiate them as fine and aroma cocoa.

Regarding the workforce used in cocoa production units, it was found that the family is the base of support and chores necessary for cultivation, man works in planting,



pruning, cleaning and weeding, fertilization, irrigation, insect control, plagues and diseases; Women and young people support the activities of harvesting, breaking or descaling of ears, elimination of thread or placenta and tuning of cocoa in drool. External labor is hired very rarely, especially during harvest. The daily value is between 5 to 8 US dollars (20,000 to 30,000 Colombian pesos); In some productive units, lunch is included and the workday is approximately between five in the morning and two in the afternoon.

The workforce that is used in the farms for the management of the cocoa crop is a family type, with the activities of harvesting, opening and cutting down those with the greatest participation of female labor. In many cases and for a good part of the year, the productive unit needs additional temporary personnel for crop management tasks such as pruning, weeding, harvesting and shelling; However, it was evident in all regions of the country, the difficulty in obtaining labor, since it abandons agricultural practices in order to develop other types of activities such as those related to transport and construction.

Likewise, it was observed that the level of application of fertilizers or fertilizers is very low, there are very few producers who have implemented an adequate fertilization plan more for their low purchasing capacity than for knowledge, they are aware that the plant needs nutrients to their productivity and development but because of their low income they have no way to invest in these inputs, since 2016 projects have been developed in favor of small producers managed by the Department of Departmental Agriculture and some municipalities such as Manaure and La Jagua de Ibirico to improve the productivity and quality of the almond such as the Program of productive transformation and productive alliances.

This produces crops with a very variable number of grains per ear between 35 and 50 depending on the variety, as well as the size of the almonds; The harvest takes place in two seasons, from April to June the first and the other between October and December. According to what has been observed, fermentation is carried out in wooden boxes, plastic bins, buckets, bags or bags; It starts on the same day the ear is harvested and lasts between 4 to 6 days. Very few producers control fermentation temperatures, none control Brix degrees and pH. Some producers do not ferment the cocoa beans, harvest, descacotan and place to dry directly, this type of producers mostly sell to intermediaries. Fedecacao and the National Chocolate Company, through their technical teams, carry out in their interventions training that seeks to raise awareness, improve and implement fermentation in small producers in order to improve the sensory quality of almonds.

After fermentation, small producers carry out drying, taking advantage of sunlight and daytime temperatures between nine in the morning to 3 in the afternoon for approximately three or four days when rain permits. As drying equipment they use



canopies, elbas houses, wood trays, plastics, concrete surfaces or another area that allows you to expose the beans to the sun for drying. The ideal for drying are the canopies and the Elbe houses, but there are very few producers that own them due to the cost of manufacturing, which affects the sensory quality of the grain due to possible flavors and aromas absorbed on the drying surface. As with fertilizers, projects include the delivery of fermenting drawers, house elbe or canopies in order to improve quality and for the producer to receive a better pay.

To determine the optimum drying point, the producers take a handful of almonds and squeeze them to see if they crunch at the strength made, also from experience, certain typical aromas allow you to determine that they are ready to sell. Some producers do it for friendship or recognition of intermediaries, others directly with the National Chocolate Company and very few sell it to the association. The ICONTEC 1252 standard defines the parameters for buying and selling as premium cocoa, ordinary cocoa and pasilla. The intermediaries make the purchase by price difference by buying in the field and then sorting, storing and waiting to sell to the national chocolate company or buyers located in other departments.

From the above, for cocoa in the Department of Cesar there are about 25 Producer Associations located in the different municipalities with an average area of 2 hectares, cocoa is currently one of the priority crops in the Departmental Development Plan 2016 - 2019 "The Way of Development and Peace". Through the department secretary of agriculture and the "Cesar Siembra" program, he has encouraged the cultivation of cocoa through the establishment of a nursery specifically for cocoa clones in agreement with the National Chocolate Company and AGROSAVIA strategically located in the municipality of Codazzi for the support of the projects to be executed such as those of productive alliances, Productive Transformation Program and Environmental Compensation, among others (Abbott et al., 2018). Identified with the SDGs, the special coffee and cocoa crops for multiple reasons can be said to be truly environmentally friendly. In fact they develop ideally within agroforestry systems, associated with short-cycle crops, temporary shadows and permanent shadows.

From the environmental and productive point of view, they present a series of positive aspects such as: preserving biodiversity, conserving or promoting a favorable microclimate, increasing plant and animal productivity, diversifying production, integrating forest production with agriculture, mitigating the harmful effects from the sun, wind and rain on soils, combine the best of traditional knowledge with modern knowledge, ensure sustainability through proper intensification of land use, improve nutrient recycling, protect the soil against erosion, positively influence the management of pests, reduce competition with the crop, use multi-purpose and persistent species, favor rapid leaf regeneration, promote high litter production, improve Nitrogen Fixation, create a favorable environment for growth of a strong



radical system, provide food, raw materials, fuels, fodder and favor biodiversity, among others (MADR, 2013).

In that sense, Quintana et al. (2018) carries out an investigation confirming that these types of crops are "friends of the shadow". Some of its physiological effects are thermal and luminous, which is also reflected in the thermal sensation of the micro environment in a Cocoa crop in the Agroforestry System. Likewise, these crops under shade protection demand less nutrients due to the low amounts of photosynthesis products, since they do not require as much nitrogen and phosphorus to form proteins, nor so much potassium to stimulate growth and accelerate the translocation of carbohydrates to the root system.

In the same way, Quintana et al. (2018) cites different investigations where they affirm that the shade trees associated with the cultivation of cocoa provide more stable environmental conditions producing abundant blooms accompanied by large fructifications that only take place during uniform periods of humidity. In Bahia Brazil, it was determined that the average annual humidity of the air in cocoa plantations placed at full exposure was 85 percent, while that of those placed in the shade was 90.4 within the crop. Likewise, the shade trees allow a better use of the fertilizers applied to cocoa, since the fertilizer that would be lost by leaching is taken advantage of by the shady trees which avoids possible fertilizer eutrophication phenomena that the crop stops consuming.

Supporting the above, the Ministry of Agriculture and Rural Development of Colombia together with FEDECACAO, affirm that agroforestry models produce a series of environmental benefits such as water conservation (quantity and quality) through greater infiltration and reduction of surface runoff, minimizing pollution and sedimentation of water courses, and improving riverbank protection. Erosion reduction: Treetops, leaf litter, branches, parts of fruits, flowers and other waste cover the soil and reduce the impact of rain on the soil. The residues of the cups that fall to the ground next to the roots, improve the structure of this and its fertility, increasing its nitrogen content and favoring the retention of nutrients as mentioned above.

## CONCLUSIONS

From the results presented, from their discussion and from the background of the literature exposed through the article, the following main conclusions can be obtained:

The production of special coffee and cocoa links a significant number of small producers who have seen in these two crops a possibility of staying within the use of their rural productive units in order to give sustainability to their families and their associative companies.



To determine if a coffee is special beyond the marketing with which almost all coffees are labeled today, customer recognition is required for the work done to produce a coffee that meets the expectations or experiences that the buyer seeks and for which is willing to pay a higher value to conventional coffee.

Although cocoa does not have a strong associative structure like coffee, it is presented as an opportunity to take advantage of a growing agribusiness and with an open market that requires strategies to improve the links that compose it.

The value chains of specialty coffees and cocoa where associative companies in the department of Cesar participate are well defined, but require investment in technology and knowledge transfer to be more efficient in terms of performance and profits in favor of the small producer.

The cultivations of special coffees and cocoa in association with timber species in the agroforestry system assume an important function in the retention of carbon in soils and wood. This is an additional potential economic benefit for farmers towards the search for carbon markets which is of great importance today in the world. On the other hand, the conservation of diversity by incorporating trees within agricultural landscapes contributes to the conservation of river banks, allows the connection of habitats for animals, birds, fish and plants. In addition, it beautifies the landscape and improves the living conditions for the inhabitants of the countryside.

The various factors mentioned and the strategic location of many small productive units in agroforestry systems, organized in rural associative companies, in areas with high vulnerability due to multiple factors on ecosystems such as deforestation, mining, illegal armed groups and illicit crops, in large part they make them a productive system suitable for the preservation of many habitats of important species of flora and fauna, towards the search for environmental rethinking of many regions and their productive support for sustainable competitiveness. That is, these types of rural associative companies align with what is proposed in the SDGs.

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