



REPORT ON

**ECUADOR'S BANANA
SECTOR**



Ministry of
International Trade

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General information on the sector

Economic importance of the banana sector

Banana exports represent 2% of Ecuador's total GDP and approximately 35% of agricultural GDP.



In 2013, investment in banana production and related industries (goods and services necessary for banana production), as well as the actual export process of this product generated work for more than one million Ecuadorian families. This benefitted more than 2.5 million people (roughly 6% of Ecuador's total population) over nine provinces which heavily depend on the banana industry. This sector represents a central axis for economic activity, generating greater revenue and providing more employment opportunities in comparison to other non-petroleum productive sectors in the country.





Domestic banana production

According to the official Registry of the Ecuadorian Ministry of Agriculture, Livestock, Aquaculture and Fisheries (MAGAP), at the moment 4,473 producers of banana cultivate the fruit over 162,236 hectares in Ecuador. These producers are distributed in the following way:

Distribution by # of hectares	Amount cultivated (hectares)	No. of Producers
0-30 (small)	35,685	3,480
>30 ≤100 (medium)	57,486	800
100 or more (large)	69,063	193
TOTAL	162,234	4,473

Source: Banana land registry/MAGAP
Elaborated by: Ministry of Foreign Trade

As shown above, approximately 78% of all banana producers in the country are small producers which, including medium producers (>30 ≤100 hectares) adds up to 95.6% of total



production. As such, it is important to note that the vast majority of banana production in the country centers on family businesses and the popular and solidary economy (EPS, in Spanish), an important sector which contributes significantly to rural poverty reduction.

Banana producers are concentrated primarily in the provinces of El Oro, Guayas and Los Ríos, home to 41%, 34% and 16% of producers respectively. The largest concentration of small producers is situated in the El Oro province (approx. 42%), while the larger producers are centered primarily in the Guayas and Los Ríos provinces.

One of the most outstanding examples of small producers in the banana sector has been 'El Guabo', created in 1997. El Guabo is an association of small-scale banana producers of the provinces of Azuay, El Oro, and Guayas. Nowadays, El Guabo has 350 members and employs over 2,000 people.

El Guabo has as its main objective to satisfy the demands of their clients with high quality products, under the fair trade system, with the aim of improving the conditions of their partners along with their social and labor environment.



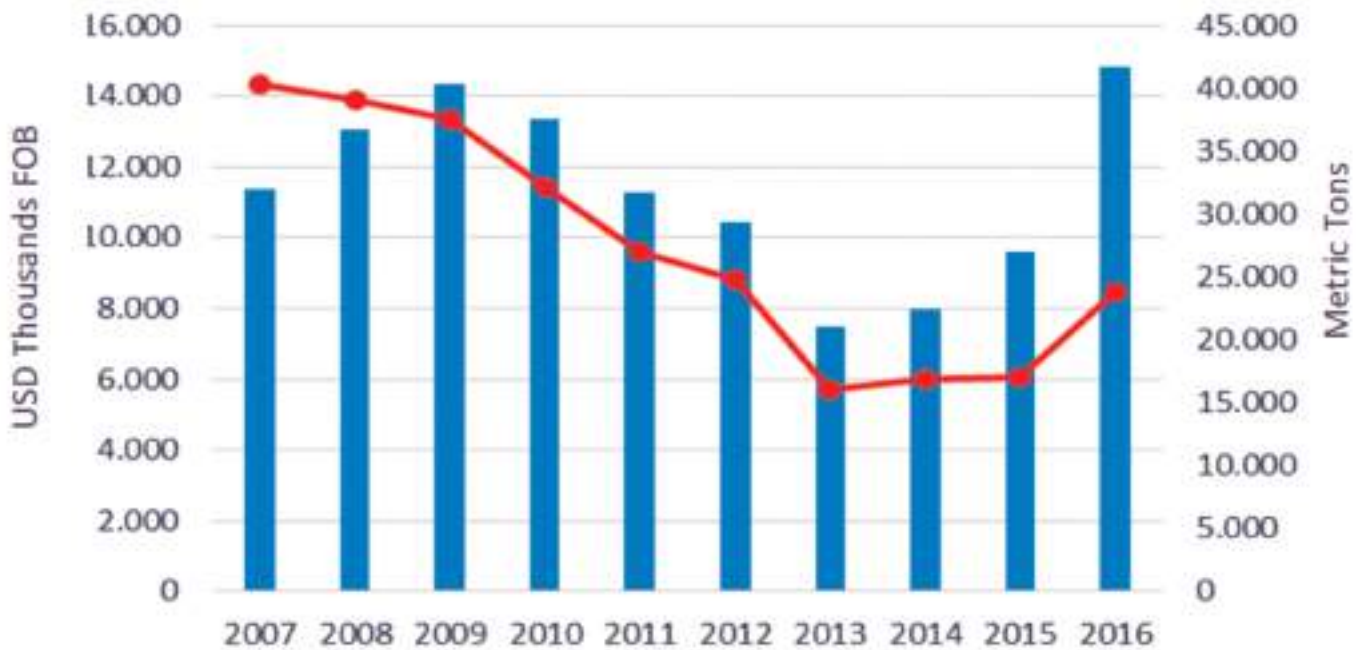
This Association has established its own monitoring system which includes the treatment of the fruit from the farm to the shipment. It has resulted in the efficient production and exportation of: Baby Banana (CJ), Organic Banana, Cavendish Valery bananas and mashed bananas.

El Guabo exports have fluctuated during the last ten years. The years of greatest exports were: 2009 and 2016. The behavior of its exports registers an Annual Average Growth Rate of 3% in value.



In 2007, "El Guabo" was one of the most important small exporting producers, accounting for 33% of the total amount exported by this sector. In 2015, exports were USD 241 million, while in 2016 exports reached 304 million.

“El Guabo” Exports



Thanks to Fair Trade sales, the association has been able to implement the following initiatives:

- A common fund that grants credit to farmers and provides them with investment opportunities.
- Improvements of the irrigation systems and packing areas.
- Training courses for members in the areas of quality control, organic production techniques, first-aid, and agrochemical reduction in production processes.
- Health insurance for all members and employees.
- An education program, which provides infrastructure improvements to local schools as well as school supplies.
- Recycling programs in all farms.

In this regard, El Guabo complies satisfactorily with the labor, sanitary and environmental legislation established in Ecuador, as well as with the international standards, which is the reason why this Association also complies with the organic certification SKAL, Fair Trade FLO, and Naturama.

In fact, the majority of plantations in the country are modernized, and many of them have obtained certifications for meeting international quality control standards under ISO, HACCP (Hazard Analysis Critical Control Point), Rainforest Alliance and GLOBALGAP.



Currently, around 80,000 hectares of banana are certified by GLOBALGAP, in comparison to only 48,000 hectares in 2010, representing a 67% increase for this specific standard. Additionally, 16,000 hectares are certified under Rainforest Alliance and 10,000 under Fair Trade.

Sustainability is not only a major concern for small Associations of producers. Larger companies are also strongly committed to the future, by producing healthy food that preserves the environment, and encourages economic stability and the prosperity of the community. For instance, Bonita Europe is a Founding Member of The World Banana



Forum, a permanent space whose goal is to achieve consensus of best practices regarding workplace issues, gender equity, environmental impact, sustainable production and economic issues.



Social and Environmental regulations for the sector

Since the approval of Ecuador's 2008 Constitution, a number of important reforms have been made to the current regulatory framework. These reforms have focused on strengthening human rights, workers' rights and environmental rights in the country, as well as assuring their implementation in production processes.

Compliance with Human Rights and Workers' Rights

- With respect to compliance with human and workers' rights, it is important to note the following measures which have contributed to this control specifically in the banana sector:



- The 2008 Constitution and subsequent labor reforms establish the obligation to guarantee universal affiliation to the public social security system for all workers. As such, all organizations must present the payrolls of each employee on a monthly basis with respective affiliation payments and salary grades in accordance with current labor laws.

This obligation is backed by the new Organic Comprehensive Penal Code (COIP, in Spanish), which establishes in Section 6 infractions to Labor Rights and Social Security. The following count as infractions or crimes pertaining to labor rights: a) impediment or restrictions on labor strikes, b) illegal retention of social security contributions, and c) non-affiliation with the Ecuadorian Institute for Social Security (IESS in Spanish). It is important to clarify that Ecuador has placed the strongest sanctions of all countries in the region with regard to these penalties, observed in prison sentences for employers who do not affiliate their staff with public social security.

- The Constitution and respective labor reforms meticulously outline the prohibition of all forms of child labor and exploitation, in compliance with international commitments made by the country. Ecuador was the first country in the Americas and the third country worldwide to ratify the Convention on the Rights of the Child in 1990. Later, in 2000, Conventions 138 and 182 of the ILO on the minimum employment age and

prohibition of the worst forms of child labor were ratified, before many other Latin American countries.

In 2002, important work began within Ecuador's banana sector to eradicate child labor through the signing of an Agreement from the Banana Sector regarding Underage Labor. This document was signed by both local producers and exporters with the support of the Ministry of Labor, the National Institute of the Child and Family –INNFA–, UNICEF and the Export and Investment Promotion Corporation – CORPEI–, and contributed to the creation of the Banana Social Forum, which remained in effect until 2010.

Additionally, the Childhood and Adolescence Code was established in 2003, which significantly strengthened controls and measures to eradicate child labor.

In 2005, the Ecuadorian government, together with various national and international NGOs as well as civil society actors, developed the National Plan for the Prevention and Progressive Eradication of Child Labor in Ecuador (PETI), which has been implemented through various projects up to the current '2014-2017 Child Labor Eradication Project', led by the Ministry of Labor. Since the establishment of PETI, the Banana Social Forum was highly active as a sectorial forum and focused on the prevention of child labor and improvement of living conditions for the country's productive sector.



In 2008, the Ministry of Labor and Employment began implementing the Intensive Plan for Eradicating Child Labor in the Banana and Mining Sectors of the El Oro Province, where the largest number of producers of this fruit are concentrated. Under this plan, interventions and inspections of 183 banana plantations were carried out, which identified 216 children and adolescents in situations of child labor. These children were separated from their work and guaranteed proper education, care and health services.

These processes continued around the country from 2009 to 2010, placing special emphasis on waste facilities, slaughterhouses, banana plantations, shrimp farms, housekeeping services and mining areas. In 2011 and 2012, Ecuador was declared free of child labor in garbage dumps and slaughterhouses, respectively, and the country continues to work strongly toward complete eradication of child labor in other key sectors.

- The country's Labor legislation establishes a Standard Minimum Wage (SBU in Spanish), as the lowest monthly salary an employee can make. Although different pay rates exist in the banana sector depending on the type of work, the sum of these pay rates cannot be less than the SBU.

It is important to point out that the Ecuadorian government has worked to assure dignified salaries which cover basic necessities. In 2007, the government began transforming the minimum wage of USD \$170 into a periodically adjustable salary based on macroeconomic variations. The last adjustment made to the national minimum wage took place in January 2017 and counted for inflation, representing a rise to USD 375 from USD 366 in 2016. Ecuador now has one of the highest standard minimum wages in Latin America, above countries such as Colombia, Perú, Brazil, México, among others.

- Another labor right in which the banana sector has placed special emphasis on is the right to healthcare and integrity for workers in banana plantations. Currently,

the Ministry of Labor, together with the Ecuadorian Social Security Institute and the Ministry of Agriculture, Livestock, Aquaculture and Fisheries is working with the FAO and has elaborated a Regulation and Manual for Industrial Safety and Occupational Health in the Banana Sector, which began as an initiative in the World Banana Forum and is based on guidelines established from the Banana Occupational Health and Safety Initiative (BOHESI).

The regulation established from this initiative is currently in the approval process within the Ministry of Agriculture, Livestock, Aquaculture and Fisheries and, once approved, will be implemented and presented locally in banana plantations. This initiative is also linked to an awareness campaign designed to assure that banana sector employees know and understand their rights.

Labor inspections have been specifically used by the Ministry of Labor in order to assure compliance with human and workers' rights. This Ministry manages the National Inspection System, which in recent years, underwent a reorganization process and has since increased the amount of inspectors. In 2013, the banana sector in particular saw an increase in inspections, which dedicated particular attention to child labor controls, rights for disabled persons, and occupational health safety.

Since 2014, inspection processes for the banana sector are carried out in accordance with a monthly schedule, and complaints are quickly handled.

- The inspections are carried out by a labor inspector, an official from the Department of Safety and Occupational Health and a representative of the Child Labor Eradication Program. One-time visits take place in each plantation, where interviews are held with employees, identification documents are required and a verification of compliance with legal requirements is carried out. Subsequently, and in order to

assure a correct application of the process, a report is given to the employer, who then has 48 hours to present the information required by the Ministry. Once this process is concluded, the corresponding resolution is drafted.

- In November 2015, the Ministry of Labor published Ministerial Accord No. MDT-2015-0233, which established an official Work Contract for the Agricultural, Flower and Banana Sectors. The establishment of a specific standardized contract for these sectors is a significant achievement, allowing for a stricter regulation of work relations for activities such as banana cultivation and for guaranteeing stable, just and dignified remuneration.
- In an effort to promote human rights in productive sectors, measures to assure more equal distribution of wealth and opportunities have complemented these reforms. This is reflected in an important measure adopted to strengthen the tax collection process for the banana sector, in order to assure a fair contribution from this sector to the country's overall economy.
- Additionally, since 2010, the country has been implementing a Law for Stimulating and Controlling the Production and Commercialization of Banana and other Plantain-Related Products (the Banana Law), which aims to regulate the sales relations between banana producers, commercializers and exporters through the signing of contracts for each different type of sale.

- Since 2013, the Ministry of Agriculture, Livestock, Aquaculture and Fisheries has promoted the 'Productivity Development Program for Small Banana Producers', which was created to improve the productivity and profitability of small plantations up to 30 hectares. The intervention logic is based on 4 activities: technical assistance; financing through credits offered by the National Development Bank (BNF); research; and business development and associativity.
- In the context of the policies supporting small producers, and through Ministerial Accord 350 presented in December 2015, the Ministry of Agriculture, Livestock, Aquaculture and Fisheries implemented a requirement that at least 15% of all banana acquisitions by exporters must be acquired from small producers.

These type of measures seek to foment a just and adequate distribution of benefits generated by this sector, and prevent larger actors from dominating the market.

- In line with strengthening small producers, the country has also incentivized associativity through associations of small banana producers under the Popular and Solidary Economy (EPS), and has promoted the creation of fair trade associations dedicated to banana exports. Some of the primary principles of the organizations that form part of the Popular and Solidary Economy are: fair and responsible trade, gender equality, social and environmental responsibility, solidarity, accountability reports and equal distribution of surplus.



Exports from Ecuadorian EPS to the European Union are centered primarily in the banana sector, which represented 63.4% of these exports in 2015. Over the past nine years (2007-2015), the volume of EPS exports and fair trade exports to the European Union increased by 112% and 1,150%, respectively.

- Finally, it is important to note that, on August 15, 2014, the Ministry of Foreign Trade and the Ministry of Agriculture, Livestock, Aquaculture and Fisheries signed a Framework Inter-institutional Cooperation Agreement for Implementing the Competitive Improvement Plan (PMC) for the Banana Sector. This plan is designed to promote solid economic growth for banana producers through strengthening associativity focused on improving business management in the value chain, applying sustainable technologies which increase levels of production and productivity, as well as generate added value for sustained commercialization.

Representatives of the public sector, together with producers, exporters, providers and other actors within the banana production chain, established a Strategic Agreement of Good Will in order to define the actions and commitments for a structural change in the sector. The common vision for this agreement is to transform this sector into a global export leader based on an organized and equitable value chain, with integrated agreements and shared value.

These points demonstrate the work that this sector has undergone in order to achieve socially responsible production and assure that profits are distributed correctly and fairly throughout the value chain.



Protection of the Environment and Health of the Population.

Framed on the principles of the Constitution, the country has taken important measures of control for environmental protection and health safety in the production processes, which have been extended to the banana sector. The main measures include:

1. The Productivity Development Program for Small Banana Producers, which was mentioned in the previous section, provides technical assistance to 100% of small farmers and has focused heavily on encouraging the research and the use of organic manure produced on the same banana plantations, contributing to environmental care and health safety for the workers and surrounding villagers.

This program has improved the productivity of small farmers, promoting organic banana production, which has facilitated the entry of their products, for example, to the European Union markets, which, as is known, requests strict quality controls related to proper social and environmental management.

2. To ensure the safety of bananas for consumption and export as well as ensure the health of populations that live next to the banana crops, a control system has been established in the country led by the Ecuadorian Agency for Quality Assurance in Agriculture (AGROCALIDAD), under the Minister of Agriculture, Livestock and Fisheries which,



through the Department of Registration of Agricultural Inputs, registers products used to control various crop pests, in conjunction with the National Direction on Environmental Control of the Ministry of Environment and the National Direction on Sanitary Surveillance and Control of the Ministry of Public Health. These instances are part of the National Technical Committee on Pesticides, which is responsible for assessing the records for the registration of chemical pesticides for agricultural use based on Decision 804 of the Andean Community, in the farming and toxicological fields, as well as analyzing and defining several aspects that may arise regarding the proper use and handling of those products.

Once certain pesticides have been evaluated and their use has been accepted, AGROCALIDAD is responsible for maintaining the registry of companies authorized for the sale of pesticides as well as the list of pesticides and related products permitted for use. In fact, it is required that all warehouses of sale and distribution of pesticides be registered in the 'system of guide' of AGROCALIDAD, whose control is based on periodic inspections of post-registration for verification and compliance with national legislation.

In addition to Decision 804 of the CAN, the control of the use of pesticides in agriculture is based mainly on the following national laws and regulations:

- Law for the formulation, importation, sale and use of pesticides and related products for agricultural use (Official Journal 442 of May 22, 1990), which was codified in 2004. This Act established better control and regulation of the pesticides used in agriculture.
- Decree 3609, Unified Secondary Legislation Text of the Ministry of Agriculture, Livestock, Aquaculture and Fisheries, updated in 2010, for the registration of biological pesticides and related products for agricultural use.
- Resolution 0173 of AGROCALIDAD, of September 2012, issuing the 'Complementary

Standard to facilitate the implementation of Decision 804 of the Andean Community". This regulation establishes the requirements for registration of enterprises for application of agricultural pesticides, among which is the obligation to pass a training course on the proper use and management of pesticides.

This Resolution also stipulates that 'it is prohibited to practice aerial applications of pesticides and related products in categories 'Ia' and 'Ib', which are of extreme and highly dangerous use, as well as pesticides when evaluation results show a high probability of contamination to the environment and to human health. Similarly, it is prohibited to conduct aerial applications near schools or populated areas. All aerial applications must have a prescription from a professional agronomist."

- The Interministerial Agreement no. 365 developed by the Ministry of Environment, the Ministry of Public Health, the Ministry of Agriculture, Livestock, Aquaculture and Fisheries and the General Directorate of Civil Aviation, published in the Official Journal No. 431 of February 4, 2015, issues the Regulation for Agricultural Environmental Sanitation, which regulates and controls the aerial and ground applications of agrochemicals and related products in agriculture considering the agronomic, geographic and environmental aspects.

This regulation states that it is mandatory:

- To establish a security strip of 60 meters without hedgerows and 30 meters with hedgerows with respect to sensitive areas (rivers, estuaries and major water bodies, which are not intended for human consumption)
- To establish other water bodies (internal channels of crops), and to plant native plants to protect these water sources.
- To establish a security strip of 200 meters on the perimeter of the crops located next to populated areas, schools, health centers, recreation centers and outdoor bodies of water

intended for human consumption; in these security strips it is allowed ground spraying only in compliance with specific guidelines.

This regulation also provides that the Ministry of Environment will be in charge of: giving capacity building to the agricultural sector in environmental regulations; ensuring implementation of hedgerows in the agricultural sector; coordinating, together with the responsible entities, the monitoring of chemicals in water, soil and air resources; ensuring compliance with safety strips for water bodies; and developing management guidelines for hazardous and non-hazardous waste. To ensure these processes, the Ministry of Environment coordinates with the Ministry of Agriculture, Livestock, Aquaculture and Fisheries and the Ministry of Public Health to conduct periodic inspections on banana crops.

In this context, the Ministry of Environment, in a joint effort with the Ministry of Agriculture, Livestock, Aquaculture and Fisheries / AGROCALIDAD, the Direction of Civil Aviation in Guayaquil and the Association of National Business Aviation (ADENA), are developing a study within banana production areas, in order to test compliance with environmental regulations related to the establishment of the buffer zone for aerial application of pesticides in banana plantations.

It should be noted that in view of the current regulations, all aircraft used for fumigations in banana plantations have the technology called spray off (smart flow) which ensures that the products will be applied only in the demarcated areas.

3. In addition, regarding the control over the use of pesticides, since 2011 the Ministry of Agriculture, Livestock, Aquaculture and Fisheries, the Ministry of Environment and the Ministry of Public Health have been running a National Training Plan for the Sound Management of Pesticides, directed to the whole marketing chain of chemical pesticides for agricultural use, including in the banana sector, using the field school methodology. By 2015, there was a total of 491 people trained, and following the first half of 2016, another 389 people received training.

For this purpose, educational materials have been developed to facilitate the understanding of this matter. Specifically for the banana sector, the brochure titled 'How to handle security strips in your banana farm' has been produced.

4. To achieve a comprehensive environmental control in banana plantations, the Ministry of Environment has based its action on the following standards:

- The Unified Text of the Secondary Legislation of the Ministry of Environment (TULSMA) (Official Journal No.725 of March 31, 2003) establishes the procedures and regulates the activities and public and private responsibilities regarding environmental quality. On this basis, the requirement of environmental licenses and records in the banana sector has been implemented.
- The Ministerial Act No. 026 of May 3, 2008, issued the Procedures for Registration of Generators of Hazardous Waste,





Management of Hazardous Waste prior to the Environmental Licensing and Hazardous Materials Transportation.

- The Integral Management of Plastic Waste that was used for Agricultural Purposes (Official Journal No.943 of 29 April 2013) requires banana plantations to have a better control of plastic waste with the support of companies that sell inputs.
- The Ministerial Act No.061 of May 4, 2015, establishes procedures for regularization, environmental control and monitoring of projects, works or activities performed nationwide. This regulation establishes the type of environmental permit that must be obtained by the banana crops for their legal operation:
 - Plantations of less than or equal to 100 hectares of banana must obtain an environmental record.
 - Plantations of more than 100 hectares of banana must obtain an environmental license. It should be noted that the environmental license is the only qualifying document that allows a company to start making productive or extractive activities, which can be obtained after meeting several conditions, including the approval of environmental impact studies and prior consultation with local communities. Once the environmental license is issued, the Ministry of Environment performs monitoring and control processes to verify steadily compliance with environmental management plans through monitoring reports, compliance audits, among other control mechanisms.

6. In addition to controlling pesticide use, AGROCALIDAD performs processes to control the quality of agricultural products to ensure the safety of banana. For this, the following standards are applied:

These regulations, which have been created specifically for safety control of bananas, have

LEGISLATION	OBJECTIVE	OUTCOME
Resolution 138 (May 27, 2013): Guide to procedures for inspection of bananas and other export plants.	To regulate the inspection of bananas for exporting in plantations and ports.	Limitation of the decline in banana production.
Resolution 138 (May 27, 2013): Protocol for the control and management of scales in the field and in the packing.	To eliminate the incidence of scale in banana plantations.	Zero scales in the boxes of banana for exporting.
Resolution 138 (May 27, 2013): Protocol for the control and management of mealybugs in the field and in the packing.	To eliminate the presence of mealybugs in bananas.	Zero reports of mealybugs in banana boxes.
Resolution 138 (May 27, 2013): Manual for registration of collecting centers	To establish specifications for the collecting centers in order to have a safe product.	All collecting centers of bananas for exporting are registered and regulated.
DAJ-resolution 201413 ^a -0201.0040 (14 March 2014) Guide to Good Agricultural Practice for Bananas	To establish the technical specifications that must be considered in the process of Good Agricultural Practice for Bananas, in all its stages, aimed at ensuring food safety and environmental protection.	Banana plantations have sustainable management of inputs and raw materials and bananas for exporting and for local consumption are safe.

Source and elaboration: Association of Banana Exporters of Ecuador - AEBE

allowed the Ecuadorian banana to be recognized worldwide for its quality.

In addition, AGROCALIDAD guarantees the organic integrity of the products sold inside and outside the country, through providing periodic control to organic operators, inspectors specialized in organic products and certifying agencies in order to verify compliance with the 'Instructive of the General Regulations to Promote and Regulate Ecologic and Organic Production in Ecuador'. Thanks to such environmentally friendly agriculture and to the controls carried out by the authorities, quality organic products for the consumer are guaranteed.

In recent years, the number of hectares for registered organic production of bananas, which are being controlled by AGROCALIDAD, has increased. Currently, according to the records of AGROCALIDAD, the country has 12,633 hectares under organic banana production control, while there are 258 registered individual operators and 24 operator groups that bring together 833 members of organic production.

Health benefits

Bananas are one of the most consumed fruits in the world, not only because of their delicious taste, but also because of their nutritional value. This has made bananas one of the most important dietary staples in the world.

In fact, bananas are an ideal food for young children and families in many regions of the world, because of their sweetness, texture, portion size, familiarity, availability, convenience, versatility, and cost.

The United Nations Conference on Trade and Development (UNCTAD) in its publication 'Banana, An INFOCOMM Commodity Profile' mentions that 'Bananas are a rich source of vitamins and minerals. It is also rich in fibers and carbohydrates, and low in fat. Bananas contain minerals such as potassium, phosphorus, calcium, magnesium, sodium, iron, copper, zinc and manganese. It also contains dopamine, a powerful antioxidant, and all the B group vitamins present in the plant kingdom. Thus, bananas contribute to the proper functioning of energy metabolism and the nervous system, and to maintain a good digestive transit'.

The United Nations' Food and Agriculture Organization (FAO) established that Cavendish bananas have 400 milligrams of potassium for every 100 grams of fresh fruit. This amount is similar to the potassium found in many cooked vegetables, meat or fish. According to the 'Antioxidant Activities and Anticancer Screening of Extracts from Banana Fruit (*Musa sapientum*)' study, if bananas are consumed regularly, they can help regulate blood pressure and heart activity.



People who consume large amounts of potassium have up to 27% less risk of heart disease.



UNCTAD's publication also indicates that bananas can help athletes improve their performance because they provide a quick energy stimulus, have high potassium content, and are a good source of vitamins C and B6.

Since bananas are readily available and easy to consume, they are being used as vectors of edible vaccines. Banana pectin is extracted and employed as a pharmaceutical excipient for tablets. Recent findings indicate that 'the complex mixture of phytochemical constituents present in fruit and vegetable extracts are more effective than their individual components in cancer prevention due to their additive and synergistic effects. Edible phytochemicals offer a suitable basis for cancer control and management'.

It is well known that the nutrient content of a fruit changes slightly as they ripen. In the case of bananas, as they ripen and turn yellow, its levels of antioxidants increase. The antioxidants in ripe bananas protect against cancer and heart disease.

According to scientific research carried out by Teikyo University in Japan, a fully ripe banana with dark patches on yellow skin has a substance called TNF (Tumor Necrosis Factor), which fights against abnormal cells. A banana has a higher immunity enhancement when it has darker patches. Therefore, the riper the banana, the better anti-cancer qualities it has.

Research concluded that the activity seen on ripe bananas was comparable to that of Lentinan, a chemical immunostimulant that is intravenously administered as an anti-cancer agent. This means that ripe bananas can act as anti-cancer agents, by stimulating the production of white blood cells.

Bananas also contain antioxidants that destroy free radicals, the molecules that circulate in the blood stream causing the formation of cancerous cells. By destroying free radicals, the antioxidants in bananas are able to minimize free radical damage in the body and fight cancer in its early stages

Conclusions

Ecuador is one of the leading producers and exporters of high quality banana in the world, meeting standards of very demanding markets like the European Union and the United States, as well as the requirements for certification to ensure compliance with social and environmental standards.

The social and labor policies in Ecuador have led to a substantial improvement of living conditions in this important agricultural sector:

- From 2003 to 2010, intensive work in the monitoring of child labor in the banana sector and in improving the quality of life for workers in this sector has been undertaken, through the activity of the Banana Social Forum, an Institution created by members of this industry, along with other public agencies.
- The struggle for the eradication of child labor in this sector is part of the National Plan



for the Prevention and Eradication of Child Labor, through which thousands of children and adolescents in child labor have been recovered in recent years. In 2007, 12.5% of children and adolescents in the country were working, while in 2015 this percentage dropped to 5.9%. The greatest efforts in this area have focused on garbage dumps, abattoirs, banana plantations, shrimp farms and flower farms.

- The Ministry of Labor leads periodic inspections on banana plantations to ensure compliance with labor rights in the sector, especially those related to child labor, rights of people with disabilities, and the control of the health of the workers.
- The Ministry of Labor issued at the end of 2015 a specific type of contract for the banana sector, which ensures stable conditions, and fair and adequate remuneration for workers in this sector.
- The Ministry of Environment, in coordination with the Ministry of Agriculture, Livestock, Aquaculture and Fisheries and the Ministry of Health, have made significant efforts to control the proper use of pesticides and to establish adequate environmental management during banana production processes, which are designed to protect the environment and the health of the residents within the producing areas.
- In addition, AGROCALIDAD ensures the safety of bananas for consumption and export, along with the health of residents which live next to the banana crops. A control system has been established in the country which registers products used to control various crop pests, based on Decision 804 of the Andean Community, in the farming and toxicological fields, as well as analyzing and defining several aspects that may arise regarding the proper use and handling of those products .
- MAGAP encourages the production of organic bananas, especially at the level of

small producers, both to promote care for the environment and the health of farmers, and to help them create added value to enter strict markets.

- The banana producers are themselves keen to improve their quality standards and social and environmental responsibility, in order to achieve the international commitments made by the country in this area. In fact, the industry is looking for cooperation strategies to achieve standards that allow producers to obtain increasingly important certifications such as GlobalGAP and Rainforest Alliance.

Bananas are one of the most important dietary staples in the world, not only because of their delicious taste, but also because of their nutritional value. Bananas can help athletes improve their performance because they provide a quick energy stimulus, have high potassium content, and are a good source of vitamins C and B6. Moreover, bananas provide higher immunity enhancement and have anti-cancer qualities, and are also known to reduce the risk of heart disease and reduce blood pressure.

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ANNEX I

ISO 3959:1977 - GREEN BANANAS: RIPENING CONDITIONS AND GUIDE TO STORAGE AND TRANSPORT

Bananas continue to develop physiologically after they have been harvested, and their state of ripeness when they are placed in the ripening room will depend on their state when harvested and on different conditions to which they have subsequently been submitted.

The ripening of the bananas consists of a preliminary and a supplementary heating, followed by the actual ripening, in the course of which two phases may be distinguished:

- A first phase characterized mainly by an extensive release of heat, without change in the color of the skin but in connection with intense physiological activity;
- A second phase characterized mainly by a decrease in the release of heat, associated with a continuation of hydrolysis of the starch with the formation of reducing sugars and sucrose, by a rapid change in the color of the skin and by the development of the odor.

In order to establish a standardized process for ripening green bananas from cultivars which form the subject of international trade, with the highest criteria of quality and safety for human consumption, as well as care for the environment, ISO 3959 was developed by Technical Committee ISO/TC 34, Agricultural food products, and was approved by the member bodies of 19 countries in 1977.

ISO 3959 describes factors influencing the degree of ripeness when the fruits are placed in the ripening room, the heating of the fruits, the phases of ripening, the action of ethylene, the storage temperature after ripening, the degree of ripeness at the time of supply to the retailer, and causes of defective ripening.

Summing up, this International Standard lays down conditions to be observed in order to obtain satisfactory ripening of green bananas following possible storage and transport in accordance with ISO/R 931.

This ISO Standard establishes a ripening process that includes:

1. Reception of fruit and quality control: after arrival of the fruit a quality and condition inspection is made.
2. The banana bag is cut to facilitate the exchange of gases and to allow the ethylene and oxygen to reach the fruit.
3. The banana is placed in the ripening room and its temperature is equalized between 15 °C and 17 °C.
4. Ethylene is added for 24 hours, which initiates the ripening process. The chamber is kept closed (with ethylene at a concentration of 500-900 ppm) for 24 hours.
5. After 24 hours the chamber is opened again. The maturation process has already begun and from that moment the banana is maturing. The ripening speed depends mainly on the pulp temperature.
6. The banana leaves the maturation chamber with a color between 4 and maximum 5, generally after 5-7 days and is delivered to customers (Supermarkets, wholesalers etc).

For downloading, please go to: <https://www.iso.org/standard/9614.html>

ANNEX II

ISO 931:1980 GREEN BANANAS — GUIDE TO STORAGE AND TRANSPORT

Bananas should be stored, before transport from the exporting country to the place of consumption and throughout the period of transport, in the green condition and, therefore in the preclimacteric phase. A banana is said to be in this phase when the process of ripening has not yet been initiated. The degree state of fullness in which the bananas should be chosen for harvesting depends on the duration of transport, which varies considerably (from a few days to 3 weeks).

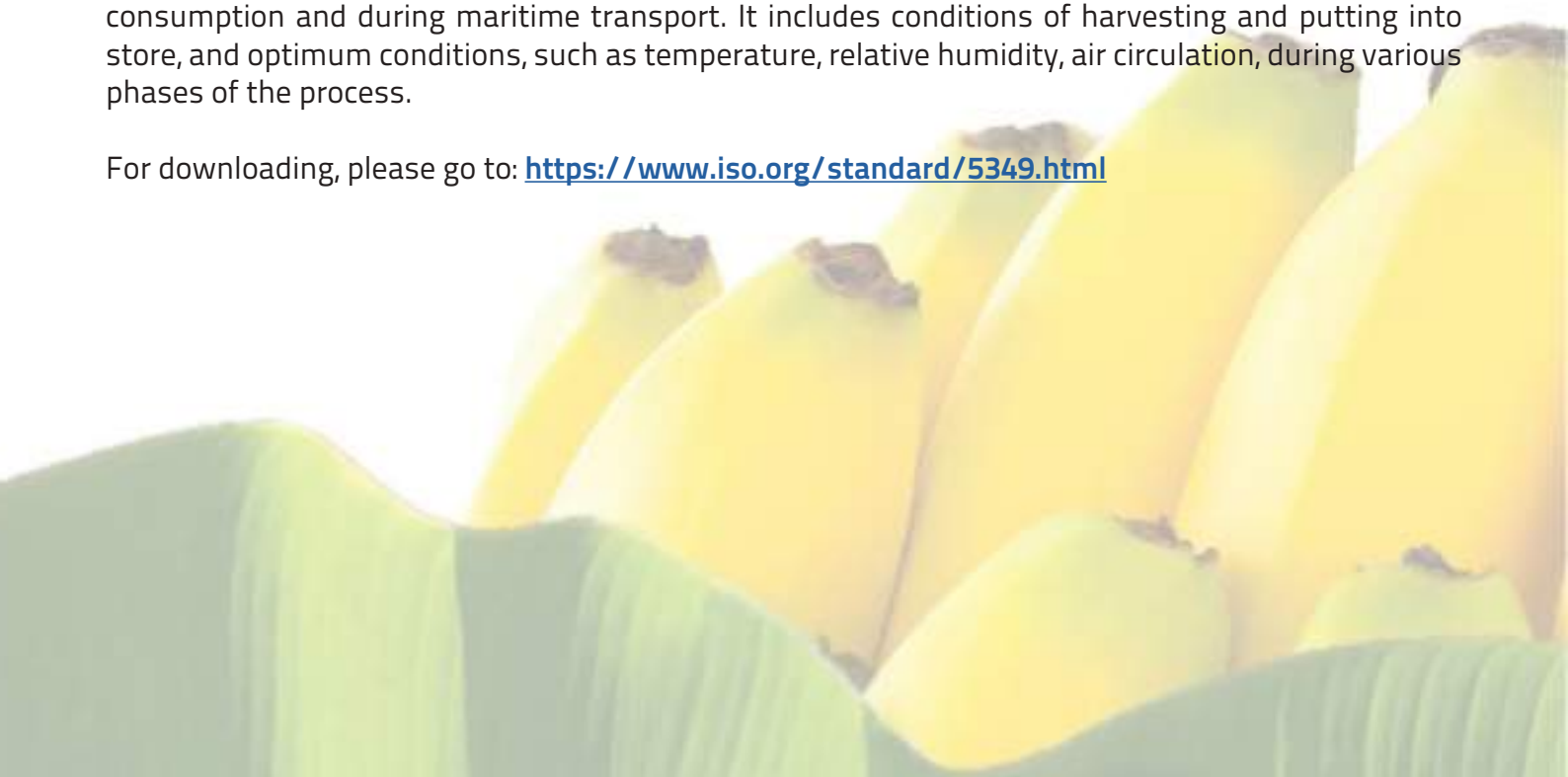
The producer should time the cutting of the bananas so that the degree of ripeness is compatible with the transport envisaged. The time of cutting therefore depends on two distinct factors: 1) the duration of refrigerated transport and 2) the physiological state of the banana. For this reason the recommendations for the degree of ripeness cannot be universally applicable and can be only of a general nature which serve as a pointer to the producer, who has to decide on his own criteria for cutting.

The state of the bananas (state of health, wounds, etc.), when they enter the store, has an influence on the storage life, and this is the justification for making recommendations on this subject. The same applies to the precautions to be taken between harvesting the bananas and putting them into the store. The high temperature of the producing areas and exposure to sunlight can appreciably reduce the storage life.

In order to establish a standardized process for storing and transporting the bananas with the highest criteria of quality and safety for human consumption, ISO 931 was developed by Technical Committee ISO/TC 34, Agricultural food products, and was approved by the member bodies of 22 countries in 1980.

In general, this guidance describes methods for obtaining the right conditions for the successful keeping, with or without artificial cooling, and transporting of green bananas (*Musa* sp. in the preclimacteric phase), during storage before transport from the place of production to the place of consumption and during maritime transport. It includes conditions of harvesting and putting into store, and optimum conditions, such as temperature, relative humidity, air circulation, during various phases of the process.

For downloading, please go to: <https://www.iso.org/standard/5349.html>



ANNEX III

SUMMARY DECISION 804 OF THE ANDEAN COMMUNITY: ANDEAN STANDARD FOR THE REGISTRATION AND CONTROL OF CHEMICAL PESTICIDES FOR AGRICULTURAL USE

Title I: Purpose and scope: Article 2)

The purpose of this Decision is to establish harmonized guidelines and procedures for the registration and control of chemical pesticides for agricultural use, to guide the correct management in the framework of good practices, to prevent and minimize risks to health and the environment, to ensure the biological effectiveness of the product, and to facilitate trade in the sub-region.

Title II: Competent National Authorities (CNA):

In the framework of Articles 4, 5 and 6 of Decision 804, it is stated that:

Competent National Authorities shall be: the Ministries of Agriculture of each country, or other bodies officially designated and uncharged of pesticide matters; the CNA and their respective national authorities, shall establish the interaction mechanisms that shall be necessary for fulfilling the registration and control requirements and procedures established in this Decision; all member states are empowered to adapt their regulatory framework and technical instruments to meet the objectives of this decision.

Title III: Registration or Authorization of the Activity: articles 7 to 9

All exporters, packers, marketers and distributors of Chemical Pesticides for Agricultural Use (CPAU), whether natural or juridical persons, must be registered with the CNA in order to carry out their activities; the information to be submitted shall be accompanied by the report issued by the CNA in order to minimize all types of risks to human and environmental health, besides the conditions interposed by the member states. In addition, a copy of the license granted by the competent authority must be issued, taking into account that such registration will have an indefinite validity and may be subject to possible evaluations by the CNA. The CNA will have the capacity to decide on its operationalization.

Title IV: Special Permits: Articles 10 and 11

The imports into member states of coded substances in development stages for research purposes in agricultural pesticides is prohibited. In case of experimentation, such substances shall be admitted only in small quantities and provided that the undertaking concerned is registered or authorized to formulate or manufacture (CPAU). The information and deadlines of delivery, validity and renewal required are detailed in article 11.

Title V: Registration of Pesticides for Agricultural Use: section I articles 11 to 16

All CPAU must be registered with the CNA. For such registration, the procedure detailed in Article 12 of this Decision and other requirements established in the Andean Technical Manual and the legislation established by each member country shall be observed. In the event that the requested registration is for the same product but with a different name, according to Article 14 of Decision 804, it will be limited to the requirements of the Andean Technical Manual.

The information used for the CPAU records, as established in article 15, should be sufficiently scientific and based on international protocols and standards; such standards will be verified by the member states according to the international organisms of reference, among others.

Section II: regarding the efficiency tests: articles 17 to 19

Efficiency tests shall be conducted according to the standard protocols contained in the Andean

Technical Manual and other protocols authorized by the CNA. According to article 18, for the CNA to approve the use of a CPAU, the applicant requesting the registration of a CPAU must accompany the application with a report of the efficiency tests that took place in order to demonstrate that the product complies with its intended use. Therefore, article 19 of this Decision authorizes member states to expand testing of the CPAU in small plots, provided that the conditions listed on literals A to D of this article are fulfilled.

Section III: of the Evaluation: articles 20 to 22

The technical information that will be considered in an application will be the technical active ingredient, formulation and additives. For said evaluation, each country will define the level of responsibility of its institutions/competent authorities, according to different aspects inherent to the registration. Besides, article 22 notes the importance of the technical opinions issued by competent authorities in order to complement their technical analysis.

Chapter II: of the Modification of the Registry: Articles 23 to 27

For a registration to be modified, the applicant must comply with the parameters and requirements established in article 23 of this Decision, by supplying the pertinent information in the format established on the Andean Technical Manual. Therefore, it is necessary to supply the proposed changes in the new draft label, as is called for in article 4. The applicant must also avoid changing the registration number, and ensure that any modification to the product takes place after the registration permission certificate has been issued, in accordance with articles 25 and 27 of Decision 804.

Otherwise, if the competent authorities demonstrate on technical grounds that the conditions that gave rise to certain registries have changed, the ANC or said authorities may affect existing registries, as provided for in article 26 of Decision 804 of the CAN.

Chapter III: of the Registry Termination:

Article 28 determines that: 'The ANC may suspend a registry, provided that it has the technical and scientific grounds on agricultural, environmental or health aspects, if the product is effective and harmful for the purposes that it was created for, if the ANC determines it to be so, in compliance with the conditions, requirements and administrative procedures set out in each legislation or by a court order'.

On the other hand, articles 29 and 31 establish the criteria for setting out the deadlines that the applicant must abide by, and the time by which it will inform users of a possible suspension.

Chapter IV: of the Registry Cancellation

A registry may be cancelled for the following reasons: lack of accuracy in the information, when a component of the PQUA has been banned and is stated in international agreements, and others that are set out in article 32 of this Decision. Once a cancellation takes place, the product may not be part of any commercial activity in that country.

Title VI: of the Importation for Personal Consumption

Member countries may use, on a discretionary basis, the mechanism of importation for personal consumption, but the product with a cancelled registry may not be part of any commercial activity, under the provisions of article 39.

Title VII: of the Labelling and Packaging:

Member states will require compliance with the labelling provisions, according to what is established in the Andean Technical Manual and in articles 41, 42 and 43 of this Decision.

Title VIII: Surveillance and control of chemical pesticides for agricultural use (CPAU)

National competent authorities, health-related institutions and further competent entities shall execute activities related to inspection, control and surveillance of chemical pesticides for agricultural

use at every stage, and shall establish mechanisms and programs to that end by following the provisions set forth in articles 44, 45, 46, 47, 48 and 49 of Decision 804.

Laboratory network

According to articles 50 and 51, it is recommended that the national competent authority is provided with at least one official laboratory; this laboratory shall provide support to CPAU registration and post-registration processes in the region.

Title XIX: Residues and maximum residues limits

To this end, articles 52 and 53 establish that competent authorities shall determine residue levels based on the FAO's levels and those that each competent entity deems necessary, which will be stated in the Andean Technical Manual

Title X: Phytosanitary Emergencies

Only in case of an emergency, as determined in article 54, will member states be allowed to import products that have no registration permit or are registered with specific aims, taking into account that its application will not be longer than the period in which this condition prevails.

Title XI: Cooperation

According to articles 55 and 56, the General Secretariat, the Andean Community and further authorities of member states shall fully cooperate in issues concerning technical assistance with the aim of adequately managing the functioning of CPAU along their life-cycle by proposing community measures and respecting the preferential framework stated in the Cartagena Agreement.

Title XII: Confidentiality of the Information

Member states shall ensure that the information presented as confidential by interested countries with the purpose of registration will be treated as established in the legal order of the Andean Community, except for the parameters determined in article 59, in the case that they might turn into health and environmental risks.

Title XIII: Rights and Obligations of the Holder

Article 63 states that the ownership of a registration is exclusively conferred to the natural person or legal entity registered as importer before the national competent authority. The ownership of a registration constitutes a transferable and transmissible right.

Article 64 determines that the right-holder shall mention the prohibition to which his registration is subject to in another country, on the grounds of health and environmental damages. The registration holder takes every responsibility inherent in the product, if it is used according to the recommendations stated in the label.

Title XIV: Andean System of Information Exchange

The aim of the Information System is stated in articles 65 and 66 of this Decision. Its main objective is to carry out the follow-up of sub-regional harmonization activities and to provide general information that contributes to the purposes of the Andean Community Decision 804.



ANEXO IV

SÍNTESIS DE LA RESOLUCIÓN DAJ-20133EC-0101.0096

AGROCALIDAD's Resolution DAJ-20133EC-0101.0096 establishes general norms to regulate surveillance and control of pollutants in agricultural products and creates a National Plan to execute such surveillance and control. This plan includes a guide with the sampling methods for monitoring pesticide residues in products of plant and animal origin. The aim of this plan is to control the maximum allowed levels of pollutants in agricultural products, in order to reduce risks of food contamination and to improve food quality in Ecuador. The scope of its compulsory application covers all border inspection points for shipments of products of plant and animal origin, farms, packing plants and in wholesale and retail trade points.

The maximum tolerance levels of pesticides, approved by Codex Alimentarius, are determined in Resolution DAJ-20133EC-0101.0096. They are also established in the European Union Regulation (CE) n396/2005 and the Code of Federal Regulations CFR40, Section 180.

The specific sampling procedure for primary production, packing plants and wholesale and retail trade points will be carried out according to the mechanisms established in Annexes 1 and 2.

The sampling of products for surveillance in the field will determine compliance with the maximum levels of contaminants and pesticides that are permitted. This will derive from the implementation and compliance with the Good Agricultural Practices in the farms.

The products suspected of being contaminated or that exceed the maximum permitted levels will be subject to a strict control and monitoring program. Therefore, all events that are identified as a risk to consumers' health will be notified to all the competent entities by AGROCALIDAD.

The responsibility to carry out the pesticide residue analysis of the counter sample at laboratories accredited by the Ecuadorian Accreditation Agency (OAE in Spanish), or other internationally accredited organisms, is on the importer.

In the case that a shipment of the importer exceeds the permitted maximum residue levels, the product will be rejected, and destroyed or incinerated. The importer will pay the expenses generated from said procedure.



ANNEX V

USE OF ETHYLENE FOR THE RIPENING OF FRUIT

In regards to the use of ethylene for fruit ripening, there are a number international rules and recommendations, such as:

- The document called 'Justification Regarding the Use of Ethylene for the Ripening of Fruit', CX/FL 11/39/7, of the CODEX Committee on Food Labelling, adopted in the 36th Session of the CODEX Alimentarius Commission, in July 13th, (REP13/FL, parr. 69, Appendix IV), which states that:

'Ethylene is a substance naturally produced by plants to regulate many physiological processes, including flower induction, the ripening process of fruits, and sprouting in onions and potatoes. It is consistent with the principles of organic production including environmental friendliness. In terms of ethylene production by fruits, there are two classes of fresh produce. These are climacteric fruits and non-climacteric fruits.

Climacteric fruits refer to fruits that have high a respiration rate during the fruit's ripening. During the ripening process of climacteric fruits, there is an abundant production of ethylene. Climacteric fruits are able to ripen after being picked. Examples of climacteric fruits are bananas, mango, papaya etc. Tropical climacteric fruits may be harvested at the physiologically mature but unripe stage. They are harvested at this early stage to enable the industry to better control their quality during the handling, transport and final marketing of these fruits.

Non-climacteric fruits are fruits that do not increase ethylene production when they ripen. The use of ethylene gas is therefore important as it helps regulate the ripening of tropical fruits mainly for marketing purposes. Using ethylene gas to ripen tropical fruits will result in uniform ripening at the desired period during the marketing chain.

When administered artificially, the rate and uniformity of the ripening process can be manipulated. Since ethylene is a natural product in the ripening process of fruits, it is consistent with the principles of organic production".

- According to the Guidelines for the Handling and Postharvest of Fresh Fruits (papaya, pineapple, banana and citrus) of the FAO, ethylene is a natural substance (hormone) produced by fruits. Even at small traces 1ppm (part per million), ethylene is physiologically active, and can significantly influence the ripening and aging processes of fruits, including its quality. This demonstrates the importance that ethylene has in the physiology of the post harvest.

Climacteric behaviors: In terms of ethylene production and respiration rate, there can be climacteric fruits and non-climacteric fruits:

- Climacteric fruits refer to fruits that have a high respiration rate during the fruit's ripening. During the ripening process of climacteric fruits, there is an abundant production of ethylene. In addition, the changes associated with this stage (such as color, taste, scent and texture) are fast, intense and diverse.
- The processes that take place in non-climacteric are continuous and progressive. This allows them to keep a slow respiration rate and a low production of ethylene.

- Climacteric fruits are able to ripen while in the plant or even after being harvested. On the contrary, non-climacteric fruits only ripen for consumption while in the plant.

Climacteric fruits	Non-climacteric fruits
Avocado (Persea americana)	Lemon (Citrus aurantifolia)
Custard Apple (Anona cherimolia)	Tangerine (Citrus reticulata)
Granadilla (Passiflora edulis)	Sweet Orange (Citrus sinensis)
Mango (Magnifera indica)	Watermelon (Citrullus vulgaris)
Melon (Cucumis melo)	Pineapple (Ananas comosus)
Papaya (Carica papaya)	Grapefruit (Citrus paradisi)
Banana (Musa spp.)	Grapefruit (Citrus grandis)
Passion fruit (Passiflora edulis)	Grape (Vitis vinifera)

Classification of fruits according to their respiration behaviour

In the majority of cases, the concentrations of ethylene required to organoleptically mature climacteric fruits are 0.1 to 1 ppm. The application of the treatment should be during the pre-climacteric phase. Late applications (climacteric or postclimatic phase) are unnecessary and therefore useless, because under such circumstances the tissues are saturated with naturally occurring ethylene produced by the fruit, which causes the plant to mature naturally.

The above mentioned Codex document states that many tropical fruits, such as bananas, are harvested at the physiological stage of maturity to enable exporters, wholesalers and retailers to better control their marketing process. If the fruit is harvested when it is ripe, it may be too soft to withstand packing and transportation. That is why bananas are harvested when they are still green and are packaged and transported at this stage of 'pre-maturity'. Therefore, the use of ethylene is very important in the management of the ripening process, ensuring uniform maturation and good quality for consumption.

Optimum conditions for ripening fruits such as banana, mango and papaya with exogenous ethylene include temperatures of 19-25°C, 90-95% RH and 10-100 ppm ethylene. The duration of the treatment varies between 24 and 72 hours, depending on the type of fruit and its state of maturity.

Commercially, ethylene is mainly used to induce the ripening of climacteric fruits such as banana and to develop the typical color of certain non-climacteric fruits such as citrus.

The gas used for ripening the fruit, called 'ripening gas', is composed of 5.5% ethylene and nitrogen. Both gases are naturally present in the atmosphere, with nitrogen up to 78%. The nitrogen used for ripening gas is obtained directly from air, while ethylene is extracted from natural gas or from other sources.

The manufacture and use of ethylene have not shown negative results nor do they generate harmful effects on the environment, so there is no restriction within international markets regarding the use of ethylene in the post-harvest of the fruits.

INTERNATIONAL AND NATIONAL REGULATIONS ON THE USE OF ETHANOL FOR FRUIT MATURATION

The use of ethanol is consistent with the principles of organic agriculture as outlined in the 'Guidelines for the Production, Processing, Labeling and Marketing of Organically Produced Foods (GL 32-1999), Annex 1, Principles of Organic Production, C. Handling, Storage, Transportation, Processing and Packaging', ethylene can be used to ripen kiwis and bananas.

Likewise, the use of ethylene is permitted in some reference standards such as the following:

- REGULATION (EC) No 889/2008 OF THE EUROPEAN COMMISSION of 5 September 2008 in Annex II 'Pesticides and phytosanitary products referred to in Article 5 (1)', point 6. Other substances traditionally used in organic farming:

Authorisation	Denomination	Description, composition requirements, and conditions of use
A	Ethylene	Degreening of bananas, kiwis y kakis; Degreening of citrus, only when it is part of a strategy to prevent the fly from damaging the citrus; induction of pineapple flowering; inhibition of sprouting of potatoes and onions.

The document "Justification Regarding the Use of Ethylene for the Ripening of Fruit" cited above, contains some international standards that allow certain uses of ethylene for some fruits:

- **Canadian Lists Permitted for Organic Production Systems CAN/CGSM-32.31 1-2006:** Allows the use of ethanol for post-harvest ripening of tropical fruits and to remove the green colour of citrus.
- **Indicative List of Substances for the Production and Organic Processing of IFOAM:** Allows the use of ethanol for the maturation of the fruit.
- **Australian National Standards for Organic and Biodynamic Products:** Allows the use of ethanol for banana maturation.
- **Japanese Agricultural Standard for Organic Production:** Allows the use of ethanol in the ripening of bananas and kiwis; and,
- **United States National Organic Program:** Allows the use of ethanol as a regulator of plant growth, to regulate the flowering of pineapples, for post-harvest ripening of tropical fruits and to remove the green colour of citrus.

Consequently, the use of ethylene is consistent with the principles of organic agriculture, which has stricter controls than conventional agriculture in relation to the accumulation of residues potentially harmful to human health and harmful to the environment.

Ecuador is also an important exporter of organic bananas, so it is pertinent to take into account the national legislation that regulates its production, also known as the Ecuadorian Organic Regulation:

- General Regulations to Promote and Regulate Organic-Ecological-Biological Production in Ecuador, Ministerial Agreement No. 299, R.O. No. 34, of July 11, 2013.
- Instructions of the General Regulations to Promote and Regulate Organic-Ecological-Biological Production in Ecuador, Resolution No. 99, of September 30, 2013.

In accordance with the above mentioned Instructions, in Chapter IV, Processing, Transportation, Storage, Marketing of Organic Products, Marketing of Organic Products, Article 93. Of the Exports of Organic Products, letter a), companies exporting organic products, processed or not, may export products with an organic, ecological or biological name only when, in addition to complying with the provisions of these Instructions and the corresponding legislation, they have a current certificate issued by a certification body accredited in the country and registered by the Competent National Authority.

From the previous paragraph it is clear that any activity carried out in the organic production system of Ecuador must be supervised (audited) by a third party control body, which observes its strict adherence to the norm.

In addition, in Annex II, 6. 'Other substances traditionally used in organic agriculture', the use of ethylene is permitted according to the following conditions:

Denomination	Description, composition requirements and conditions of use
Ethylene	Degreening of banana, kiwis y kakis; Degreening of citrus, only when it is part of a strategy to prevent the fly from damaging the citrus; induction of pineapple flowering; inhibition of sprouting of potatoes and onions

In this way, ethanol is also used to support the maturation process of organic bananas, which has successfully passed the equivalence assessment under the Common Objectives and Requirements of Organic Standards (COROS) and has been admitted to the Standards Family of IFOAM (International Federation of Organic Agriculture Movements); Ecuador being the third country in Latin America and the Caribbean to achieve recognition of this magnitude.





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