

*Full Length Research Paper*

## Certification rules for the fruit agri-business

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Orcharding is an activity with a high multiplier effect on income and it represents one of the main alternatives for the generation of employment in the development of agribusiness in Brazil. Certification aims to raise the standards of quality, adding value to the product and may contribute to competitiveness in the fruit industry as it is an important requirement for entry the international market. This paper conducts a systematic review of the scientific literature about the trade requirements and procedures required for the export of fruit, mapping the intellectual production developed over the last ten years. The universe of data collection comprised databases (SciELO, Scopus and Science Direct), Brazilian journals and conference proceedings in the area, following a standard literature search for systematic coherent keywords. The results show that the consumer is more aware about the whole supply chain and that the certification produces benefits not only related to the production process but also associated to environmental and social sustainability.

**Key words:** Certification, fruit and literature review.

### INTRODUCTION

Brazil is the third largest producer of fruit worldwide after China and India, however in terms of tropical fruits Brazil ranks first (Kist, 2012). Orchardng is an activity that has a considerable positive effect on the Brazilian economy, through employment generation, as well as being a driving force behind its agribusiness development. More specifically, the orcharding pole of Petrolina-Juazeiro located in northeastern Brazil serves as an example of the capacity for growth and development of the orcharding in general (Buainain and Batalha, 2007).

In recent years, consumer confidence in food safety regarding perishables, such as fruits, has been shaken a few times. In contrast, many countries that import products together with key actors in the supply chain use global strategies to repair people's confidence in the

safety of their food through the adoption of specific programs to ensure control, standardization and traceability throughout the food production chain. According to Spers (2003), food security, under the qualitative approach, is capable of ensuring that the consumers will purchase high-quality products guaranteeing their safety. This productive approach, that places a priority on a certification process that helps market quality and safety, has grown in importance, together with new manufacturing processes as well as new trends in consumer behavior.

Certification systems largely focus on the supply chain of fruit. There are implications in different parts of the chain, on both the supply and production demands, and in particular the certification focuses on activities from

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**Table 1.** Planning methodological.

<b>Steps of the systematic literature review</b>	<b>Strategy adopted</b>
1. Identify the databases to be queried and set keywords	The survey was conducted on the world wide web (internet) and included the databases (SciELO, Scopus and Science Direct), Brazilian magazines in the agricultural area and conference proceedings (lectures/publications), with a standard literature search using the keywords: "certification" "fruit production", "fruit exportation", "traceability", "quality certification".
2. Selection of publications	Studies published from 2001 to 2011 were considered that address the issue of Certification of food products
3. Data analysis	The information of the works were organized and tabulated so it was possible to develop comparisons and analyses
4. Synthesize the data	From the data analysis it was possible to prepare a systematic summary.
5. Conclusion	From the summary it was possible to understand the importance of certification in the supply chain of fruit

production planning to post-harvest. Nassar (2003) highlights the propagation of certification systems used as an instrument that provides standardization and procedures that enable quality control to ensure a set of attributes. In this case, the certification system serves as a tool to remove or classify companies and products. On the demand side, certification systems establish certain required features for a product, serving to unify standards and increase overall market efficiency.

It appears that private certifications are increasingly being used in all phases of the supply chain in order to exert control over the entire production process in order to limit the risk associated with various activities during production, from harvest through final transport, by various actors in the supply chain to ensure consistent, safe quality products (Jaffee and Masakure, 2005; Humphrey, 2008; Vagneron et al., 2009). In Tennent and Lockie's view (2012), these certifications play an increasing role in determining access to the market and can be considered as an opportunity for small farmers to update their productive systems in the scope of Good Agricultural Practices (Asfaw et al., 2010), mainly in fresh fruit and vegetable markets (Unnevehr, 2000; Garcia and Poole, 2004).

Henson and Humphrey (2010) emphasize that the current proliferation of private certification sets new challenges for farmers and operators in the food chain, especially those located in developing countries, such as Brazil.

The objective of this study is to carry out a systematic review of scientific literature about the commercial and procedural requirements of fruit exportation, understanding which agents are involved in a certification process in the orcharding sector and how its quality standards add value to the product while also intensifying competitiveness in the fruit industry.

## RESEARCH METHOD

The research method used was a systematic review of literature adapted from Kitchenham (2004) and Sampaio and Mancini (2007) (Table 1).

## RESULTS AND DISCUSSION

The results were grouped according to the subjects of the works analyzed.

### System of certification

According to Nassar (2003), certification is the defining of the attributes of a product, process or service and ensuring that they fit into pre-defined guidelines. On the supply side, certification is an instrument to provide standards and procedures that are intended to enable companies to manage their attributes and ensure access to the markets. From the perspective of the customer, certification is designed to inform and ensure the recommended attributes, related to quality and safety, for the product. Certification becomes important when (self-regulated) standardization becomes insufficient to meet the needs of those involved in the processes of production and commercialization.

According to Lazzarotto (2003) certification is stimulated in a market where there are consumers who recognize that a certified product is a product with attributes of a different quality and who are willing to pay a little more for these products. In markets where there are consumers willing to pay for that distinctive quality, certification should be available only through institutional determinations. Thus, understanding consumer behavior is important for the survival and competitiveness of com-

panies and certifiers certified. Following this reasoning, Lourenzani et al. (2006) believes that certification is just one important necessary step for the producer who can offer their products in domestic and international markets differentiated by the fact that the consumer recognizes a differential in the certificate to offset the higher purchasing price.

The certifications facilitate access to new markets, improved product quality, and add value to encourage forms of cooperation between producers and agribusinesses (Giovannucci and Ponte, 2005). Certification is a way to differentiate the product without the huge investment that the formation of a brand requires. At the same time, a certified product is, from the standpoint of industrial processing and modification, identical to similar non-certified like products. In other words, the certification adds value without changing the product (Nassar, 2003).

Jahn et al. (2004) point out that the differences among certification processes are in the concept of quality, in the presence or absence of protectionist elements and depth of coverage in relation to the productive chain. The authors believe that in practice the development of the certification system is still in its early stages. The functions performed by the certification process are of market character (adjustments made for the goods to meet market demands) and commercial (market information or market communications with the market) character (Gomes et al., 2006).

Certification has important consequences for the fruit industry in Brazil because it guarantees access to export markets. It guarantees the quality and traceability, allowing producers of fruits from Brazil to reach new markets, without, however, guaranteeing higher prices (Dorr, 2008).

However, Humphrey (2008) highlights the challenges to deploy and maintain these licenses/certifications include technical requirements (e.g., infrastructure and equipment for health/hygiene and safety, and using the right chemicals in the right amounts) to maintain records.

### **Models of fruit certification**

Certification involves the existence of standards, certification bodies and accreditation bodies. In order to operationalize the process, there should be a regulatory agency that sets the norms and a coordinator agent, responsible for the coordination and certification process (Lazzarotto, 2003). In private certifications, trust in the brand represents a contract between the company and the consumer, whose renewal depends on an accurate strategy for quality management that surpasses the limits of the company and expands to its suppliers and distributors (Scare and Matinelli, 2001).

Among the certification mechanisms involving public and private agencies for regulation and monitoring, the best known is Integrated Fruit Production – IFP, a

voluntary program. The system of integrated fruit production (IFP) emerged in Europe in the 70s, with a view to using self-sustainable production systems that provide protection and integrated management of plants, with the goal of quality production and environmental sustainability. The precursors of this system were Germany, Switzerland and Spain, where they replaced the traditional production techniques with this system, reducing production costs and environmental damage, and improving product quality (Andrigheto and Kososki, 2005). The IFP is defined by the International Organization for Biological and Integrated Control of Noxious Animals and Plants (IOBC) as: "System to produce high quality fruit based on the principles of environmental sustainability, food security and economic viability by using techniques not harmful to the environment and human health" (Andrigheto and Kososki, 2002).

The four pillars that support Integrated Fruit Production (IFP) are: Organization of the productive base, sustainability of the system, monitoring of processes and information. The purpose of this system is to produce high quality food, while depending on the use of techniques that take into account the environmental impacts on the soil, water and production (plant). During the evaluation of the quality of products, the system considers physical, chemical and biological characteristics of local natural resources in the processes involved in the production chain. The IFP and the implementation in the production process of so-called Good Agricultural Practices (GAP)<sup>1</sup> promote the standardization of production processes in order to ensure product quality to meet international requirements (Fonseca et al., 2010).

Integrated production activities in Brazil began in 1998/99 with a free membership program for producers and packers, under the overall coordination of the Ministry of Agriculture, Livestock and Food Supply - MAPA. Its regulation achieved a legal milestone in 2001 with the publication of its basic guidelines in the Official Gazette of the Government of Brazil. Among the goals achieved with this system of production, there is emphasis on production tracking, which gives the farmer a certification seal, and the exporter, a quality fruit (Andrigheto and Kososki, 2005). The IFP was renamed Integrated Production (IP) and is currently valid for all agribusiness chains, and it is responsible for providing the specific standards for each crop (Brazil, 2012). Integrated Production should still be applied holistically, because it is based on rules that take into account the features of each ecosystem and considers welfare as well as the conscious exploitation of natural resources. It is a system in which its basic unit is centered on the

<sup>1</sup> Good Agricultural Practices (GAP) refers to the practice and procedures established for the primary production to control hazards, productivity and quality. The practices and procedures are based on the application of technologies developed for the control of the possible dangers and potential for product quality and productivity in the field (Manual of Good Agricultural Practices and HACCP, 2004).

whole farm system and its application on individual parts of the operation that are not compatible with the holistic vision (Embrapa Meio Ambiente, 2012).

Among the private certification schemes, there are the initiatives of supermarket chains. An internationally recognized model, which like IFP is a voluntary program, is provided only to those who fall within pre-established norms. The EurepGAP / GlobalGAP frequently mentioned in the area of certification, was created by an association of European supermarkets. Launched in 1997 by the Euro-Retail Produce Working Group (EUREP), EurepGAP/GlobalGAP corresponds to a frame of reference of good agricultural practices, which aims to serve the interests of consumers, in terms of food safety, animal welfare, environmental protection and health, as well as safety and well-being of the worker (EUREPGAP, 2004). Consists of a set of normative documents, which include the General Regulations Integrated Farm Assurance, the document GLOBALGAP Control Points and Compliance Criteria and the GLOBALGAP Checklists (GlobalGAP, 2013). To obtain EurepGAP certification an audit is performed by auditors of unbiased companies. They are skilled enough to act professionally while checking whether the standards established by the Protocol are being met in every respect (Pessoa et al., 2002).

According to Cavicchioli et al. (2005), the EurepGAP is the most common seal found in Europe and it is accepted by about 30 retailers representing 34% of the European market. Gomes et al. (2006) point out that European countries were pioneers in the search for agricultural certification due to the internationally recognized tradition of valuing and seeking food production quality. The Europeans were the first to have products with certificates attesting to the quality of its products as superior to other similar and also attest to the origin. The European retail sector plays a key role in assembling and organizing marketing alliances that aim to ensure the quality of production processes and agricultural products (Carfantan and Brum, 2006). Thus, the network of retailers in Europe was the initial driving force for what was already becoming an issue for their customers. For this reason, the development of a certification standard with more general acceptance was also the interest of producers. EUREPGAP focused on Good Agricultural Practices - GAP, highlighting the importance of Integrated Production and of working conditions of agricultural laborers (Berger, 2009).

Due to the wide acceptance of the EurepGAP concept from producers worldwide, at the end of 2007 it was decided to change the brand to GLOBALGAP. GLOBALGAP is now a private organization that sets voluntary standards for the certification of agricultural products around the world, whose secretariat is based in Germany. Their goal is to establish standards of Good Agricultural Practice (GAP) that include different requirements for the several products, adaptable to agriculture

worldwide. GLOBALGAP has volunteer members who are divided into three groups: Producers, suppliers or retailers, and distributors (Berger, 2009). The Global GAP is a need to maintain access to export markets, investments, and these investments are likely to generate substantial profits. The same has been gaining global importance, becoming indispensable, especially for exporters who supply the European market (Henson et al., 2011). EurepGAP also establishes requirements to ensure the conservation and welfare of the people who are involved in food production, stimulated also by the use of Hazard Analysis and Critical Control Points - HACCP. The main points of control are: Storage and maintenance of records; traceability; seedlings and varieties; seed stocks; history and site management; soil and substrate management; use of fertilizers; irrigation; crop protection; harvesting; post-treatment harvesting, pollution and waste management; recycling and reuse; health, safety and welfare of workers, environmental issues; customer service and complaints (Cavicchioli et al., 2005).

The Control Points and Compliance Criteria (CPCC) assessed as critical of the level of service in the early stage of EurepGAP certification are: Fertilization, crop protection, waste management and pollution, recycling and reuse, health, safety and welfare workers and environmental issues (Paulino and Jacometi, 2006). In addition, the EurepGAP protocol consists of a set of basic requirements of good agricultural practices that correspond to global standards of food safety, environmental preservation, health and safety and animal welfare (Cafartan and Brum, 2006). EurepGAP certification can be given to a producer or a group of producers (belonging or not to an association or cooperative). A version of this protocol, published in March 2001, defines essential elements for the development of best practices for the global production of vegetable and fruit products. These guidelines define the minimum acceptable standard to guide groups of European producers (Pessoa et al., 2002).

Another seal, considered voluntary, that can be cited is Tesco Nature's Choice (TNC). This is a private process of certification of suppliers used exclusively by the British retailer Tesco. More stringent than the EurepGAP, the Code of Practice Tesco Nature's Choice was created by the technical staff of Tesco, with requirements aimed at product quality, the use of best management practices for products and processes, protection of the environment, as well as improving the welfare of rural workers and biodiversity. To get the seal, you must be a supplier of Tesco, and all those interested in supplying the network had to be certified by January 2006 (Cavicchioli et al., 2005). In TNC certification the products are marketed only in its own stores, making the seal highly restrictive.

In addition to voluntary certification, the main requirement for the United States to permit imports is the Department of Agriculture (USDA) pre-shipment seal of

the Animal and Plants Health Inspection Service (APHIS) which is a certificate that includes health and phytosanitary and animal health regulations, presenting specifications for each fruit and vegetable (Assis, 2009).

The APHIS seal uses several methods to protect their producers and consumers against the introduction of diseases, plant and animals pests that might limit or jeopardize food production. It is based on a strategy to safeguard human animal and plants health, making a secure ecosystem, providing safe agricultural trade, and reducing loss of natural resources (APHIS, 2011). For the issue of USDA-APHIS, there must be monitoring by a representative of the USDA itself, funded by producers, which significantly burdens the export process.

According to Trienekens and Zuurbier (2008), voluntary certifications have become almost a mandatory requirement for access to markets, especially those in developed countries. Companies that focus on the international market are faced with the need to certify their product and process for different voluntary standards. Companies need to demonstrate greater control in the production, trade and distribution of food to ensure quality and traceability of their product and remain competitive in the market. Thus, standards can act as reducing trade barriers by reducing the information asymmetry between buyers and producers, providing greater confidence between the parties to the transaction.

Some studies have shown the impact of certifications for exports of products in some countries. A study of fruit growers in Thailand showed that the costs of implementation are still major barriers to farmers adopting the GlobalGAP. However, the main determinants for farmers to acquire and maintain the standards are: Establishment size, capital, access to information and external assistance (Kersting and Wollni, 2012). Maertens et al. (2012) conducted a study on the inclusion / exclusion of smallholders in export horticulture chains of high standards in Africa. They concluded that there are still differences, because in some countries the rules led to increased exclusion of small farmers, while other exports of high standards are largely made by small farmers. A common strategy used to increase the participation of small farmers in the export of high value chain is to promote the certification of private standards through development with the goal of helping small farmers to acquire a certificate (Asfaw et al., 2010). In the center-south of Chile's GlobalGAP certifications and Tesco are the most used by producers of fresh fruit exporting to world markets (Barrena et al., 2013). The GlobalGAP certification of small farmers contributes to improved quality, increased sales volumes and higher for the production of fruit or vegetables, respectively, Chile, Kenya and Madagascar (net income Handschuch et al., 2013; Asfaw et al., 2009; Subervie and Vagneron, 2013).

Dorr (2009) presents a comparative analysis of certification systems that exist in the fruit industry in Brazil and the results showed that EurepGAP /

GlobalGAP and Integrated Fruit Production (IFP) are similar certification systems. However, they differ with respect to the number of requirements and their distribution over various stages (e.g. production, post-harvest). In both systems, much attention is given to labor and environmental conditions, as well as ensuring a minimum price for farmers. Most of the requirements of EurepGAP / GlobalGAP are included in the IFP, but there are differences with regard to their level of importance and distribution over several stages. Moreover, it was found that farmers with certification EurepGAP/ GlobalGAP use accounting provided by the IFP, although EurepGAP / GlobalGAP itself does not require any accountability. This means that the certification process with EurepGAP / GlobalGAP is easier and faster when the farmer has already implemented the IFP. Andrigueto and Kososki (2005) argue that the IFP is placed at the apex of the pyramid as the most evolved strategic level in organization, technology, management and other components. These aspects are embedded in a context where the levels for innovation and competitiveness are stratified by levels of development.

Table 2 shows a summary of the main characteristics of the certification models found in the literature. Considering the pyramid of the organization, technology, management and production quality, proposed by Andrigueto and Kososki (2005), Good Agriculture Practices - GAP represent all models of certification for the first step towards certification and standardization, quality and preservation of environmental resources in the productive system.

### **Role of certification in the fruit production chain**

The requirement of certification in relation to the inputs of a supply chain can lead to further integration of their links, improving coordination, information flow and adaptation to the demands. This process aims at a more efficient management and operates in the improvement of coordination mechanisms, both upstream and downstream in the supply chain. In this sense, quality programs in the chain of food production have been adopted, reflecting the international requirements, resulting in the adoption of certification seals proving the quality, health and safety of imported products, as happens today with mainly fruit for to the markets of the United States and European Union (Assis, 2009). According to Lazzarotto (2003), the benefits generated by the adherence to the certification are reflected throughout the production chain as there is a reduction in informational asymmetry so all parties obtain unbiased information about product quality. These standards certifications, led by retailers, offering a new form of governance in the value chain in the global food system, but in doing so they reinforce the oligopolistic structure of the food system, where power is concentrated in a few actors

**Table 2.** Comparative analysis of the main models for the certification of fruit.

Model	Features	Coordinating agent	Applications
IFP	Voluntary accession. It is premised on the Good Agriculture Practices - GAP. It has 115 requirements divided into mandatory, recommended, prohibited and permitted with restrictions. Certificate valid for 12 months, but monitoring occurs three times a year	Public agencies	Specific Standards for culture.
EurepGAP/ GLOBALGAP	Voluntary accession. It has 214 requirements, obligations classified as major, minor obligations and recommendations. Certificate valid for 12 months, but monitoring occurs twice a year. It is based on Good Agriculture Practices - GAP. A necessary requirement to export fruit to the European continent	Network of retailers in Europe	Applies to all cultures of fruits.
TNC	Voluntary accession. Premised on Good Agriculture Practices – GAP. It includes the requirements of EurepGAP, but there is a greater emphasis regarding food safety and the environment. Restricted to registered suppliers of Tesco	Network British retailer (Tesco)	Applies to all cultures of fruits.
APHIS	Mandatory requirement from the United States to permit imports of the United States Department of Agriculture (USDA) regulations includes sanitary, phytosanitary and animal health, with every fruit and vegetable for some specific standards and is premised on Good Agriculture Practices - GAP	Public agencies	Applies to all cultures of fruits.

who define the rules of the game. Moreover, the governance structure is from the top down, where producers have little decision-making power in the process, creates dependencies between producers and retailers (Tennent and Lockie, 2012).

Some authors emphasize the role that the retail sector plays in the food chain in relation to obtaining certification seals. Trienekens and Zuurbier (2008) pointed out that large retail companies have the power to put pressure on their suppliers to comply with all the public and private norms. By taking on the coordination of food supply chains, European Union retailers pursue a goal of standardization and differentiation. It makes unique products available to the consumer that combine market differential with food security and even deal with social issues. Control devices, used by the various segments of the production chain, become validated by certification systems and interdependent entities, sometimes by groups of consumers that drive retailers to look for a different quality from its suppliers (Cafartan and Brum, 2006).

The ability to add value to a product through the legitimacy of some aspects and definitions of quality leads to the need for certification. Thus it is important to know the institutions that organize and control both the quality criteria and the certification mechanisms. The importance of the certification also appears strongly in the food chain. Food quality is not only related to physical properties but also to social aspects involved in the production system, which may add economic value to the product. In this context, the enhancement of quality in the market is provided by the process of certification (Renard, 2005).

Santos et al. (2005) identified the roles and the impact of private certification adopted by large supermarket

chains in Brazil and the coordination chain management of fruits. They concluded that the management of the supply chain is mainly with regard to technical assistance, monitoring and quality control. However, the certification of fruit by supermarket chains seems to be influencing some of the coordination chains of fruit in Brazil. However, the connection between them and the producer is still weak and for the most part they are characterized by partnerships without a long established formal contract.

Souza and Amato Neto (2009) pointed out the relationships between producers and intermediaries in the chain. They observed that the intermediaries are concerned with the requirements of their main customer, the retailer. Information is transferred in respect of certificates and what changes should be made to suit them. For this reason, many intermediaries put some of their staff inside the packing house at times of harvest in order to verify that quality standards are met. In addition, information is transferred about the varieties in demand and problems regarding the quality standards of the fruit until it reach its destination. Some intermediaries highlight the difficulty in educating the producers about the importance of adherence to the certificates. They contend that the certificates do not necessarily represent increased sales or better prices; therefore it is difficult to convince producers of their importance.

The occurrence of postharvest diseases is one of the most disturbing factors in the production chain of fruit, accounting for a large part of the volume losses of the fruit products during storage and marketing (Kluge et al., 2002). All protocols require that certifications be made in pest control during the post-harvest and storage, however, did not specify techniques for specific controls of fungi and pests during post harvest storage and

transportation. Initiatives used to improve quality in post-harvest treatments are in control of fungi, pests and rot. We will highlight this work, prevention and control in mango and grape fruits exported throughout the San Francisco Valley, these measures are not specifically required by any of the certificates, however, may contribute to the fulfillment of the requirement for the control pests and fungi during post-harvest. In the case of the sleeve, there is a treatment to control fungi, suitable for the sleeve destined for Europe and Canada. It is used to avoid problems with rot. The treatment is done by keeping the fruit immersed in water at 52°C for 5 min. The control of temperature and immersion time must be extremely rigorous because if these variables are outside the control range there may be irreversible damage to the product. In addition, there is the hydrothermal treatment (hot water dip), this treatment applied to the sleeve for the United States, Japan and Chile, consists of immersing the fruit in a "hot" water (46.1°C) solution for 75 to 90 min depending on the weight of the sleeve. Immediately after the end of this time, the sleeve is immersed in "cold" water at 21°C. So it is taken to the "clean zone", an area free of insects, especially the fruit fly (EMBRAPA, 2004). In the case of the grape, the main problems are in the post-harvest dehydration, desgrane and rot that can be mitigated by proper and careful handling of the fruit (Kluge et al., 2002). The rapid cooling of the temperature of the grape is one of the recommended techniques to reduce problems during storage and transportation of this product. In the São Francisco Valley this treatment is performed by controlled cooling air flow. The process must be performed under ideal temperature and humidity for the preservation of grape and requires 8 to 14 h to complete. For seedless cultivars, the cooling temperature and storage should be 0°C, while the cultivars seeds can be cooled and stored at 2°C. In both cases, the recommended relative humidity values range between 85 and 95%. Lower values predispose the grape to water loss while values above 95% favor the development of microorganisms (EMBRAPA, 2010). Another way to prevent fungus and rot is through packaging, blister packs of generators of SO<sub>2</sub>, consisting of sodium metabisulfite or potassium can be placed on the packaging of grapes, the goal is to minimize the development of some post-harvest rots. The proportion of sodium metabisulfite or potassium used in the boxes is 1.5 g per 1 kg of grapes ((EMBRAPA, 2010). Studies prove that grapes subjected to the action of SO<sub>2</sub> generator showed smaller loss of weight, the lowest rate of detached and damaged berries, and better quality of stem (Castro et al., 2003; Lichter et al., 2008; Neves et al., 2008; Zutahy et al., 2008). Speaking with three large producers of the São Francisco, they demonstrated the use of these techniques, in addition to monitoring temperature and relative humidity inside the refrigerated containers throughout the transport time. Producers confirmed that certification protocols help in pest control,

however, certificates could standardize these procedures to standardize preventive actions to fungi, pests and diseases during the post-harvest, particularly for long distance travel.

Modern orcharding should be able to produce healthy and quality products in accordance with the requirements of environmental sustainability, food security and economic viability, using technologies which are not harmful to the environment and human health. In this context, the conformity of the fruit is a market requirement. The market demands commercial characteristics of quality and safety through legislation, ensuring the control and traceability for the process of the supply chain of fruit. In addition, there is a unique opportunity for social gain arising from the adoption of systems that create "cleaner" production, which ensure a higher quality of life for each link in the chain of production, and this is currently a latent concern of consumers. The adjustment to the requirements of certification requires understanding of the role to be played by all segments and links that operate in the production chain, and their interrelationships, for traceability procedures and the production of a safe and quality fruit (Chaves et al., 2010).

One can expect that the differentiation of markets and therefore the differentiation of quality standards, certification systems and labels encourage companies and brands to build supply chains that are based on quality assurance. In other words, quality assurance can provide benefits for businesses to add value to their products throughout the supply chain.

## Conclusion

Some issues stand out in the analysis which helps to understand the role of certification in fruit growing. The first considers the growing interest of consumers to guarantee traceability and healthy products without waste from production systems that are environmentally and socially correct. The consumer, who was once regarded a passive agent in the production chain now becomes active, exposing their expectations and desires to the whole chain. Faced with a global market, increasingly dynamic demands coupled with an increasingly aware global population, certification protocols such as EUREPGAP / GLOBALGAP, IFP and TNC, are indicators with visual identity, recognized internationally, which ensure the production within the demands of Good Agricultural Practices (GAP) required by consumers. The second refers to certification as a factor which can increase competitiveness of companies giving product differentiation by adding value and therefore increasing international trade. The competitive environment for most companies is responsible for the rapid and dynamic changes that occur in it, requiring constant strategies and operations to enhance their competitiveness in the

market. The third issue assesses the importance of certification for the production chain of fruit. It has intensified due to increased requirements of the leading importers of fruits in the world as it pertains to food safety, from the plantation to the end consumer. The major retailers are becoming the coordinators of this chain, absorbing consumer and customer demands for food safety. Moreover, the retailers are driving the suppliers to comply with the requirements regarding Good Agricultural Practices (GAP), environmental sustainability and social systems of production in which they participate. Thus, the certification results in benefits not only related to the production process but also associated to the social aspects.

Despite the managerial implications for certification organizations in the fruit industry to produce products that meet the requirements for certification protocols, investments are needed in strategic planning. Other aspects comprise identification, monitoring and control of critical success factors for service to CPCC (control Points and Compliance Criteria), and technological development, with improved production techniques and specialized training of manual labor. Another issue comprises the adoption of performance measurement practices to assist the process of continuous improvement. These practices can detect what is happening with the performance of businesses and the actions that should be taken. Thus, the measurement of performance can become a vital aspect for the efficiency of the companies that make up the supply chain of fruit.

### Conflict of Interest

The authors have not declared any conflict of interests.

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