

Production system of organic orange and its implications: Study in the SOS site Agroecological, Northeast of Pará.

Marcelo Augusto Machado Vasconcelos¹, Cassiano Moraes Guerreiro²,
Marcelo Araújo de Oliveira³, Amanda Pinheiro Fortaleza⁴, José Jaime Pessoa
do Nascimento Filho⁵, Thiago da Silva Dias⁶

¹ geoprocessing technology school, Universidade Federal do Pará, Brazil
E-mail:vasconcelos@ufpa.br

² geoprocessing technology school, Universidade Federal do Pará, Brazil
E-mail:cassianoguerreiro7@gmail.com

³Secretária de Estado do Meio Ambiente e Sustentabilidade, SEMAS-PA, Brazil
E-mail:marcelo.c.de@hotmail.com

⁴Secretaria Municipal do Meio Ambiente do Município de Capanema-PA, Brazil
E-mail: Amanda.fortaleza1@hotmail.com

⁵Secretaria Municipal do Meio Ambiente do Município de Capanema-PA, Brazil
E-mail:jaime-linux@hotmail.com

⁶ Secretaria Municipal do Meio Ambiente do Município de Toledo-PR, Brazil
E-mail:thiagodiasflorestal@gmail.com

Abstract— *The organic production of produce in Brazil has been increasing very year due higher demand for more health food, and many farmers are migrating to these concept of food production. Therefore, the aim of this study is to understand the philosophic concept, as well as doing a description and analyzing the implications of the production system of organic orange. The research was done at Sítio SOS Agroecológico, localized in the city of Capitão Poço, northeast of Pará. The qualitative exploratory research was done with the owner of the area, who is also a producer of organic orange, through, mainly, visits, semi structured surveys, transect walks in the area, and photographic records. The production of the site is considered adequate; their main market are organic fairs and big supermarkets; however, price and logistic are the main obstacles, besides the certification, where in Brazil is still an onerous process. The production system of Sítio SOS shows certain similarities with the concept of biologic and natural agriculture since both systems goals are the reduction of the rural producer costs, the use of alternative products and/or natural available on the property.*

Keywords— *Agroecology, Certification, Agroforestry Systems.*

I. INTRODUCTION

During the last decades, agriculture has been changing its characteristics from the development of new technologies, agricultural machinery and chemical industry, that although it drives the production of foods, also produces side effects. From the concern with such side effects, farmers have developed agricultural methods and processes that they say are safe and sustainable. It is a production based on the dynamic interaction between soil, plants, animals, people, ecosystem and environment (IFOAM, 1998).

The growing concern with the environment has made the consumer become more and more demanding regarding the attributes of quality and safety of the products and the preservation of the environment. The irrefutable search for constant increases in agricultural productivity through the use of agrochemicals and heavy mineral fertilizers has caused food and environmental pollution at undesirable levels (Assis et al., 1995).

In this context, the organic process of production has been acting as a form of ecologically adequate agricultural exploitation in the face of environmental problems, opening space for the development of organic agriculture, which presents itself as a resumption of the use of old agricultural practices, but adapting them to the most modern technologies of agricultural production aiming at

the increase of productivity and causing the minimum of interference in the ecosystems, besides being one of the alternatives to make feasible the small property (ORMOND et al., 2002).

According to Law No. 10,831, dated December 23, 2003 (BRAZIL, 2015), it is considered:

The organic system of agriculture and livestock production, all those in which specific techniques are adopted, optimizing the use of available natural and socio-economic resources and respecting the cultural integrity of rural communities, aiming at economic and ecological sustainability, maximizing social benefits, the minimization of non-renewable energy dependence, using, as far as possible, cultural, biological and mechanical methods, as opposed to the use of synthetic materials, the elimination of the use of genetically modified organisms and ionizing radiation at any stage of the production process, processing, storage, distribution and marketing, and the protection of the environment.

In order to become an organic farmer, the applicant must undergo a rigorous process of research into the environmental conditions of the farm and potential for production. Certifiers must have their own guidelines and must exercise appropriate control over the use of their licenses, certificates and certification marks (BRAZIL, 2015b). In Brazil, "Quality Seals" (certification seal) are used together with the specific brand of each producer to indicate the agreement with the guidelines, which are certified by accredited certifiers to the National Association for Organic Production (CNPORG) (IBD, 2002).

The culture and commercialization of organic products in Brazil were approved by Law 10.831, of December 23, 2003. Its regulations, however, only occurred on December 27, 2007 with the publication of Decree No. 6,323 (MAPA, 2015). The demand for organic products in Brazil and around the world has increased in the last years, even though in 2006, only 1.75% of the establishments were organic producers (NUNES, 2006).

In the last ten years, citrus production in the state of Pará has reached high growth rates, mainly in the Guamá micro region, where the main producing municipalities like CapitãoPoço, Garrafão do Norte, Irituia and Ourém are concentrated, constituting the "productions center of citrus" State. With the advances of the citriculture in this period, Pará started to take a prominent position, being among the six largest producers of orange in Brazil. The area cultivated with citrus in the State of Pará has grown rapidly, reaching around 14,600 hectare in 2000, with an average yield of 15.6 tons / fruits / hectare (LEMOS et al., 2004).

In the Guamá micro-region, the SOS Agroecological Site has gained prominence. It is located in the municipality of CapitãoPoço, in the Northeast of the State of Pará, with the main activity of growing the fruit (*Citrus sinensis*) "organic". This activity started in 1997, but the marketing as an organic product was only from 2007, with organic certification by Biodynamic Institute Certifications (IBD). In this way, the objective of the present work is to understand the philosophical conception, as well as to describe and analyze the implications of organic orange production system in order to bring information to the institutions of education, research, extension to guide debates and actions on organic production and environmental conservation in the Northeast region and other regions of the State of Pará.

II. METHODOLOGY

The studied area has 75 hectares being called SOS Agroecological Site, with geographic position S 01 ° 47'57 " W 47 ° 06'40,8 ", located in the municipality of CapitãoPoço (Figure 1). The municipality is located in the physiographic zone of Guamá, territory of the Northeast of Para and microregion of Guama, with an area of 2,714.85 km. It is limited to the north with Ourém, to the east with Santa Luzia do Pará and Garrafão do Norte, to the south with Ipixuna do Pará and Nova Esperança do Piriá and to the west with Aurora do Pará, Mae do Rio and Irituia (NUNES, 2006).

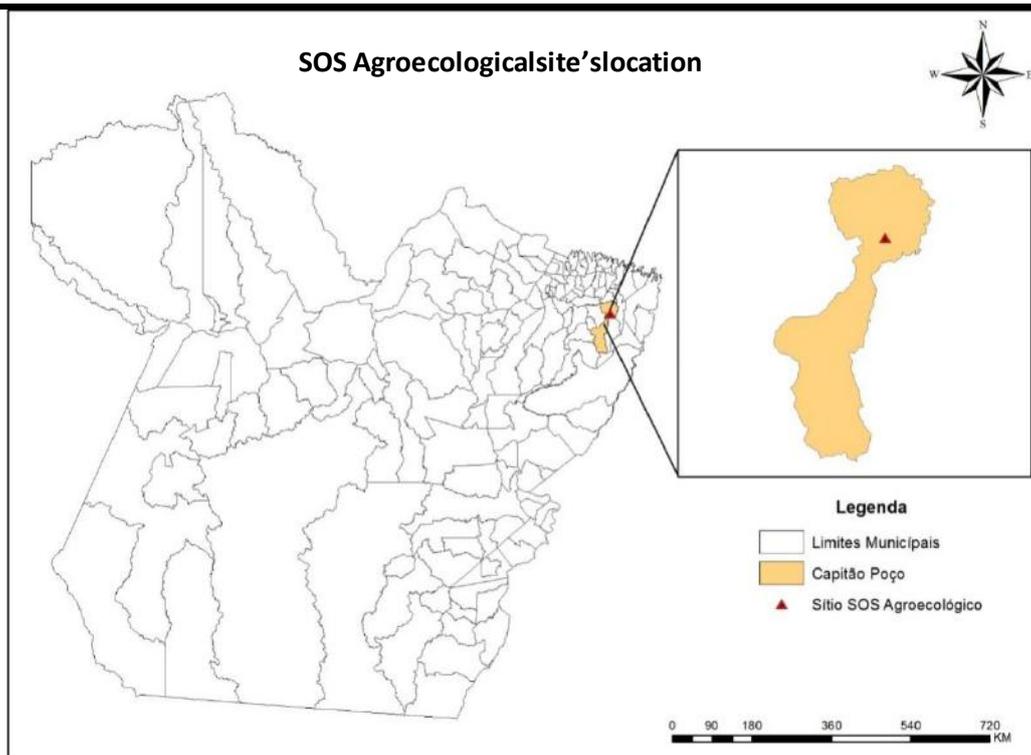


Fig. 1: Location map of the study area.

For the development of this study, a qualitative exploratory research was carried out with the owner of the area and producer of organic orange, mainly through visits, semi - structured interviews, cross - country walks in the area and photographic records.

Qualitative research makes it possible to capture the opinions and perspectives of individuals, information more difficult to obtain by quantitative research. The great advantage of this type of research for the study of organizations is the richness of the details obtained. Qualitative data expresses detailed descriptions of situations, subject events, experiences, attitudes, beliefs and thoughts (CASSAB, 2007).

The research in general, is a formal procedure, based on the method of reflective thinking, requiring a scientific treatment, where it is the way to know reality or to discover truths. The collected data, obtained in this type of research, are collected in situations where those interviewed in the research transit and build their life, where lifestyles, cultures and experiences hatch (CASSAB, 2007).

The variables observed and studied for the present work were: seedling production, main difficulties found for organic production, incident pests, management used and market logistics.

III. RESULTS AND DISCUSSION

According to the interviews carried out with the owner of the SOS Agroecological Site, the seedlings are acquired

by the conventional system, using the grafting method, whose purpose is to select the species with the highest productive potential and to reduce the risk of pest and diseases.

The rootstocks act in several horticultural and pathological characteristics of the citrus, emphasizing: the absorption, synthesis and utilization of nutrients; transpiration and chemical composition of leaves; response to leaf and fruit abscission products; size, precocity of production and plant longevity; maturation, weight and permanence of fruits in the plant; peel and juice coloring; content of sugars, acids and other components of juice; tolerance to pest insects; post-harvest conservation; productivity and fruit quality (SOUZA et al., 2010).

The arrangement between the graft and the rootstock plays an important role in the productivity and quality of the citrus fruit. Thus, the productive system used, the climatic conditions of the region, the existing and potential pests and diseases of the market to which the fruits are destined are important points to be considered (OLIVEIRA et al., 2010).

For the management of the planting, the fertilization is done through the area enrichment method, where the crushing of the "fertilizer" plants like Ingá (*Inga edulis* Mart) and Black Mucuna (*Mucuna atterima*), *Pueraria* (*Pueraria phaseoloides* (Roxb.) Benth) and phosphorus mobilizing plants occurs: *Titonia* (*Tithonia diversifolia*) and *Embaúba* (*Cecropia pachystachya*), in addition to

fertilization with sheep manure (Ovisaries) in the case of orange trees (1 to 2 paddles per plant). As the production system is organic, no chemical fertilizers or agricultural pesticides are used.

A study by Gallo and Rodriguez (1960) pointed out the importance of legumes and mulch in increasing orange tree productivity. Thus, it can be seen that without the use of chemicals, many benefits can be obtained in the production of orange, both in conventional and organic production.

Initially pest control was performed with alternative pesticides in the study area of the present study. But at the moment, the production system of the SOS Agroecological Site is in a environmental equilibrium. The effects of different dead coverings from the mechanical management with lateral trimmer that performs the deposit of phytomass in the orchard line concludes that the mulch with natural vegetation presented a suppressive effect on the weeds.

In the SOS Agroecological Site, inter-cropping is carried out in the oranges lines, such as Soursop (*Annona muricata L.*), Cashew (*Anacardium occidentale L.*), Noni

(*Morindacitrifolia L.*), Bacabi (*Oenocarpus bacaba Mart.*), Pineapple (*Ananas comosus L. Merrill.*), Brazilian mahogany (*Swietenia macrophylla King*), African mahogany (*Khayasenegalensis (Desv.) A. Juss.*), Chestnut of Pará (*Bertholletia excelsa Bonpl.*), Cedar (*Cedrela odorata L.*), Andiroba (*Carapaguianensis Aubl.*), Among others, Agroforestry (SAFs) with organic management, where the agroecological principles were incorporated in order to contribute to the biodiversity conservation and environmental balance of the area. The SAFs implemented in the production area of Orange tree contribute to the fertilization of the crop, increasing the productivity through the cycling of nutrients.

The main occurrences of pests and diseases that attack the planting are the ants (*Acromyrmex sp.*) and the fruit fly (*Ceratitisanastrepha*). The fruit fly is considered the main pest (Figure 2A), because it is responsible for transmitting leprosy, called Citrus leprosis virus (CiLV), a disease that influences the visual quality of the fruit (Figure 2B). For the control of disease proliferation, drastic pruning is performed.

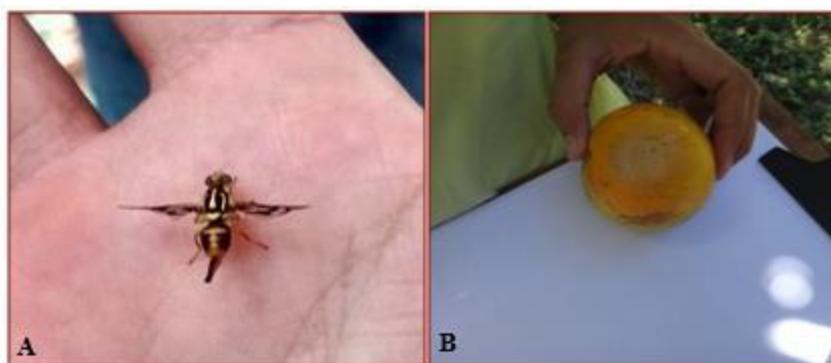


Fig. 2: A- Fruit fly (*Ceratitisanastrepha*); B- Leprosis.

In organic production, priority should be given to the use of resistant varieties to control the main fruit diseases (BORGES; SOUZA, 2005). The consequence of a mixed or consortium planting reduces the incidence of fertilization and the attack of pests and diseases, because the system is in equilibrium, so the resistance of the crop is greater.

According to the characteristics of the practices and management of the productive system of the SOS Agroecological Site it is clear that the same follows to the conception of two styles: *organic farming and natural agriculture*. The first is biological control and integrated pest and disease management. This agriculture reinforces the use of organic fertilization and other biological techniques. On the other hand, it recommends the least possible change in the natural functioning of ecosystems and uses microorganisms beneficial to plant and animal

production, known by the acronym EM (effective microorganisms).

The fundamental principle of organic farming is the fact that agriculture is based on the biological sciences, being defined as a system that tries to maintain the environmental balance. Maintenance of soil fertility and pest and disease control is done by the use of natural processes and cycles, with only a moderate expenditure of energy and resources, maintaining good productivity (HODGES, 1981).

As regards natural agriculture, it is defined as a system of agricultural exploitation based on the use of practices that seek to take full advantage of nature, as far as ecology and local natural resources are concerned. In other words, cultivation practices of natural agriculture are based on the natural method of soil formation, relying on the force of nature and with all the scientific technical knowledge acquired throughout human evolution (Assis, 2005).

Some of these unconventional forms have characteristics strictly related to agriculture, while others still add aspects related to education, religion and nutrition. However, among the characteristics of the various alternative styles, agricultural production strategies based on ecological concepts for the recycling of nutrients and optimized organic matter, balanced populations of pests and increasing multiple use of land are the common point among them (COSTABEBER, 2007).

Still on the two styles of organic agriculture and natural agriculture, it was verified that the cost of production is considered low, in relation to the conventional, since there is no use of herbicides, fungicides among other products that increase the value of the production. According to Neves et al. (2004), the cost of pesticides in citrus fruits reaches 45% of the cost of production.

In the table below are some of the characteristics faced by the producer of the Site to which it was made (Table 1).

Table.1: Aspects evaluated with organic orange producer.

ASSESSED ASPECTS	SOS AGROECOLOGICAL SITE
Certification period	1 year.
Forest species	Native and African mahogany, Chestnut of Pará, Cedro and Andiroba.
Difficulties in the production of organic orange	Specialized labor, neighbors surrounding the property use the conventional system (chemical fertilization).
Production cost: Organic x Conventional	Smaller for organic.
Productivity	Low
Main markets for marketing	Regional Market: Local Market and Metropolitan Region; national market: São Paulo.
Marketing price	30% more than the conventional one.

It is worth mentioning that organic agriculture has as principles the use of compounds, plants of deep roots and mycorrhizal performance in the health of the crops. Lately, there is great economic interest in this agriculture that has increasingly been seen as a profitable business (FEIDEN, 2005). According to the guidelines of the Biodynamic Certification Institute (IBD), areas or units that produce, process or export organic products must be clearly separated from others that handle conventional products.

However, when talking about biodynamic agriculture, it has more integrated approach to rural property, seeking to

see it and manage it as a living organism. From a practical point of view, what most distinguishes biodynamic agriculture from organic agriculture is the use of certain preparations incorporated in compost piles and natural manures, such as planting windbreaks, or spraying directly on plants (FEIDEN, 2005). It is in this context that the knowledge about the ecological characteristics of the species is of fundamental importance for the success of the enterprise, among them one can mention the flowering and fruiting (Figure 3).

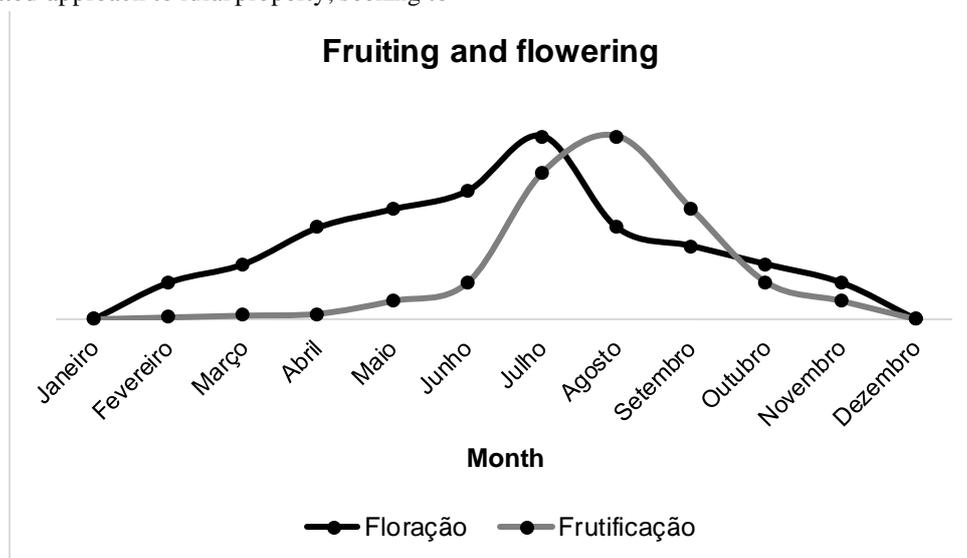


Fig.3 - Period of fruiting and flowering of organic orange, produced in the study area of the SOS Agroecological Site.

In this context, windbreaks in SAFs have been used in the SOS Agroecological Site as natural delimiters. In addition, the interaction between citrus plants and windbreaks usually focus on quantifying the effect of shading from installed windbreaks on yield and fruit quality, wind and cold damage, and the spread of disease (Oliveira et al., 2010).

The main marketing channels in descending order are: fairs, industry, organic / natural product outlets and

middlemen. The location of the property and the production runoff channels are among the factors that most interfere in the difficulty of commercialization (distant from large shopping centers and with high freight cost, in some cases not compensating the sale) (TURRA and GHISI, 2004). The impact on increasing product output decreases the value of freight and opens up new marketing opportunities at both the regional and national levels (Figure 4).

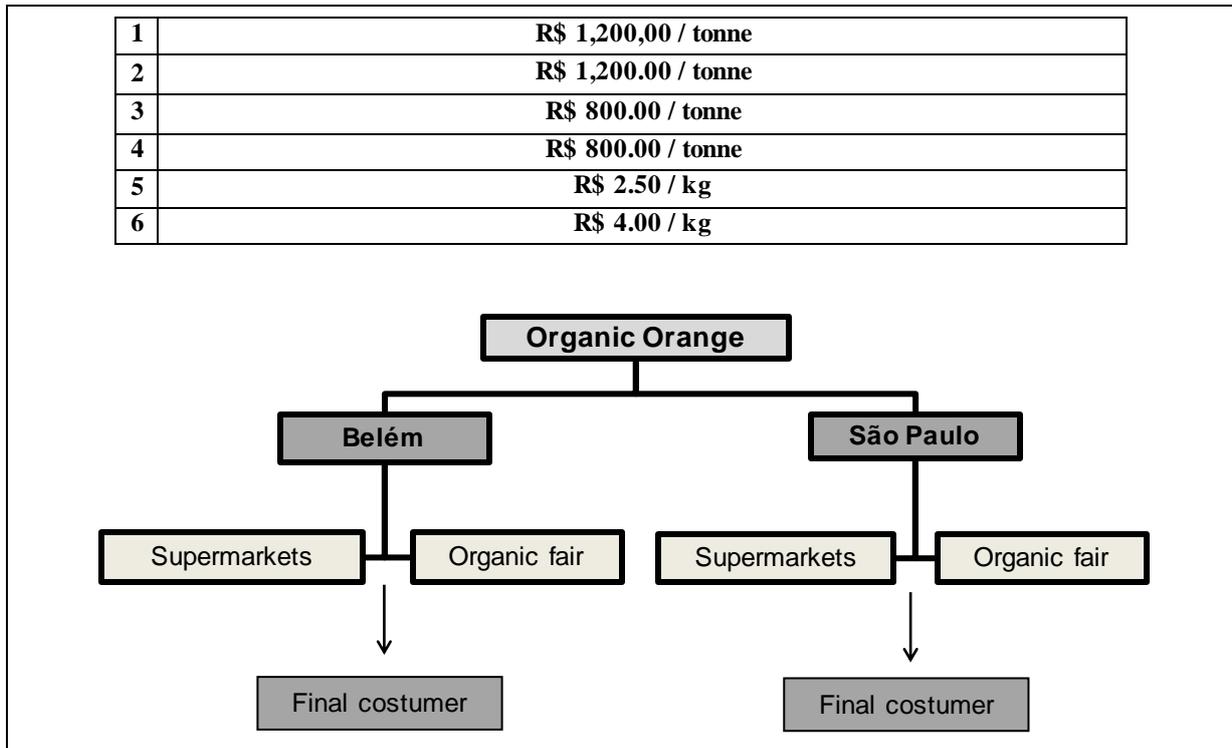


Fig. 4: commercialization flow of Organic Orange

IBD is responsible for the organic certification of the SOS Agroecological Site, where it is valid for one year. One of the difficulties of obtaining organic certification is that the process is time-consuming and expensive, since the property has to be in accordance with the norms required by the current legislation and for this it takes a longer time until this process is successfully achieved.

The main advantage of organic versus conventional refers to the lower toxicity index and the maintenance of the environmental balance. For the producer, one of the advantages of this system is related to the non-use of chemicals, since, according to Lima Neto et al., (2009), a large number of farmers do not use protective equipment, these chemicals being used indiscriminately.

Moreover, they are personally satisfied to offer consumers better quality products and to promote

improvements to the population close to the production sites, considerably reducing environmental contamination (PANZENHAGEN et al., 2008). The fact that organic farming requires more manpower, generating employment or the use of the family's own labor force can still be considered as another advantage.

Organic production has a high cost of implementation due to the process of conversion and certification that is submitted the property when adhering to organic cultivation (BRITTO, 2015). However, over the years, maintenance costs are lower than traditional production, because producers begin to manufacture many of the organic compounds needed for the activity, in addition to the differentiated price. This fact is easily visualized in the information of the Site studied (Figure 5).



Fig. 4: Annual percentage of expenditure and profit for the organic production of orange from the SOS Agroecological Site

The main difficulties of the organic system are related to a change in the patterns of production and consumption, as well as the lack of effective public actions. The initial costs are high, because factors such as the acquisition of suitable implements and materials, seeds, the introduction of soil preparation and conservation practices, technical assistance among others, are inserted when converting from conventional to organic agriculture is desired (CAMPANHOLA ; VALARINI, 2001).

Another difficulty is the control of pests, as this can lead to contamination of soil, plant and man by worms, coliforms and excess nitrogen (ABREU JÚNIOR et al., 2005). As the scale of production is reduced due to the low number of farmers adhering to the organic method, these products have a higher cost to the consumer (ALMEIDA JÚNIOR et al., 2008). However, a study by the Gallup Institute revealed that about 70% of Brazilians are willing to pay 30% more for organic food (PORTAL SÃO FRANCISCO, 2015).

IV. CONCLUSION

It is concluded that the system of production of the SOS Agroecological Site presents a certain similarity with the conception of organic and natural agriculture, since both systems aim at the reduction of costs of the rural producer, the use of alternative and / or natural products available in the property - having as main product Organic Orange - excellent quality and much appreciated in the region.

It is also observed that the sustainable management of the Organic Orange system of the SOS Agroecological Site is characterized by a set of conservation and ecological practices that lead the system to balance with the environment, which facilitates certification and staggered production to the consumer market.

Despite the innumerable advantages of the organic system of the SOS Agroecological production site, obstacles to the permanence of certification of this new method in the region are still found, since producers have little or no tradition of organically producing.

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