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Characterization of family organic production in peri-urban regions

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The objective of this study was to evaluate the difficulties and potential of organic farming for the family small-scale farmers in the municipalities of metropolitan areas of large shopping centers, such as the state of Rio de Janeiro, Brazil. To that end, a questionnaire comprising open-ended and closed-ended questions relevant to biological farming was applied. Factors that hinder the production and sale of organic products were addressed. The data obtained using the questionnaire was compared with periodic technical visits to the farmers' properties. The results indicated that biological farming in the municipality is characterized as family-based, small-scale production and that products are mainly sold in farmers' markets. The group faces the following difficulties: A lack of continuous technical assistance, the limited availability of labor, and reduced consumer demand for the products. Farmers know and understand the importance of soil conservation processes in biological farming management and that this production system is based on health preservation, and needs to comprise affordable prices for the end consumer, and to expand the market.

Key words: Sustainable agriculture, family farming, organic products.

INTRODUCTION

Biological agriculture is defined as a production model that addresses socioeconomic and environmental issues. It combines livestock production, by using animal waste, and plant production, in addition to the use of residues such as rock powder and castor and sunflower cake originating from sites outside of the farm (Caldarte et al., 2012).

Biological agriculture is prominent because it is practiced worldwide and because it is a type of agriculture that prioritizes sustainable production, which has been found to be an important factor in social and environmental development. Agencies such as the Food and Agriculture Organization (FAO) evaluate the organic movement positively because it favors small-scale agriculture and

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because of the consequent revitalization of rural communities and environmental protection, especially in developing countries (El-Hage, 2007).

In Brazil, the incentive for the implementation of alternatives aimed at sustainable agriculture and agroecological production practices seeks to generate new perspectives so that a significant portion of the 13 million small farmers may insert themselves into the market because, until recently, this group has not benefited from public policies for rural development (Ferreira and Zannoni, 2001).

Studies show that the social and environmental benefits associated with biological farming, including environmental conservation and enhancement and stabilization of farmer income, positive impacts on local rural economy (Nieberg and Offermann, 2002; Lotter, 2003; Darnhofer, 2005).

Another important aspect addressed by Morgan and Murdoch (2000) refers to the participation of biological farmers' groups in all stages of the crop production process, from planning and implementation to commercialization, because the products are typically sold through direct relationships with consumers. However, part of biological farming remains tied to conventional sales channels that heavily dependent on financing capital, hindering the socioeconomic development of family farmers (De Wit and Verhoog, 2007).

At the state level, family farmers are represented by the Association of Organic Farmers of Rio de Janeiro (Associação de Agricultores Biológicos do Rio de Janeiro - ABIO), which is responsible for the participatory guarantee system throughout the state.

In this context, this article aims to analyze the development of urban agriculture in Brazil, studying the specific case of a group of organic farmers in the state of Rio de Janeiro. To do so, this article is structured in three topics: (a) a topic on a discussion on the characteristics of biological agriculture in Brazil; (b) a topic on the methods used and study area description; (c) a topic on a trajectory and development on the characteristics of organic agriculture in the municipality of Seropédica, located in the metropolitan area of Rio de Janeiro.

Biological agriculture in Brazil: Overview, advances, and the development of policies supporting organic agriculture

When biological agriculture began to be practiced in Brazil, it was closely linked to philosophical and social movements that sought the return of contact with the land as an alternative lifestyle. It was driven by a line of questioning that was against the consumerist model of modern society in the 1970s. During this same period, Brazil was already included as an organic product producing and consuming country in international statistics.

In the 1980s, several non-governmental organizations (NGOs) were founded to act in biological agriculture, coordinated through the Alternative Technologies Project Network (Rede Projeto Tecnologias Alternativas – PTA) and subsequently by the Advisory and Services, Alternative Agriculture Project (Assessoria e Serviços, Projeto Agricultura Alternativa – AS-PTA). However, growing interest in the organic export sector emerged, and thus, discussions of and debates over formulating and constructing Brazilian legislation for biological production began. Legislation was passed only after the global forum of NGOs and social movements that was held in Rio de Janeiro in 1992 - ECO 92 - and the approval of the 1994 European environmental legislation (Alves et al., 2012).

The issues concerning and negotiations for regulating biological agriculture in Brazil only occurred in 1994 and were officially recognized in May 1999 with the publication of the first Brazilian regulation on biological agriculture, the MAPA Regulatory Ruling 007/99 (Brasil, 1999). In 1996, the proceedings of the Brazilian National Congress began to pass Law 10,831, which defines and establishes mandatory conditions for the production and commercialization of biological agricultural products and which was only published in December 2003 (Brasil, 2003). In December 2007, Decree 6,323 was published, which regulates the activity, and in 2008, the specific regulatory rulings were published (Brasil, 2008a, b). Furthermore, the legal structure covers other regulatory rulings and decrees on the use of phytosanitary products and others subjects.

In August 2012, Decree no. 7,794 was approved, which implements the Brazilian National Policy on Agroecology and Organic Production (Política Nacional de Agroecologia e Produção Orgânica – PNAPO), establishing the Brazilian federal government's commitment to policies, programs, and actions that spur the agroecological transition and organic and biological production, collaborating with sustainable development and the improved quality of life of the population.

The scenario of biological agriculture in Brazil lacks information. The existing data are disseminated in the archives of farmers associations, certifying organizations, and NGOs and in the Agricultural and Livestock Census (IBGE, 2006).

Data from the International Federation of Organic Agriculture Movements (IFOAM, 2009) demonstrate that in 2008, a total area of 1,765,793 ha was organically farmed, including approximately certified 932,120 and 833,637 ha was in transition, with 7,250 farmers directly practicing biological agriculture.

The Agricultural and Livestock Census performed by the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística - IBGE) in 2006 recorded 90,497 established organic farmers in Brazil; 5,106 (5.6%) were certified, and 85,391 (94.4%) were uncertified. These data demonstrate the difficulty of

farmers accessing certification, and in this case, it can be assumed that a considerable number of establishments are within a transition period. Of all of the establishments, 42% practice livestock production (meats, milk, eggs), and another 33% practice agriculture with temporary crops (soybean, corn, wheat, rice, bean, sugarcane).

Brazil has a diverse biological production that includes permanent crops (coffee, fruits, yerba mate), horticulture, floriculture (numerous species), forest production (planted and native), and extractive production and aquaculture.

Regarding the area of certified organic production, Brazil accounted for 4.9 million hectare, according to the last Agricultural and Livestock Census (IBGE, 2006); 4.4 million hectare were uncertified (89.5%), and 517,000 ha were certified (10.5%).

For funding and investing in agricultural production, the government currently provides two financing instruments: the national program for strengthening family agriculture (Pronaf) and the agricultural and livestock plan. Both financial aid lines offer support for biological and agroecological-based agriculture. There are also specific credit lines, including Pronaf Agroecologia, Pronaf Floresta, and Pronaf Eco. Female and young farmers also have distinct Pronaf lines, Pronaf Mulher and Pronaf Jovem (Brasil, 2014).

Other programs such as MAPA's Safra plan also have a credit line known as the Low-Carbon Agriculture Program (Programa de Agricultura de Baixo Carbono - ABC), which prioritizes the implementation and improvement of organic agricultural production systems, ABC Organic.

Within this scenario, organic agriculture began to be treated differently due to the grant for rural insurance starting with the 2012/2013 crop season. It is important to highlight that family agriculture insurance (seguro da agricultura familiar – SEAF) has ties to the Pronaf credit line, which is a specific policy for family agriculture, with multi-risk insurance covering losses due to adverse weather, fungal diseases, and/or pests without known or economically infeasible control techniques (CIAPO, 2013).

However, access to this insurance is hindered by both the low values covered and the restricted access to financing, especially due to the limited technical ability to develop projects and difficulty in gathering all of the information and documents necessary for requesting this financial support by some family farmers (Rocha and Santiago, 2013).

Biological farming in Rio de Janeiro

The biological agriculture movement in Rio de Janeiro state began in the early 1980s with a meeting of 400 people sharing a common goal: To produce and consume chemical contaminant-free products. The combination of this movement with the NGO "Harmonia

Ambiental [Environmental Harmony]" resulted in the formation of Coonatura, which, in 1981, started ecological food production at a leased site in a district of Petrópolis, a mountainous region of Rio de Janeiro state (ABIO, 2014).

The group of farmers initially comprised individuals from urban areas who had a high educational level and who did not practice agriculture as their only source of income. The group's work focused on concerns with the quality of products sold to consumers and the impacts of contamination during farming (Campos, 2001).

This group's initiatives served as the basis for creating the first organic farmers association in the country. Thus, in 1985, the Association of Organic Farmers of Rio de Janeiro State (Associação de Produtores Biológicos do Estado do Rio de Janeiro - ABIO) was created, founded with the goal of disseminating biological agriculture and agroecology. ABIO supports organic farmers in their production and commercialization activities through cooperation and associativism and certifies the organic food produced by its members by supplying a certification seal (ABIO, 2014).

Feres (2009) highlights the importance of ABIO in encompassing most of the state's farmers and providing organic product certification, generating credibility for farmers and products, conferring the group greater transparency with regard to the practices and principles adopted for organic production in Rio de Janeiro.

Rio de Janeiro is not traditionally known for relevant agricultural production, and only some areas stand out, such as the northern Rio de Janeiro region in sugarcane production and the mountainous region in vegetable crop production (IBGE, 2014).

Nevertheless, Bicalho (2004) observes a change in the state's agricultural production that benefits the organic system, in which non-traditional and family farmers have adopted this farming technique, influenced by the ideological issues of the first biological farmers, the added value, and the increased demand for these products throughout Brazil. Thus, the state's organic production areas are practically located throughout all of its regions, covering areas without a history of agricultural activity and also sites near urban centers.

The development of biological agriculture in large metropolises is a reality, especially due to the strengthening of urban and peri-urban agriculture, thus ensuring self-sufficient food production and reduced dependence on the commercialization of products from other regions. Practicing urban agriculture has also allowed the families involved to strengthen communal activities, reducing the risks of food and nutritional insecurity and promoting increased income and employment for these areas (Weid, 2004).

To promote sustainable agricultural practices near urban centers, the ideal principles are agroecological principles, which involve crop rotation, alternative phytosanitary management, soil conservation and use, and the use of all of the available space and diversified

production that help farmers obtain higher gains and allow selling throughout the year (Aquino and Assis, 2007)

Despite the uncertain biological agriculture market resulting from the lack of official data that identify production and the amount of capital generated by Rio de Janeiro and other municipalities involved in the production system, this market is currently booming, and the state has 319 farmers in the Brazilian National Register of Organic Farmers of the Brazilian Ministry of Agriculture and Federal Government (Cadastro Nacional de Produtores Orgânicos do Ministério da Agricultura e Governo Federal) (MAPA, 2014).

STUDY AREA AND METHODOLOGY

The study focus on the characterization of a group of farmer associated to SerOrgânico association, which represents biological farming in the municipality of Seropédica. SerOrgânico was founded in 2009 and currently has 15 registered farmers (Rede Ecológica Rio, 2014). To study the forms of agrobiological farming practiced by Seropédica farmers (registered in SerOrgânico), a survey was conducted combining questionnaire application and periodical technical visits to the farmers' properties in order to generate data on production management and its variables and consequently generate a production history.

The topics addressed were related to the agricultural difficulties faced by the farmers, the forms and alternatives found for commercialization, and the complexity of working with biological agriculture within the Seropédica region, following the procedures described in the current farmer's manual published by the Brazilian Ministry of Agriculture, Livestock, and Supply (Ministério da Agricultura, Pecuária e Abastecimento – MAPA, 2011) related to the activities practiced at the farmers' production sites.

Although the municipality of Seropédica accounts for 15 units registered in the organic farmers association (SerOrgânico), only 11 continuously produce on their properties. Therefore, the research performed in this study was directed to these farmers due to their continuous production and commercialization over the years.

The study comprised visits to the farmers' properties and a questionnaire with open-ended and closed-ended questions aimed at agronomically evaluating the production system. Topics that are the main drawbacks related to the urban, family, and biological farming system in the municipality of Seropédica were addressed.

The questions were directed toward property size, the time needed to convert the conventional crop system to the biological system, and membership in ABIO. The following were also targeted in the study: the main soil conservation practices adopted, soil fertility management, pest and disease control, and invasive plants (Figure 2). Moreover, issues such as the source of the water used in irrigation, the commercialization of production, and the labor employed and concerns regarding the existence of continuous technical assistance were addressed.

The time that biological farming was performed in each property was based on the time of ABIO membership, given that this association issues the certificate of compliance to the producer.

Organic agriculture in Seropédica: Trajectory and development

Location and history

The municipality of Seropédica is located 70 km from the capital of the Rio of Janeiro (Figure 1) in a region geographically known as Baixada Fluminense and as a metropolitan region by the state's

administrative political division (Ceperj, 2014). It encompasses an area of 283.8 km² and a population of 81,260 inhabitants, predominantly urban. The economy is based on sand and clay extraction and agriculture, which accounts for approximately 6,022 ha dedicated to family farming (IBGE, 2014).

The largest portion of these areas comes from the expropriation of unproductive farms that were managed by Brazilian federal agencies for agrarian colonization and reform in the 1950s. These expropriations led to nine settlements divided into lots, each averaging 10 ha. These centers produce fruit and vegetables but also practice more varied activities and differ in their degree of development (Golinski et al., 2007).

Despite the incentive to adopt the organic production system from research institutions such as the Federal Rural University of Rio de Janeiro (Universidade Federal Rural do Rio de Janeiro - UFRRJ), Embrapa Agrobiologia (Embrapa Agrobiologia), and the Agricultural Research Company of Rio de Janeiro State (Empresa de Pesquisa Agropecuária do Estado do Rio de Janeiro - PESAGRO), which are located in this municipality (Cruz and Bigansolli, 2011), and ABIO itself, because of strong land speculation in recent years, many farmers have sold their properties, abandoned agriculture, or transferred their activities to other municipalities.

Biological family farming as alternative income for the municipality of Seropédica

Family farming is based on a production method in which the center of decisions, management, work, and capital is controlled by the family, whose income is sometimes supplemented by working wages. It is based on diversifying the products farmed to decrease costs, increase revenue, and take advantage of market opportunities and labor availability (Abramovay et al., 1996).

This farming method stands out because of its importance in generating employment and income and its collaboration in keeping rural space permanent, reducing rural exodus, and accounting for a considerable share of the national wealth generated. It is also responsible for food produced for domestic consumption, especially intended for self-consumption (subsistence farming), generating a source of resources for low-income families, thus significantly contributing to the economy of the national and regional agricultural sectors (Guilhoto et al., 2007).

According to data from the Brazilian Institute of Geography and Statistics (IBGE, 2006), 84% of the agricultural establishments in Brazil are family based, with 74% of individuals practicing some type of work in the field linked to family production and occupying 24.3% of the area used by Brazilian agricultural establishments. Therefore, this segment is indispensable for basic food production. Thus, understanding the factors that govern family farming in the municipality of Seropédica serves as an instrument for ensuring food security and the supply for local consumption, which may contribute considerably to the economy of this municipality and be an alternative for increasing income for the families involved in this production system.

Campanhola and Valarini (2001) emphasize biological agriculture as one of the income alternatives for small-scale farmers because of the increasing demand for healthier foods worldwide. Moreover, organic products exhibit characteristics of niche markets and thus aim to meet the demand of a restricted and select segment of consumers who are willing to pay a higher price for these products, which does not happen with *agricultural commodities*. Thus, although small-scale farmers do not achieve large-scale production, they can provide their products to small local markets, strengthening the trust and credibility relationships among the parties involved (Neto et al., 2010). Moreover, diversified planting and decreased dependence on amendments originating from outside the farm allow the income of organic family farmers to be

stable throughout the year, reducing the effect of seasonality.

RESULTS AND DISCUSSION

Characterization of the biological production unit in the municipality

Biological farming is a recent agricultural method in the municipality, with respondents having on average 10 years of production certification, and therefore can be considered fragile, requiring care and attention.

Regarding the area intended for biological agriculture, it does not exceed 6 ha for any of the farmers interviewed. A portion of the area is reserved for pasture, either for owned or leased animal production. It is important to note that for half of the respondents, lease represents increased income (Figure 2). However, the area intended for biological production is always very diverse, which is important for practicing agroecologically based agriculture (Mesquita, 2013).

The group of farmers from Seropédica encounters the following main difficulties in developing agriculture in the municipality: a lack of continuous technical assistance, which generates a lack of current available information about crop management and difficulties in implementing the biological system (IBD, 2000). This factor differentiates this group of farmers from farmers in other regions of the state, such as those in the previously established green belt regions in the municipalities of Teresópolis-Nova Friburgo and Petrópolis (the mountainous region of Rio de Janeiro).

Interventions from educational and research institutions located in the municipality occur sporadically via courses, the dissemination and propagation of agronomic techniques, and partnerships aimed at installing and conducting experiments on the farms.

However, according to the farmers interviewed, there is no return from the results of the research conducted on their properties, which leads to skepticism with regard to the formation of new partnerships. A similar trend has been reported by Guimarães (2011), who evaluated the implementation of agroecological practices and found that only half of the family farmers evaluated (including conventional farmers) in Seropédica make use of agroecological practices, demonstrating that research and the consequent extension generated by educational institutions have not reached regional farmers in a relevant manner.

Among those interviewed in this study, 36% noted that the evaluation and interpretation of soil fertility is a predominant factor that contributes to increased production on the property and that the diffusion of this technique based on continuous technical assistance would bring benefits. It is noteworthy that practices such as no-tillage, crop rotation, and mulch are the main forms adopted for managing organic matter and soil moisture content, consequently improving the physical and

biological characteristics of the system (Figure 2).

Regarding soil fertility management, liming is practiced in 65% of the farms surveyed. However, the procedure of interpretation and lime application is only performed correctly at two sites. Nitrogen is applied using castor cake, and phosphorus is applied using termophosphate. However, the uses of mulch, cattle manure, and biofertilizer are practices adopted by some of the organic farmers in Seropédica (Figure 2).

None of the respondents has mechanized agricultural tools to incorporate the fertilizers to improve soil fertility. However, it is common practice to rent this equipment during periods of soil preparation. The study found that all of the farmers know and understand the importance of soil conservation processes for soil management and its fertility for organic production. Thus, it can be affirmed that all of the farmers interviewed perform at least one agricultural practice with this goal.

Mazzoleni and Nogueira (2006) evaluated the organic production chain of a site close to Curitiba, Brazil, and compared certified and uncertified farmers, and they found that in 97% of the cases, the certified farmers performed practices that favor soil conservation and the environment, such as the use of mulch, no-tillage, and crop rotation.

Regarding pest or disease control, only 36% of the organic farmers in Seropédica use commercial products certified for use in organic agriculture; however, all use alternative control products such as solutions and extracts (Figure 2).

Similar to the findings of Malanski and Onçay (2011) in Campo Bonito, Paraná, Brazil, the biological farmers evaluated in the present study preserve the custom of seed sharing, work collectively, use popular knowledge to plant and harvest, observe the moon phases and the behavior of animals and birds, and make weather predictions. They believe in homemade phytopathological control comprising teas, syrups, and macerations.

Although there is a market interested in local biological production, none of the farmers demonstrated willingness to increase the area or plant a type of crop that they did not already produce. In all cases, labor was cited as the main limitation. According to Figure 1, the following main crops are produced by the group: annual crops, such as leafy vegetables, fruits, and medicinal plants.

Storch et al. (2004) also found such a situation when studying farmers from Rio Grande do Sul, Brazil. For these authors, labor was a recurring problem that was affecting various sectors of local production. It is noteworthy that the work force involved in the biological production of the SerOrgânico farmer association was family-based; however, 100% of the respondents hired day laborers for mowing and weeding (which were cited as main forms of invasive plant control). There was a migration of labor among the properties according to the demand for invasive plant control and soil management (Figure 2).

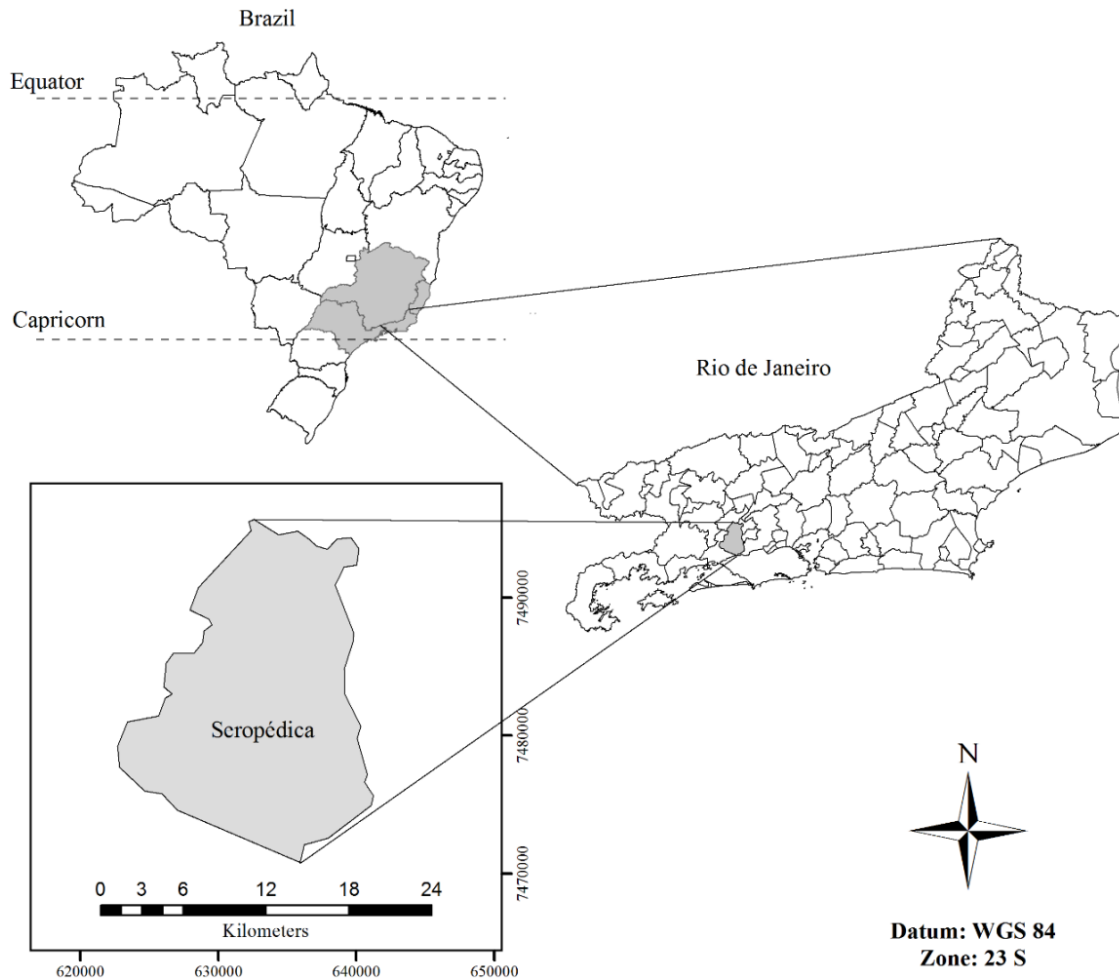


Figure 1. Location of the municipality of Seropédica.

Of the 11 respondents, six cited agricultural production as the main family income. The other farmers maintained an alternative occupation to increase the profitability generated by selling the production surplus.

Characterization of the agricultural production and commercialization in Seropédica- RJ

The main reason reported by biological farmers in Seropédica for adopting family-based and biological-based agriculture is health preservation, followed by price and market demand for the product.

Concern with the risks of using pesticides seemed to be widespread among the farmers who adopt the biological and agroecological production system, which was also reported as a factor of concern for farmers from Canada (Macrae, 1991), Rio Grande do Sul (Storch et al., 2004), and other regions of Rio de Janeiro (Aquino and Assis, 2007).

Due to climatic difficulties and low technological and

financial investments, production in Seropédica is concentrated during two distinct periods: spring/summer and fall/winter. During the first season, the high temperatures in the municipality and the high disease rate do not allow planting leafy vegetables and medicinal plants by 100% of the respondents.

As an alternative, the farmers plant sweet potato, cassava, and corn and sell seasonal fruits during this period. During the cooler seasons, the number of products sold increases and includes cherry and table tomato, eggplant, and leafy and aromatic vegetables.

The products are sold in open farmers markets or via direct sale (Figure 2) belonging to the Organic Farmers Market Circuit of the City of Rio de Janeiro. Currently, all of the farmers sell their products in this manner. Moreover, 55% of the farmers sell their products to the Agroecology Network (Consumers Association) and the hotel chain within the state's Costa Verde region. In all cases, the respondents also sell their products directly to consumers who know the production site and go to the site itself (direct sale).

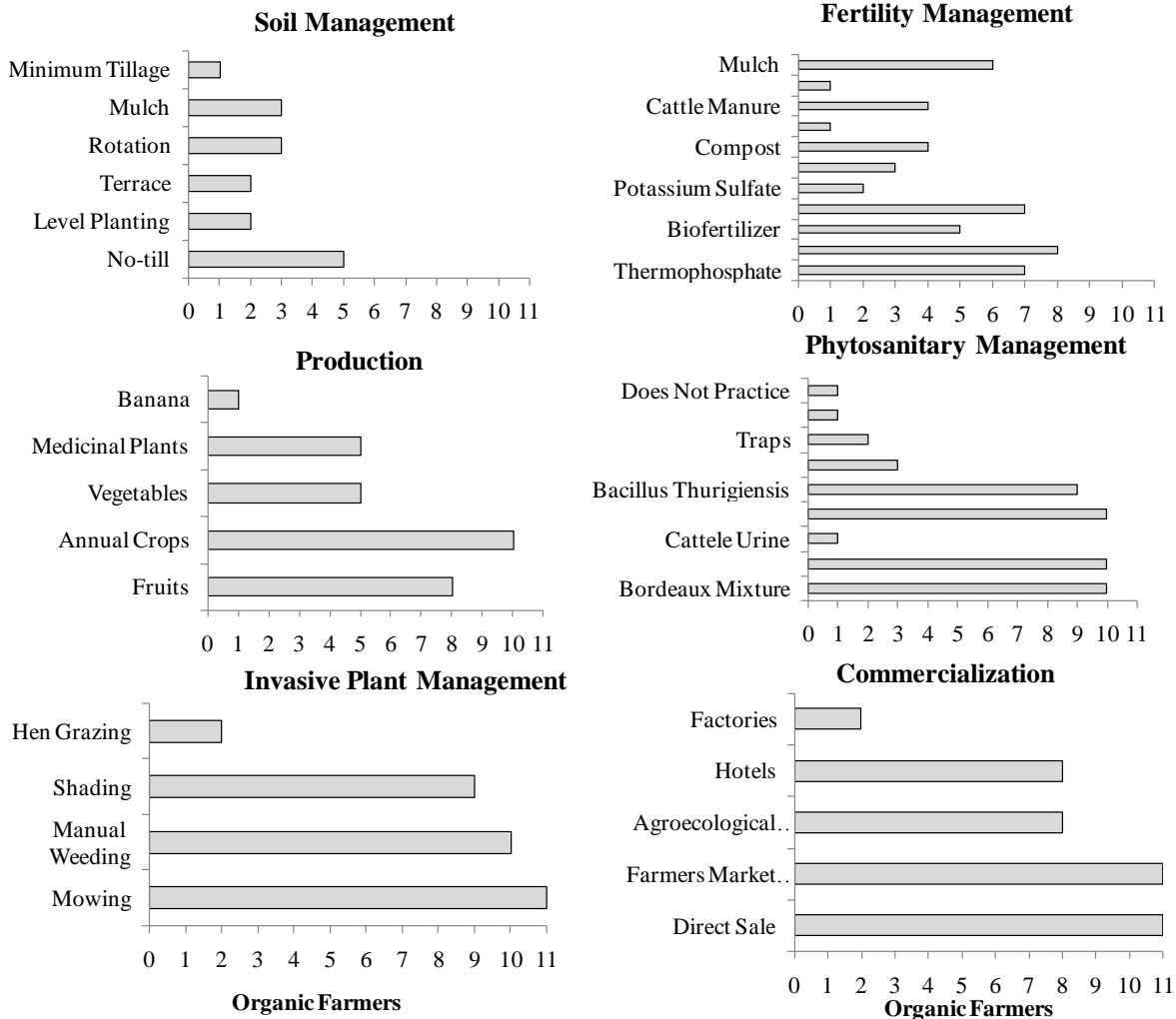


Figure 2. Types of organic production management adopted by family farmers in Seropédica, Rio de Janeiro.

According to Schultz et al. (2001), the agroecological production agents consider direct sales and sales in organic farmers markets to be the most appropriate methods for distributing their products, allowing farmers to be closer to consumers. However, this mechanism has limitations, mainly due to the possibility of increased demand that cannot be supplied and the requirement that the producers be present at these sites, reducing their ability to work at the production unit.

For Seropédica, this factor was cited as the main difficulty for selling at farmers markets, which occur Tuesdays, Thursdays, and Saturdays in different neighborhoods in Rio de Janeiro. The mean distance to these sites from the producing municipality was 70 km.

Conclusions

This study identifies some positive and negative factors of the biological production system adopted by farmers

belonging to the SerOrgânico organic farmers association. Overall, the difficulties faced are similar to those of most small-scale farmers throughout Brazil. The positive aspects are as follows: the knowledge of conservation practices, application soil fertility improvement techniques, high product diversity, and effective phytosanitary control using appropriate amendments for the region's key pests and diseases. The negative aspects are as follows: a lack of continuous technical assistance, low production scale, irregular supply, which hinders long-term contracts with distributors and retail markets, and the limited availability of labor. Direct contact with consumers at commercialization sites favors trust in the products; however, the presence of the producers reduces their ability to work at the production unit. Another important aspect is the difficulty accessing specific credit lines and the lack of technical monitoring for production. The following are highlighted as positive aspects: Expanding the market for products, environmental preservation, the

ability to diversify production, and the favorable prices of organic products.

Conflict of Interests

The authors have not declared any conflict of interests.

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