


SUSTAINABILITY IN FAMILY FARMING: CHALLENGES AND OPPORTUNITIES – A CASE STUDY OF FAMILY FARMERS IN CAIUÁ/SP

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ABSTRACT

Family farming plays a vital role in food security and rural development, especially in rural areas. This study investigates sustainability in family farming, focusing on the Nossa Senhora das Graças Settlement, in Caiuá, São Paulo. The objective was to analyze agricultural practices, identify challenges and propose improvements to promote more sustainable practices. The qualitative and exploratory research included semi-structured interviews and direct observations of agricultural practices. The results reveal a limited diversity of crops, predominance of traditional soil conservation techniques and mixed use of natural pesticides and chemicals. Challenges include a lack of resources, technical assistance, and knowledge about sustainable practices. Despite recognizing the importance of sustainability, farmers face significant barriers that limit the full adoption of sustainable practices. The research highlights the need for public policies and training programs to support the transition to more resilient and sustainable practices in family farming.

Keywords: Family Farming. Sustainability. Nossa Senhora das Graças Settlement. Sustainable Practices. Barriers.

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INTRODUCTION

Agriculture plays a crucial role in the global economy and food security. However, the challenges facing contemporary agriculture are significant, including the need to increase food production to meet the growing demand of the world's population, while reducing environmental impact and promoting social justice. In this context, family farming stands out, as it plays a fundamental role in food production, especially in rural regions.

The general objective of this work is to investigate sustainability in family farming, focusing on understanding the challenges faced by farming families and identifying opportunities to promote more sustainable practices. Specific objectives include:

- Analyze the agricultural practices currently adopted by farming families and assess their environmental impact;
- To identify the main challenges faced by families in the search for sustainable agricultural practices, having as a research space, the small producers of agrarian reform in the Municipality of Caiuá, in the interior of São Paulo, precisely in the Settlement called "Nossa Senhora das Graças".

The central problem that the article proposes to investigate concerns how sustainable agricultural practices can be promoted and implemented effectively in family farming, considering the specific challenges and opportunities of this context.

The present research becomes relevant due to the strategic importance of family farming and its potential to contribute to sustainable development. The need to address environmental, social, and economic issues related to agriculture is crucial at a time when society is increasingly aware of global challenges such as climate change and food security. By understanding the challenges faced by farming families and identifying opportunities to improve sustainability, the survey can provide valuable guidance for governments, non-governmental organizations, farmers, and other actors interested in promoting sustainable family farming. Furthermore, this research aligns with the United Nations 2030 Agenda and its Sustainable Development Goals (SDGs), contributing to the advancement of these goals.

In the following topic, the multifunctionality of agriculture historically will be addressed. Then, the importance of sustainable development in this dimension will be discussed, where heterogeneous definitions and characteristics of the family farmer will be highlighted. Therefore, public policies aimed at these social actors will be explored, as well as sustainability involving primordial pillars such as: society, environment and economy. In

order to evidence the theoretical praxis, a study of a Rural Settlement in the Municipality of Caiuá/SP – Assentamento Nossa Senhora das Graças will be presented, with the purpose of evidencing local sustainable practices, in which it has the lowest degree of urbanization in the Pontal do Paranapanema Hydrographic Unit, in the interior of São Paulo.

AGRICULTURE AND ITS MULTIFUNCTIONALITY

After decades of modernization of agriculture, which tried to obtain rapid productivity gains in the territory, in the 1990s, the notion of multifunctionality of agriculture appeared and a social demand for other functions for agriculture in addition to production emerged (Guillamiun et al., 1999).

Givord (2001) points out that, for a long time, the opposition between the "Rural Model" versus the "Agricultural Model" (or the "Rural" versus the "Agro"), made them seem like competitors, but today they are seen as complementary. For the author, this integration was enshrined, at the political and legal level in the European Union, in the concept of multifunctionality of agriculture, expressed by "Agenda 2000" which establishes rural development as the second pillar of the Common Agricultural Policy (CAP). This concept is also internationally recognized in the debates promoted about Biomass: it is plant production, capable of being transformed into energy, raw material for Biofuels that are nothing more than a form of alternative to the use of oil as the main energy source of our society. Solar energy is converted via photosynthesis into green matter and transformed into a form of energy available for the means of transport and power of industrial processes, Biofuels.

The new functions that agriculture has been assuming go far beyond that. Human beings are highly dependent on these functions, especially in their social aspect. Considering the territory as an inhabited space, the role of agriculture in its management is mainly grouped around three axes: the economic role, the ecological role and the social role (Guillaumin et al., 1999).

As for the economic role, agricultural products can have an effect on the development of the territory, due to their economic impact (agri-food sector) and the effects that fall on other sectors (local economic dynamism). In the ecological aspect, agriculture is also related to the constitution and management of the landscape. It participates in the preservation of biodiversity, in the maintenance of vegetation cover, in the protection of water sources, among others. And, above all, because of its social importance. This is one

of the important functions of agriculture in the territory, in terms of human presence, as it has the ability to maintain an employed population, as well as to animate rural life (Guillaumin et al., 1999).

These functions, sometimes called "new functions" can be considered as positive externalities of the agricultural production activity, for example, the constitution of a pleasant landscape. On the other hand, they can also be services demanded from agriculture by other actors, which lead to modifying their practices, such as changing the date of harvest to preserve an animal species, maintaining corridors to avoid forest fires, welcoming students for practical classes, among others (Guillaumin et al., 1999)

SUSTAINABLE DEVELOPMENT IN AGRICULTURE

The word "development" suggests change, since what develops does not remain static. However, defining what it means that a society is undergoing stage changes is a more complex challenge.

The term "development" often evokes the traditional division of the world into developed and underdeveloped countries. This notion was originally used to justify the expansion of the North American production model, under the premise of seeking a fair and democratic distribution of global wealth. This process began around 1949, when the then US president, Harry Truman, proposed a "bold and modern program" to allow underdeveloped areas to have access to scientific advances and industrial progress achieved by the United States (Esteva, 2000). Since then, "development" has often been used as a synonym for growth, evolution, and maturation. However, for a large part of the world's population, this positive meaning of the word "development" is a constant reminder of what they are not (Esteva, 2000).

The concept of development is encompassed by several other relevant themes, as a means of progress and structuring. Krenak (2019) reflects that sustainability is a myth, which is invented to justify the evils we do to nature. In this sense, he asks: "Natural resource for whom? Sustainable development for what? What does it take to sustain?" (Krenak, 2019, p. 12).

In contrast, several environmentalists and scholars define and expose the composition of this form of development. According to Sachs (1998), sustainable development must encompass the following dimensions:

- **Social Sustainability:** This refers to a development process in which economic growth aims to build a more equitable society by reducing the disparities between rich and poor. This implies a fairer distribution of income and goods, seeking greater equality (Sachs, 1998).
- **Economic Sustainability:** It involves the efficient allocation of public and private resources. Economic efficiency should not only be evaluated on the basis of the profitability of firms on a microeconomic scale, but also in terms of macroeconomic impacts that benefit society as a whole (Sachs, 1998).
- **Ecological Sustainability:** Refers to the carrying capacity of ecosystems, the reduction of the use of non-renewable resources, the reduction of waste emissions, and the balance in the consumption of natural resources between rich and poor countries. This also involves research and development of less polluting, low-cost, and efficient technologies for rural and urban environments, as well as appropriate environmental regulations (Sachs, 1998).
- **Spatial Sustainability:** Focuses on achieving a more balanced configuration between rural and urban areas, seeking a more efficient territorial distribution of human settlements and economic activities. This implies territorial planning and development that avoids excessive concentration in urban areas and promotes sustainable development in rural areas (Sachs, 1998).
- **Cultural Sustainability:** It involves the search for endogenous roots in modernization processes and integrated agricultural systems. This means seeking changes within the cultural continuum and translating the concept of eco-development into specific solutions that respect the culture, the ecosystem and the local area. It is essential to consider culture as an integral part of sustainable development, preserving local traditions and knowledge (Sachs, 1998).

These dimensions represent fundamental pillars of sustainable development in agriculture and demonstrate the need to consider not only economic growth, but also social, ecological, spatial and cultural issues to ensure equitable and lasting development.

FAMILY FARMING IN BRAZIL

Historically, humanity has evolved from a natural environment to a technical environment, and after the 1970s, it has reached a technical-scientific-informational

environment, in which the role of the sciences has become increasingly evident as an engine of human progress (Santos, 2006).

It is important to highlight that farmers grouped under the term "family" do not form a homogeneous group. In Brazil, of the almost 4 million family farmers, the characteristics vary widely due to several factors of agricultural establishments such as: size, type of soil, climate, relief, water availability; characteristics of the farmer such as: gender, age, level of education; Characteristics of agricultural production: mono or polyculture, types of cultivation and breeding, technology used, access to support services, income) and other preponderant differences such as cultural diversity and family income sources. Creating a concept that encompasses such diversity is not trivial and is unlikely to be unanimous and fixed over time (Castro, 2023).

According to the Food and Agriculture Organization of the United Nations (FAO) (2018), family farming involves the management of agricultural activities, forestry, fishing, livestock and aquaculture by a family, which depends mainly on the work of its own members, integrating economic, environmental, social and cultural functions.

In the legal sphere, with the objective of supporting the credit policy aimed at the sector, Law No. 11,326, of July 2006, defines in article 3 the guidelines for the National Policy on Family Farming and establishes criteria for the identification of this public. According to the law, a family farmer or rural family entrepreneur is considered to be one who carries out activities in rural areas and simultaneously meets the following requirements: not having an area larger than four fiscal modules; predominantly use family labor in their activities; obtain a minimum percentage of family income from their economic activities, as defined by the Executive Branch; and manage the establishment with the participation of the family. The exception to the area limit applies in cases of rural condominium or other forms of collective property, provided that the ideal fraction per owner does not exceed four fiscal modules (BRASIL, 2006).

The family farmer has a special connection with the land, which serves as both a place of work and a home. This intimate relationship motivates the search for production methods that respect and preserve the environment, value human work and improve the quality of life in both rural and urban areas (Wanderley, 2009). Regarding the conceptualization of family farming and the various synonyms used in the literature and legislation, the importance of this sector in the Brazilian scenario is highlighted, contrary to the historical view of it being a low-income and subsistence agriculture (Abramovay, 1997).

PUBLIC POLICIES IN FAVOR OF FAMILY FARMING

Studies on public policies (PP) are recent in Brazil, resulting in conceptual divergences (Lima, 2012). Secchi (2015) points out that, in Portuguese and other Latin languages, "politics" can have two connotations, differentiated in English by the terms politics and policy, the latter being similar to public policies. Rua (1998) defines politics as formal and informal procedures that express power relations to resolve conflicts over public goods. Secchi (2015) also adds that public policies deal with the concrete and symbolic content of political decisions and the process of their construction and performance.

According to Schneider and Grisa (2015), several public policies aim to strengthen and develop family farming in Brazil, focusing mainly on supporting less favored farmers. It is crucial that both public managers and the population in general understand the functioning of these policies.

Abramovay (2006) highlighted three important dimensions for the valorization of family farming in Brazil. First, on the intellectual level, the emergence of studies and research has helped to understand the diversity of family farming and its socioeconomic importance. Second, in terms of public policies, the creation of PRONAF and the increase in agrarian reform settlement projects in the 1990s provided new job and business opportunities in the countryside for many families. Finally, on the social level, family farming is supported by social movements and unions that fight for the economic viability of family production.

Next, three of the main nationally relevant public policy programs will be exposed: PRONAF, PAA and PNAE.

National Program for the Strengthening of Family Agriculture – PRONAF

When public policies for family farming are mentioned, PRONAF is often the main highlight. The Program financially supports individual or collective projects that aim to generate income for family farmers and agrarian reform settlers. Its creation marks an important point in rural areas, recognizing the particularities of family farming, which was previously considered only a subsistence activity (Leite, 2021). Created in 1996 by Decree No. 1,946, it was developed with the collaboration of governments, NGOs and social movements. The program initially focused on three areas:

- Credit, receiving more than 90% of the resources;

- Municipal Infrastructure and Services, which from 2003 onwards began to be addressed territorially; and
- Training, which currently has less relevance. The resources come from the General Budget of the Union (OGU), the Worker Support Fund (FAT), cooperative banks and constitutional funds, and are managed by the National Treasury to directly finance the beneficiaries and equalize interest rates (Silva, 2008).

The main purpose at the time of its creation was to offer lines of credit to a specific social group, present throughout Brazil, especially in areas with low economic activity. Over time, the program has undergone several regulatory changes to expand family farming's access to credit and facilitate its insertion in the financial market. Today, it serves as the basis for several programs to support family agricultural production, such as the PAA (Silva, 2011).

To access PRONAF financing, it is necessary to have some requirements such as the Declaration of Aptitude (DAP) or the National Registry of Family Agriculture (CAF-Pronaf), which must be issued by accredited entities. It should be noted that funding is prioritized for agroecology projects, initiatives that reduce greenhouse gas emissions, and for proposals led by women and youth. The program is operated by public and private banks, BNDES, and rural credit cooperatives, and finances a variety of activities, from the cultivation of staple foods and agroecological products to investments in rural housing and rural tourism (Mapa, 2024).

For Schneider, Cazella and Mattei (2004), the creation of this program was a significant milestone in public policies for the Brazilian rural environment. This program recognizes and legitimizes a new social category, family farmers, formerly known as small producers, family producers, low-income producers or subsistence farmers.

National School Feeding Program - PNAE

The National School Feeding Program (PNAE) became a public policy for family farmers with Law No. 11,497, of June 16, 2009. This law requires that at least 30% of the resources of the National Fund for the Development of Education (FNDE) in the PNAE be used to buy food from family farms and rural entrepreneurs, prioritizing agrarian reform settlements, indigenous communities and quilombolas (Brasil, 2009, Art. 14).

The regulation facilitated the direct marketing of family farming products (Constanty; Zonin, 2016), promoted the formal organization of farmers (Silva; Days; Amorim Júnior, 2015); guaranteed quality food for vulnerable populations (Triches; Barbosa; Silvestri, 2016), expanding the State's view of food beyond the issue of hunger (Moura, 2014); and encouraged the agenda of directing organic foods (Saraiva et al., 2013). In the public sector, as a relevant premise, the creation of public calls enabled greater access for family farmers to government purchases (Schwartzman et al., 2017).

For Saraiva et al. (2013), the PNAE promotes local development by interacting with regional agriculture. Franzoni and Silva (2016) consider it part of the "new paradigm of rural development", reflecting changes in food consumption and agri-food markets. Torres et al. (2011) emphasize that the PNAE is an instrument of sustainable and equitable development, supporting family farming and ensuring food security in schools with agroecological products.

In the context of family farming, it can be considered linked to innovation, technology and citizenship, addressing topics such as social innovation and social technology. It is important in the sense of supporting family farming, contributing to social transformation, promoting socio-environmental sustainability, organizational innovation and access to new technologies, in addition to serving as a pedagogical process (Franzoni and Silva, 2016).

Food Acquisition Program - PAA

The Food Acquisition Program (PAA) aims to strengthen family farming and its associated activities, with an emphasis on areas of greater economic vulnerability. It seeks to promote sustainable practices and ensure access to nutritious food for people in situations of food insecurity, aligning with the right to adequate food. In addition, it encourages the consumption of locally produced food, supports the acquisition of products for initiatives such as Solidarity Kitchen, and facilitates the formation of stocks by cooperatives (Brasil, 2023).

The PAA also aims to strengthen local marketing networks, value biodiversity and organic production, and promote healthy eating habits. The Program encourages cooperativism and associativism, supports the production of specific communities and promotes practices that conserve natural resources, with the goal of reducing inequalities and supporting farmers who have dependents with disabilities (MDA, 2023).

Reintroduced by President Lula in 2023, the Program brought significant updates, such as increasing the sales limit for family farmers to R\$ 15 thousand. Thus, it now also facilitates access for indigenous peoples and quilombola communities, and prioritizes the inclusion of women and agrarian reform settlers; It also carries out the public purchase of food from family farming without bidding, with the purpose of redistributing these products to people in vulnerable situations, promoting income in the countryside and helping to fight hunger. Currently, it offers five modalities: purchase with simultaneous donation, PAA-Milk, direct purchase, institutional purchase, and support for the formation of stocks (MDA, 2023).

FAMILY FARMING AND SUSTAINABILITY

According to Silva (2007, p. 20) "sustainable agriculture is that which is capable of maintaining its productivity and usefulness to society, being economically viable, commercially competitive, environmentally acceptable and socially just". Veiga (1996) observes that, in the family farming model, the integration between work and management facilitates the adaptation of decisions to the specific characteristics of the production process. This model highlights the use of internal inputs, the diversification of activities and the conservation of natural resources.

According to Bianchini (2005), sustainable rural development must meet three main aspects:

1. Ecological: Minimize negative impacts on the environment, preserve soil fertility, ensure the stability of water resources, and protect biological diversity.
2. Social: Valuing local knowledge and internal community resources, promoting equity in access to new technologies.
3. Economic: Ensure the viability of local populations, improve the quality of life and establish a sustainable agri-food system at all levels.

The concept of sustainable rural development is an overarching idea that incorporates diverse social movements, including trade unions, land movements, and environmental initiatives. It also encompasses organic agriculture and movements that promote Agroecology as a basis for a transformation in agricultural practices, in addition to including segments with a preservationist perspective. For Almeida (1998), this is a model in constant evolution, where the joint action of NGOs and social movements, in interaction with public policies, helps to outline guidelines, although there is still no unifying concept that encompasses all the proposals and interests at stake.

In recent years, the discussion about the relevance and role of family farming in the development of Brazil has intensified. This debate is driven by very relevant themes such as: sustainable development, employment and income generation, food security and local development (FAO/INCRA, 2000). Wanderley (2000) suggests that Brazil is gradually recognizing the importance of family farmers, previously considered only as the rural poor. Currently, these small producers or low-income farmers, who are the focus of studies on rural development, are seen as representatives of an alternative agricultural model, distinct from the predominant landowner and employer agriculture in the country.

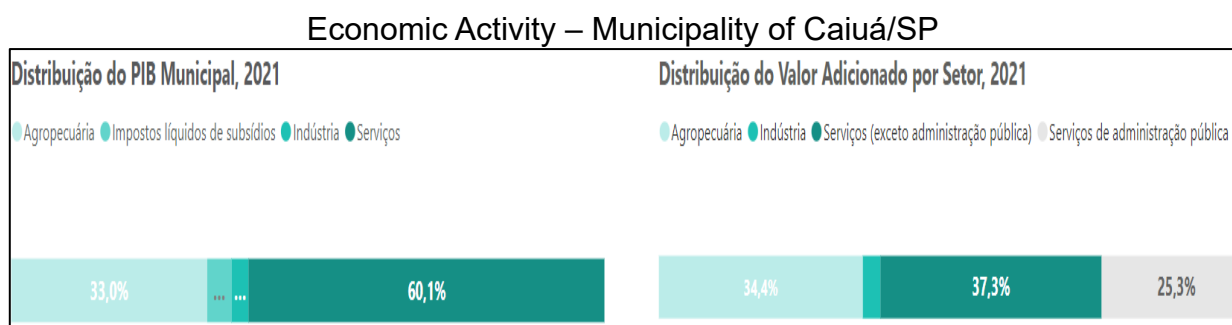
CASE STUDY

From this topic, a case study will be exposed on the Municipality of Caiuá, located in the interior of São Paulo, where the Rural Settlement called "Nossa Senhora das Graças" will be specifically addressed as a research territory.

The Municipality of Caiuá

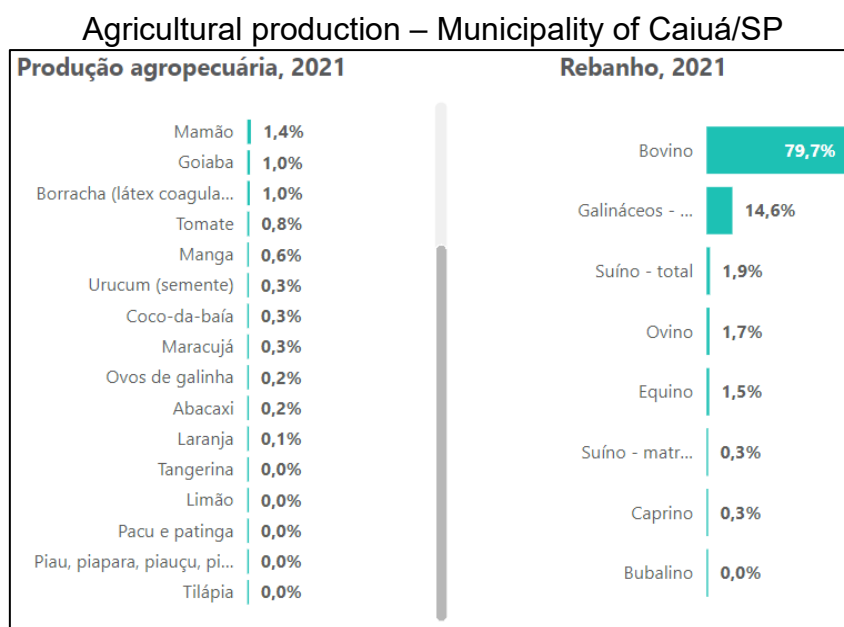
Caiuá/SP is part of the Electoral Zone of Presidente Venceslau, but belongs to the District of Presidente Epitácio/SP, where all real estate registrations, protests and lawsuits are carried out. The inhabitants are called Caiuáenses and the municipality has a single District of Peace, with a 4th Class Police Station in the Subregion of Presidente Venceslau. It is located in the southwestern part of the State of São Paulo, where it occupies an area of 505 km², bordering itself to the north by Panorama/SP, to the south by Marabá Paulista/SP, to the east by Presidente Venceslau/SP and to the west by Presidente Epitácio/SP (Caiuá City Council, 2024).

In the municipality, the predominant economic activity is the Services sector, followed by the Agriculture sector, as shown in the following table:



Source: Seade (2021).

In the context of agricultural production, the focus of this article, there are the following divisions:



Source: Seade (2021).

According to information brought by Seade (2021), in agriculture the main crops are papaya, guava, and latex. However, cattle ranching is highly predominant with about 80% of the total.

Population and degree of urbanization

Municipalities of Pontal do Paranapanema	Population (IBGE, 2022)	Degree of urbanization (%) (Government of the State of São Paulo, 2022)
Alfredo Marcondes	4.445	90,5
Álvares Machado	27.255	91,3
Anhumas	4.023	87,7
Caiabu	3.712	85,5
Caiuá	5.466	38,3
Emilianópolis	3.014	87,7
North Star	2.703	86,6
Euclid da Cunha Paulista	7.924	64,5
Iepê	7.619	92,8
Indiana	5.090	88,2
João Ramalho	4.371	89
Marabá Paulista	4.573	44,5
Martinópolis	24.881	86,9
Mirante to Paranapanema	15.917	58,9
Nantes	2.660	95,6
Narandiba	5.713	81,3
Piquerobi	3.264	79,7
Pirapozinho	25.348	95,9
President Bernardes	14.490	83,7

President Epitácio	39.505	94
President Prudente	225.668	98
President Venceslau	35.201	97
Rancharia	28.588	91,8
Regent Feijó	20.145	93,9
Ribeirão dos Índios	2.025	88,6
Rosana	17.440	96,4
Sandovalina	3.645	80,1
Saint Anastocio	17.963	94,3
Saint Expedite	3.000	93,3
Taciba	6.260	87,9
Tarabaí	6.536	94
Teodoro Sampaio	22.173	82,7
	600.617	96,5

Source: Government of the State of São Paulo (2022); IBGE (2023); Adapted by the author (2024).

It can be concluded that the Municipality in comparison with the others of Pontal do Paranapanema is the one with the lowest degree of urbanization, where of its 5,466 inhabitants (last Demographic Census) and a degree of urbanization of 38.3%. This means that approximately 2,093 people reside in the urban area, while about 3,373 inhabitants live in rural areas. Thus, the importance of promoting family farming activities is perceived.

In addition to the city (urban perimeter), the Municipality has units called Agrovilas III and IV and nine more rural settlements, which makes the management and operationalization of public policies quite complex. Carvalho (1998) defines settlements as areas of land expropriated or acquired by the government for agrarian reform, where families of rural workers live and produce, constituting a heterogeneous social group.

The Lagoa São Paulo resettlement, created in 1983 in the municipalities of Presidente Epitácio and Caiuá, with technical assistance from the Companhia Energética de São Paulo (CESP), originated Agrovilas III and IV de Caiuá. This resettlement was established to house families from the islands and farms flooded by the construction of the Sérgio Motta Hydroelectric Power Plant (Porto Primavera) in Rosana, as well as individuals who became unemployed after working on the construction of the plant. Viudes (2017) identifies the other Settlements in the Municipality:

- Maturi Settlement: implemented in: 1998; area: 4,519.35 ha; settled families: 172; Distance from the seat of the municipality (urban area): about 60 km. It is the largest settlement in the municipality; together with the Luís de Moraes Neto settlement, it is the furthest from the seat of the municipality;

- Luís de Moraes Neto Settlement: implemented in: 2003; area: 1,713.09 ha; settled families: 72; lots: 104; distance from the seat of the municipality (urban area): about 60 km;
- Santa Rita Settlement: implemented in 1998 with an area: 523.54 ha and 21 lots with settlers;
- Santa Angelina Settlement: implemented in 2002, it has 23 lots with settlers;
- São Francisco Settlement: implemented in 2003, it has 22 lots with settlers;
- Malú Settlement: implemented in 2003, it has 25 lots with settlers;
- Engenho Settlement: implemented in 2001, it has 19 lots, 15 in the municipality of Caiuá/SP and 4 in the municipality of Presidente Epitácio/SP.

Settlement of Our Lady of Grace

In March 2007, the Land Institute of the State of São Paulo (Itesp) implemented the Nossa Senhora das Graças settlement, located in the municipalities of Caiuá and Presidente Venceslau, in Pontal do Paranapanema, benefiting 66 families in a total area of 1,544.66 hectares (Government of the State of São Paulo, 2010)

Despite the implementation of agrarian reform areas, a significant portion of the settled population faces difficulties in receiving public funds. A striking example is found in this Settlement. Effectively created in 2010, the Nossa Senhora das Graças Settlement, under the coverage area of the ITESP Foundation, still has families that have problems receiving public funds due to default.

Another point is the commercialization of milk, which faces difficulties, mainly due to the low prices paid by dairy products. Aspects such as the lack of infrastructure, both for storage and marketing, contribute significantly to the low value of the product in the market. The absence of cooling tanks in the settlements forces producers to deliver milk in gallons, resulting in even lower prices (Carmo, 2015).

METHODOLOGY

The present research has a qualitative nature with exploratory purpose and aims to understand the dynamics and challenges faced by the settlers of the Nossa Senhora das Graças Settlement, located in Caiuá/SP. The qualitative approach is chosen for its ability to provide a deep and detailed understanding of participants' perceptions and experiences. Exploratory research, in turn, seeks to identify and examine little-known or little-studied

phenomena, providing initial knowledge that can serve as a basis for more in-depth future studies. In addition, a literature review was carried out to theoretically support the study, allowing a comparative and contextualized analysis of the data collected in the field (Andrade 2017).

The field study was conducted in the municipality of Caiuá, located in the state of São Paulo. The area of specific focus is the Nossa Senhora das Graças Settlement, a settlement that is home to several families who depend on family farming for their livelihoods. This region was chosen for its peculiar characteristics and the relevance that family farming has for the local economy and for the sustainability of the communities present there.

Data collection was carried out with the settlers, where semi-structured interviews were conducted to capture the perceptions, experiences and challenges faced by the residents of the settlement. The interviews allowed for direct and flexible interaction with the participants, enabling the collection of rich and detailed information about their realities and perspectives. In addition, the agricultural practices and living conditions of the settlers were observed, complementing the data obtained in the interviews (Marconi; Lakatos, 2007).

The analysis of the collected data was carried out based on the information obtained in the interviews. The analysis process followed the content analysis technique, which involves the categorization and interpretation of textual data, seeking to identify patterns, themes and emerging meanings. This approach allowed for an in-depth understanding of the experiences and challenges reported by the settlers, providing relevant information on the sustainability of family farming in the Caiuá region. The results were compared with the reviewed literature, allowing for a critical and contextualized analysis of the study's findings.

DATA COLLECTION

A research was conducted in the Nossa Senhora das Graças Settlement, using the methodology of semi-structured interviews, with the objective of obtaining a comprehensive view of the agricultural practices currently adopted by farming families and evaluating their environmental impact. This study also aimed to identify the main challenges faced by families in the search for sustainable agricultural practices.

As previously stated, the Settlement has a total of 1,544.66 hectares, which are divided among 66 families, totaling approximately 9.67 bushels of land for each lot, or 96,710.5007 square meters of rural space.

The questionnaire (see appendix A) was applied to 7 families belonging to the Settlement, which have an average of 2 residents. The questions were answered mostly by the women of the household. It should be noted that the fact of not having other adults in the house presupposes another frequent problem in Family Farming units – rural succession.

Initially, residents were asked what types of crops are on the property. The answers were not very varied, however, as can be seen in the graph, vegetables (such as okra, gherkin, beans, sweet potatoes, corn and vegetable garden foliage) were the most mentioned, outlining a common productive characteristic among the residents.

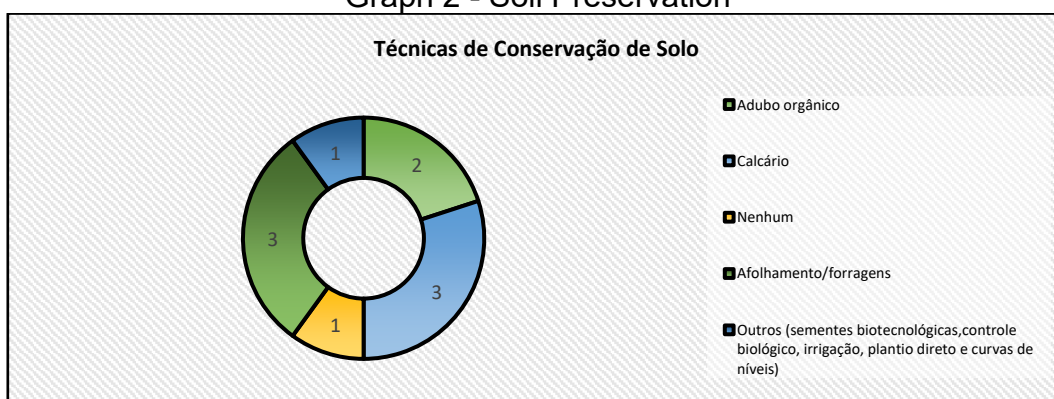
Graph 1 – Crops of the properties



Source: Author (2024).

When asked about the main soil and water conservation techniques, numerous answers were obtained, however, limestone, foliage and the use of organic fertilizers are the main tools used.

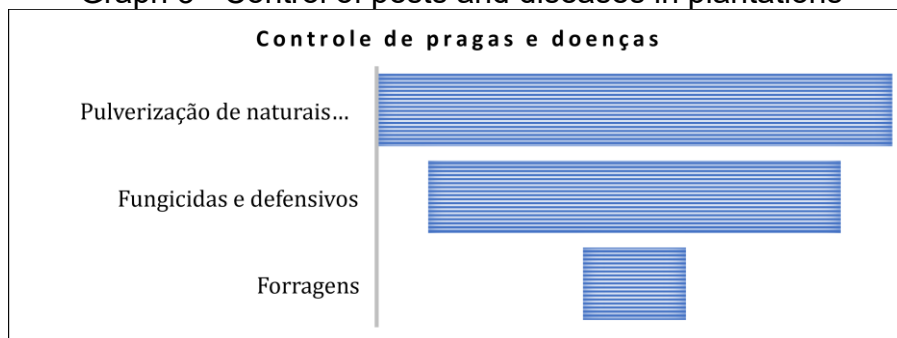
Graph 2 - Soil Preservation



Source: Author (2024).

When questioning the main mechanisms to defend crops from pests and diseases, there was a very peculiar division between natural products and fungicides and various pesticides. This fact exposes that there is the use of unnatural mechanisms such as the use of pesticides, but the spraying of natural products is cited with predominance.

Graph 3 - Control of pests and diseases in plantations



Source: Author (2024).

When asked: "How is climate change impacting the production of the lot?", unanimous answers such as: "with rigor and a lot of difficulty", "with a drop/damage to production", "with an increase in production expenses", "bringing more pests".

Another point of great propensity in responses concerns access to resources and technologies in order to implement more sustainable agricultural practices. Of all the 7 responses collected, only 1 resident said affirmatively, a fact that they justify by the lack of "technical assistance", "machinery" and "financial resources" for this specific area.

Another point asked to residents was whether they have knowledge about sustainable agricultural practices and, if so, which ones they would consider more viable. The answers are shown in the graph below:

Graph 4 - Knowledge about sustainable agricultural practices



Source: Author (2024).

The answers, unfortunately, expose a worrying trend, where more than 50% do not know viable practices that could generate applicability on their rural property. An additional point highlighted is that there are some initiatives such as SENAR courses, but many do not participate, or do not participate frequently; some also said that "there are no initiatives", which may demonstrate a lack of knowledge on the part of the Settlement as a whole or even a lack of incentive to the importance of training.

Still on which opportunities could improve sustainability in local agriculture, the following were vehemently mentioned: technical assistance, government funding in projects aimed at Family Farming and even an "association", which has already been implemented, but what is perceived is little participation and distrust among some residents. In this same aspect, participation in the Associations was questioned, where only 3 families stressed participating and believing that it can contribute to a more sustainable environment. Furthermore, it was questioned whether the residents would be open to experimenting with new sustainable practices and technologies, as a result, it was found that 100% of the interviewees are willing to seek and learn new ideas that permeate sustainability, but some exclaimed that these policies are far from being effective in the Nossa Senhora das Graças Settlement.

Finally, they were asked if they imagine that sustainability in family farming tends to contribute to greater food security and social justice, where all the answers were affirmative in the sense of avoiding pesticides, having fewer health problems, not harming the soil anymore and having the possibility of more access to food produced by those who need it most.

RESULTS AND DISCUSSION

The study carried out in the Nossa Senhora das Graças Settlement revealed crucial aspects about the agricultural practices adopted by the families, highlighting both the opportunities and the challenges faced in the search for a more sustainable agriculture. The research showed a limited diversity of crops, with a predominance of vegetables such as okra, gherkin, beans, sweet potatoes, corn and foliage. This productive homogeneity suggests an orientation focused mainly on subsistence and the local market, which reflects the multifunctionality of agriculture, as discussed by Guillaumin et al. (1999), where the productive function is only one of the several dimensions that agriculture can encompass.

The adoption of soil and water conservation techniques, such as the use of limestone, foliage and organic fertilizers, indicates an awareness of the importance of ecological sustainability, as described by Sachs (1998). However, the research points to a limitation in the implementation of these practices, attributed to the lack of resources and technical assistance, which underlines the need for more robust public policies that support sustainable development in family farming (Silva, 2007).

In pest and disease control, the divide between the use of natural pesticides and chemicals reflects a tension between the desire for more sustainable practices and the reliance on conventional methods. This can be interpreted in light of the concept of multifunctionality, where agriculture not only produces food but also impacts soil health and environmental quality (Guillaumin et al., 1999). The continued use of pesticides, although contradictory in relation to ecological sustainability, can be understood as a response to the lack of viable alternatives and limited knowledge about more sustainable practices.

Climate change has been unanimously recognized as a significant challenge, directly affecting agricultural productivity and increasing production costs. This recognition emphasizes the urgent need for adaptation and mitigation through more resilient agricultural practices, aligned with the principles of ecological and economic sustainability (Sachs, 1998). Farmers' perceptions of climate impacts corroborate the importance of public policies that integrate these dimensions and promote the resilience of rural communities.

Regarding access to technologies and resources to implement more sustainable practices, most respondents reported difficulties, citing the lack of technical assistance, machinery and financial support as the main barriers. This situation reflects the structural vulnerability of the families in the settlement and highlights the need to strengthen programs such as PRONAF and PAA, which aim to support family farming through credit and technical assistance, as discussed in the literature on public policies (Schneider and Grisa, 2015).

Limited knowledge about sustainable agricultural practices, admitted by more than half of the interviewees, indicates a gap in education and training, even with the existence of initiatives such as SENAR courses. This suggests that there is an urgent need for greater encouragement and dissemination of these training opportunities, to ensure that farmers have the necessary tools to adopt more sustainable and competitive practices (Veiga, 1996; Bianchini, 2005).

On the other hand, it is promising that all respondents expressed a willingness to experiment with new sustainable practices and technologies. However, skepticism about the effectiveness of these policies may be a reflection of past experiences or a lack of ongoing support. This reinforces the need for more effective public policies and an integrated approach that considers the social, economic, and ecological dimensions of sustainability (Sachs, 1998).

Finally, all participants agreed that sustainability in family farming is crucial to ensure food security and promote social justice. This consensus reflects an understanding that sustainable agricultural practices are essential to preserve soil health, reduce the use of pesticides, and increase access to healthy food within the community, in line with the pillars of sustainable development in agriculture (Silva, 2007).

These results indicate that while there is a growing awareness of the importance of sustainability, the implementation of more sustainable agricultural practices in the Nossa Senhora das Graças Settlement still faces significant challenges. These challenges are mainly related to the scarcity of resources, limited knowledge, and lack of adequate technical support. Therefore, there is an urgent need for more effective public policies and training programs that can support farming families in the transition to more sustainable and resilient agricultural systems, as recommended by several authors in the theoretical framework.

FINAL CONSIDERATIONS

This study explored the agricultural practices adopted in the Nossa Senhora das Graças Settlement, focusing on sustainability and the challenges faced by family farmers. The analysis revealed that while there is a growing awareness of the importance of ecological, economic, and social sustainability, the implementation of more sustainable practices still faces significant barriers, such as lack of resources, limited knowledge, and insufficient technical assistance.

The research highlighted the multifunctionality of family farming, showing that, in addition to its productive function, agriculture plays crucial roles in environmental preservation and in maintaining social cohesion in rural areas. However, reliance on conventional methods, such as the use of pesticides, and limited crop diversification, mean that many farmers are still unable to fully adopt sustainable practices. This points to the need for continuous and more robust support from public policies, such as PRONAF and

PAA, which have the potential to facilitate the transition to more sustainable practices, but which need to be more accessible and effective in their implementation.

The difficulties faced by farmers in accessing technologies and resources, coupled with limited knowledge about more sustainable practices, suggest the importance of strengthening capacity building and education initiatives in the field. Training programs, such as those offered by SENAR, need to be widely disseminated and adapted to local realities so that they can effectively train farmers to adopt more sustainable practices. It is noteworthy that there is a clear willingness among farmers to experiment with new practices and technologies, which is a positive sign for the future of sustainable agriculture in the settlement. However, this provision must be supported by effective public policies and technical assistance that is continuous and adapted to local needs.

Thus, for family farming in the Nossa Senhora das Graças Settlement to achieve a sustainability model that is economically viable, environmentally responsible, and socially just, an integrated approach is needed that considers the multiple dimensions of sustainability. More effective public policies, more accessible training programs, and ongoing technical assistance are crucial elements to support this transition. Only with adequate support will family farmers be able to overcome current challenges and contribute significantly to food security, environmental preservation and sustainable rural development.

This study contributes to the understanding of the challenges and opportunities in the context of family farming, highlighting the importance of public policies and an integrated approach to promote sustainability in the field. Future research could benefit from a more in-depth focus on the evaluation of specific public policies and the analysis of agroecological practices, aiming to offer practical solutions to the challenges identified, in addition to observing the phenomenon of rural succession in small properties, with a focus on the family production process.

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APPENDAGES

APPENDIX A - Semi-Structured Interview

Guarantee of Anonymity in the Interview

I would like to assure you that all information collected during this interview will be treated with complete confidentiality. To protect the privacy of all participants, we will not ask for names, addresses, or any other personal data that could identify you or your family.

The data will be used exclusively for academic research purposes and will be presented anonymously, ensuring that your answers cannot be associated with you. Your anonymity is of utmost importance to us, and we are committed to respecting and protecting your privacy.

Your participation is voluntary, and you can choose not to answer any questions that cause you discomfort. We sincerely appreciate your contribution to this research and hope that your responses will help promote more sustainable agricultural practices and improve the conditions of family farming in our region.

Issues:

About Agricultural Practice

1. What types of crops do you currently plant on your property?
2. What soil and water conservation techniques do you adopt?
3. How do you deal with pests and diseases in crops?

About the Challenges

4. How has climate change impacted your agricultural production?
5. Do you have access to resources and technologies to implement more sustainable agricultural practices?
6. What are the main economic difficulties you face in agriculture?

About Sustainability

7. Do you have knowledge about sustainable agricultural practices? If so, which ones do you consider most viable?
8. Are there local initiatives or programs that encourage sustainable agriculture? Do you participate or have you participated in any at Nossa Senhora das Graças?

About Opportunities

9. What opportunities do you see to improve the sustainability of family farming in the Settlement?
10. Do you participate in farmers' networks or associations? Do you believe it can help promote sustainability?

About Future and Innovation

11. Are you open to experimenting with new sustainable practices and technologies on your property? Do you think they are close in the Settlement?
12. How do you imagine that sustainability in family farming can contribute to food/food security and social justice?