



## COOPERATIVISM IN THE HONEY VALUE CHAIN: A STUDY OF THE BEEKEEPING COOPERATIVE OF THE PICOS MACROREGION (CAMPIL) – PIAUÍ

Jefferson Antônio de Oliveira<sup>1</sup>  
Filipe Augusto Xavier Lima<sup>2</sup>

**Abstract:** *This study analyzes the role of cooperativism in the honey production chain based on the experience of the Beekeeping Cooperative of the Picos Macroregion (CAMPIL), in the state of Piauí, Brazil, focusing on its contribution to sustainable rural development and to the territorial organization of beekeeping in the Semi-arid region of Piauí. Using an exploratory and qualitative approach, the research combines bibliographic and documentary review, analysis of secondary data, semi-structured interviews, and spatial analysis of the distribution of cooperative members. The research considers the cooperative's area of operation in the Picos macroregion, located predominantly within the Caatinga biome, and may also encompass areas of ecological transition depending on the territorial distribution of its members. The results show that CAMPIL plays a strategic role in organizing production, facilitating honey commercialization, reducing dependence on middlemen, and expanding access to more demanding markets, including international ones. The cooperative also contributes to the social reproduction of family farming through income redistribution, collective actions, and territorial strengthening. However, it faces challenges related to drought, reduced flowering, operational costs, and institutional vulnerability. The study concludes that beekeeping cooperativism is an important mechanism of peasant resistance and a relevant pathway for promoting sustainable rural development in the Semi-arid region.*

**Keywords:** *Cooperativism; Beekeeping; Sustainable rural development; Social organization.*

## COOPERATIVISMO AGRÍCOLA NA CADEIA DO MEL: O CASO DA COOPERATIVA APÍCOLA DA MACRORREGIÃO DE PICOS (CAMPIL) – PIAUÍ

**Resumo:** Este estudo analisa o papel do cooperativismo na cadeia produtiva do mel a partir da experiência da Cooperativa Apícola da Macrorregião de Picos (CAMPIL), no estado do Piauí, com foco em sua contribuição para o desenvolvimento rural sustentável e para a organização territorial da apicultura no Semiárido piauiense. Com abordagem exploratória e qualitativa, a pesquisa articula levantamento bibliográfico e documental, análise de dados secundários, entrevistas semiestruturadas e análise espacial da distribuição dos cooperados. A pesquisa considera a área de atuação da cooperativa na macrorregião de Picos, inserida predominantemente no bioma Caatinga, podendo abranger áreas de transição ecológica conforme a distribuição territorial dos cooperados. Os resultados indicam que a CAMPIL exerce função estratégica na organização da produção, no escoamento do mel, na redução da dependência de atravessadores e na ampliação do acesso a mercados mais exigentes, inclusive externos. Também se destaca sua contribuição para a reprodução social da agricultura familiar, por meio da redistribuição da renda, da realização de ações coletivas e do fortalecimento territorial. Contudo, a cooperativa enfrenta desafios relacionados à estiagem, à redução das floradas, aos custos operacionais e à vulnerabilidade institucional. Conclui-se que o cooperativismo apícola constitui importante mecanismo de resistência camponesa e de promoção do desenvolvimento rural sustentável.

### 1 Introduction

Beekeeping constitutes one of the oldest agricultural activities practiced by humankind, playing a fundamental role in both nutrition and traditional medicine since Ancient times. Historical records indicate that the Egyptians were the first to systematize beekeeping, integrating

---

<sup>1</sup> Master's degree in Development and Environment from the Federal University from Ceara (PRODEMA/UFC). ORCID: <https://orcid.org/0009-0007-4014-7081> Lattes: <http://lattes.cnpq.br/5340406400152972> E-mail: [jefferson23@alu.ufc.br](mailto:jefferson23@alu.ufc.br)

<sup>2</sup> PhD in Rural Extension (UFSM). Federal Rural University of Pernambuco (UFRPE). ORCID: <https://orcid.org/0000-0003-4235-1311> Lattes: <http://lattes.cnpq.br/6333811948672580> E-mail: [filipeaxlima@ufc.br](mailto:filipeaxlima@ufc.br)



apiculture into their agricultural and cultural practices, an experience that later spread to other peoples and regions around the world (Couto; Couto, 2006). Over time, this activity ceased to be merely an empirical practice and became part of structured production chains, encompassing production, processing, and commercialization, particularly in rural contexts characterized by family farming.

In Brazil, beekeeping has emerged as a strategic activity for sustainable rural development, combining economic, social, and environmental attributes that qualify it as an alternative for productive inclusion in rural areas. Beekeeping is considered one of the activities that most closely aligns with a socially fair and environmentally sustainable model, being capable of generating income, strengthening collective organizations, and preserving natural resources (Souza, 2007). Data from Brazilian Honey Exporters Association (Abemel, 2024) indicate that Brazil exported 37,890 metric tons of honey in 2024, generating revenue of US\$100.439 million. These numbers consolidate a growth trajectory observed since 2018, characterized by the continuous expansion of export volumes.

However, the evolution of international prices reveals a more unstable scenario, according to the Abemel (2024) report. After reaching values above US\$4.00 per kilogram in 2018, the average price experienced a sharp decline in 2020, falling to levels below US\$2.00 per kilogram. This downturn was followed by a gradual recovery, culminating at US\$3.74 per kilogram in 2022. From that point onward, the market entered a period of deceleration, reflecting both demand pressures and supply adjustments. As a result, the average prices recorded in 2024 (US\$3.46/kg) remained below the 2022 peak, signaling a trend toward stabilization at intermediate levels between the extremes observed in 2020 and 2018.

In this context, the increase in export volume has played an important role in sustaining beekeeping revenues, partially offsetting the decline in average international prices. Monthly data presented by Abemel (2024) confirm this dynamic: in November, the sector simultaneously reached its peak commercial performance, with 4,590 metric tons shipped and revenue totaling US\$12.577 million, demonstrating a positive correlation between volume and revenue when both factors align favorably. This concentration of performance within a single month, in turn, also signals the underlying volatility of the market, suggesting that revenue sustainability depends both on occasional opportunities and on structural strategies.

Based on Abemel's 2024 data, Brazil occupies a prominent position in the international honey market, as evidenced by both its high export capacity and the consolidation of its presence in strategic high-consumption markets. The country has established itself as a major supplier to the North American market, which absorbed 79% of the total export volume (29,966 metric tons) and accounted for 78% of Brazilian export revenues in 2024. Canada and Germany accounted for



11% and 6% of exports, respectively, demonstrating the geographical diversification of Brazilian honey exports. Furthermore, the country also participates in higher value-added markets, such as the Chinese market, where the average export price reached US\$7.95 per kilogram, substantially higher than the overall average of US\$2.65 per kilogram observed in 2024. Since 2018, Brazil has exhibited a linear growth trend in the volume of honey exported abroad, demonstrating the strengthening of the country's presence in global trade over the years.

Beekeeping also stands out due to its specific production characteristics: it requires low initial investment, involves relatively simple management practices, and relies on renewable natural resources, such as nectar and pollen from native flora, making it particularly accessible to small and medium-sized producers (Henrique *et al.*, 2008; Lourenço; Cabral, 2016). Unlike other agro-industrial value chains that are heavily dominated by large business groups, honey production remains largely under the control of family farmers, thereby encouraging cooperative forms of organization and commercialization (Almeida; Carvalho, 2009; Sabbag; Nicodemo, 2011).

In this context, the Brazilian Semi-arid region emerges as one of the areas with the greatest potential for beekeeping in the country, due to the richness and diversity of its flora, associated with climatic conditions favorable to the production of high-quality honey (Khan *et al.*, 2014). The state of Piauí, in particular, stands out for its vegetation formations and for the transition between tropical and Semi-arid climates, which results in rich and prolonged flowering periods that favors beekeeping (Aleixo *et al.*, 2014). It is within this setting that the Beekeeping Cooperative of the Picos Macroregion (CAMPIL) is located, representing one of the most well-established experiences of beekeeping cooperativism in Northeastern Brazil.

Founded in 1985 by 30 beekeepers, CAMPIL emerged as a response to the predatory practices of middlemen, who imposed unfairly low prices on the honey produced by local farmers. By collectively organizing the commercialization process, the cooperative began to ensure fairer prices, expand market access, and strengthen the producers' economic autonomy. Currently, CAMPIL brings together more than 150 members, has its own administrative structure, and acts as an intermediary in contracts with industries and exporters, including those operating in international markets, while pursuing organic certification as a strategy for adding value and gaining access to more demanding market niches.

CAMPIL's experience reflects the central role of cooperativism as a form of peasant resistance to the power asymmetries present in agrifood value chains. Given that honey production represents an important economic activity for family farming in the Semi-arid region of Piauí, the general objective of this study is to analyze the role of cooperativism in this production chain, using CAMPIL as an empirical reference. The specific objectives of this study are: (i) to understand the organization of production and the commercialization mechanisms adopted by



CAMPIL, with an emphasis on overcoming dependence on intermediaries and gaining access to foreign markets; and (ii) to examine how the cooperative contributes to sustainable rural development and the social reproduction of family farming within the specific context of the Semi-arid region of Piauí.

## 2 Theoretical framework

Brazil has a high honey production capacity and stands out in the international market due to the quality of its apicultural products (IBGE, 2017). In this context, the Northeast region exhibits particular competitiveness in the global market, owing to environmental conditions that favor the production of high-quality honey. According to data from the 2017 Census of Agriculture conducted by IBGE (2017), the main distinguishing feature of honey produced in Northeastern Brazil is the low presence of chemical contaminants, such as pesticides and antibiotic residues. This characteristic is largely attributable to the fact that a significant portion of honey production is associated with native vegetation, thereby reducing bees' exposure to agricultural inputs used in intensive farming systems.

Furthermore, Landau (2020) argues that the climatic conditions prevailing in the region, particularly the low humidity levels, hinder the spread of diseases in beehives. As a result, the need for medications to control bee health is reduced, contributing to the production of a product that is more compatible with the requirements of organic honey markets. Thus, according to Landau (2020), the combination of favorable natural resources, lower chemical contamination, and reduced reliance on medicinal treatments provides Northeastern Brazilian honey with a significant competitive advantage, strengthening its position in both national and international markets.

According to data from the 2017 Census of Agriculture, Brazilian beekeeping is predominantly carried out by small-scale producers, with family farming accounting for 80% of the establishments in the sector both nationwide and in the Northeast region. In areas encompassing the Northeast, northern Minas Gerais, and northern Espírito Santo, the activity assumes an even deeper social significance. This is evidenced by the fact that 94% of the apicultural establishments in the Northeastern region are concentrated in the Semi-arid region, particularly in the states of Piauí, Bahia, and Ceará, where water scarcity severely limits other profitable rural production alternatives.

In this scenario of climatic constraints, beekeeping has become an important tool for income diversification (IBGE, 2017). Of the 101,797 apicultural establishments in Brazil, 24,150 are located in the Northeast region, accounting for a total of 674,186 beehives. The strong social



inclusion dimension of the activity is reflected in the land tenure structure of these beekeepers: of the total number of beehives in the region, 9% (62,801) belong to producers without land ownership, while another 34,385 are located on properties of up to 1 hectare, clearly demonstrating the role of the activity in supporting the sustainability of families with limited access to land.

It is worth noting that the growth of Brazilian beekeeping was also reflected in the national results observed in 2021 (IBGE, 2023). In that year, the country produced 55.8 thousand tons of honey, recording an increase of 6.4% compared to the previous year. Although the Southern Region maintained its leadership in production volume, the Northeast stood out for the strengthening of its apicultural activity, reaching a production of 20.3 thousand tons (Table 1).

Table 1 – Brazilian honey production (in thousand tons)

Region\State	2017	2018	2019	2020(a)	2021(b)	Change (%) (a/b)	Share (%)
<b>North</b>	0,8	0,9	1,0	1,0	1,1	14,2	2,0
<b>Northeast</b>	12,8	14,1	15,6	19,3	20,3	4,8	36,3
Maranhão	2,4	2,3	2,3	2,5	2,4	-3,8	4,3
Piauí	4,4	5,2	5,0	5,7	6,9	21,2	12,3
Ceará	1,8	2,1	2,7	3,9	3,8	-3,4	6,7
Rio Grande do Norte	0,2	0,4	0,5	0,6	0,6	-2,7	1,0
Paraíba	0,2	0,2	0,2	0,3	0,3	11,4	0,6
Pernambuco	0,3	0,6	0,8	0,9	1,2	33,0	2,2
Alagoas	0,2	0,3	0,3	0,4	0,4	9,1	0,7
Sergipe	0,1	0,0	0,1	0,1	0,1	16,6	0,2
Bahia	3,4	3,0	3,7	5,0	4,6	-8,4	8,2
<b>Central-west</b>	2,0	1,5	1,8	1,9	1,7	-6,7	3,1
<b>Southeast</b>	9,6	9,2	9,8	9,9	10,5	6,0	18,8
<b>South</b>	16,5	16,5	17,8	20,4	22,2	8,8	39,7
<b>Brazil</b>	41,7	42,3	46,1	52,5	55,8	6,4	100,0

Source: IBGE (2023).

This result has a particular historical relevance, as it represents the consolidation of a recovery process that began after the severe drought that affected the region starting in 2012 (Landau, 2020). By surpassing the production volume recorded in 2011, the last year prior to the prolonged drought, Northeastern apiculture demonstrated not only its capacity for recovery but also its reestablishment as an important honey-producing hub in the country. Thus, the performance recorded in 2021 shows that the Northeastern apicultural sector was able to overcome the impacts of one of the most severe climatic crises in its recent history, reaffirming its importance



for national honey production.

At the state level, Piauí has established itself as the largest honey producer in the Northeast, leading regional participation with 12.3% (Table 1). The state stands out both for its rapid recovery from the effects of the 2012 drought and for the strong production growth recorded between 2020 and 2021. Closely followed, Bahia establishes itself as the second main production hub, maintaining its relevance in the regional scenario even after a slight decline in 2021.

The state of Ceará, in turn, ranks as the third-largest producer (Table 1). Although it shows a more gradual recovery, production in the state was boosted by the higher rainfall levels recorded in 2022 and 2023, triggering a recent cycle of expansion. Completing the group of the four main honey-producing states in the Northeast, Maranhão stands out as an emerging force, consolidating its growth trajectory in the region.

In the Brazilian context, beekeeping has established itself as a relevant economic alternative for family farmers and rural communities, especially in Semi-arid regions, as it combines low environmental impact, potential for value addition, and the ability to diversify rural income. Moreover, its recent expansion in the country highlights not only the economic importance of the honey value chain, but also its potential as a basis for forms of collective organization oriented toward the valorization of peasant labor and the construction of rural development strategies that are more socially fair and environmentally responsible (Balbino; Binotto; Siqueira, 2015).

Technology, knowledge, and innovation are among the main factors associated with economic development and national competitiveness. In the Brazilian case, agribusiness is a prominent example of this dynamic, having reached a leading position in the international market for products such as grains, sugar, coffee, meat, and orange juice. According to Klosowski, Kuasoski, and Bonetti (2020), this performance results from the combination of scientific research, technological adaptation, and in-depth knowledge of tropical ecosystems, enabling a more efficient use of natural resources such as soil, water, biodiversity, and solar radiation.

In this context, beekeeping emerges as an activity with high economic, social, and environmental potential, which remains insufficiently explored compared to other segments of agribusiness. According to Klosowski, Kuasoski, and Bonetti (2020), rational beekeeping presents characteristics that make it particularly strategic for sustainable rural development. This relevance, according to the aforementioned authors, can be understood through three main aspects: first, the activity is strongly associated with family farming, constituting an important source of employment and income for small rural producers. Second, beekeeping shows a high degree of complementarity with other agricultural activities, contributing both to income diversification and to increased productivity through pollination services. Finally, its main products, such as honey,



propolis, royal jelly, pollen, beeswax, and apitoxin, have high added value, surpassing that of several conventional agricultural products.

In beekeeping, management and production practices are adopted according to each beekeeper's perception and experience, in interaction with the sociocultural elements of the territory in which production takes place. Thus, the importance attributed to certain practices may vary across different regional contexts, both due to local environmental characteristics and to the specific cultural features that guide the organization of labor and production (Brasil, 2021).

The relationship established by producers with the land is closely aligned with an agroecological perspective, insofar as cultivation is not reduced to the mere production of food or income, but is embedded in a particular way of life and of social reproduction in rural areas. In this approach, agroecology goes beyond a strictly productive dimension and is configured as a mode of existence, in which farmers construct their own forms of labor organization, coexistence, and permanence in the territory. It represents a form of rationality that restores the centrality of land and its multiple connections with human, economic, and symbolic dimensions, contributing to the construction of alternative forms of sociability in rural environments (Figueiredo; Santos; Costa, 2024).

For that matter, farmers tend to develop a relationship of care with the land that goes beyond the limits of individual property, also encompassing shared spaces and neighboring territories. This stance reveals a broader understanding of production, guided not only by the pursuit of economic outcomes but also by concern for workers' health and environmental conservation. In this context, agroecological production ceases to be merely a technical alternative and takes on the character of a social and environmental necessity, implying a questioning of the conventional production model, which is often sustained by slash-and-burn practices, pesticides, synthetic inputs, and environmentally degrading management practices (Valença *et al.*, 2025).

Demand for honey has expanded in recent decades, driven by population growth and, above all, by the increasing interest of consumers in natural foods perceived as healthier. However, precisely because it is a highly valued product with strong market appeal, honey also becomes a frequent target of adulteration, which includes the addition of sugars, syrups, and other substances not originally part of its composition. These fraudulent practices compromise the authenticity of the product, reduce its nutritional properties, and negatively affect its quality, with repercussions both for consumer trust and for the value of the production chain (Máquina *et al.*, 2025).

It is within this context that cooperativism assumes a central role, as it constitutes an institutional mediation that enhances beekeepers' capacity for organization, negotiation, and economic insertion. Indeed, through collective action, cooperativism makes it possible to improve production processes, add value to output, and ensure a more equitable distribution of work results,



contributing to the strengthening of family farming and to the social reproduction of producers within their territories (Camargo *et al.*, 2024).

Cooperativism constitutes an economic and organizational system based on the principles of cooperation, democratic participation, and collective interest (Büttenbender *et al.*, 2019). These principles (Table 2) guide cooperatives in the production, circulation, and distribution of wealth, reconciling economic efficiency with the social development of their members and communities.

Table 2 – Cooperative principles

1) Voluntary and open membership	Cooperatives are voluntary organizations, open to all persons able to use their services and willing to assume the responsibilities of membership, without discrimination based on gender, social, racial, political, or religious grounds. To participate, individuals must be aware of and decide whether they are able to comply with the agreements established by the majority.
2) Democratic member control	Cooperatives are democratic organizations controlled by their members, who actively participate in the formulation of policies and in decision-making processes. Men and women elected as representatives of the other members have equal voting rights (one member – one vote); higher-level cooperatives are also organized in a democratic manner.
3) Economic participation of members	Members contribute equitably to the capital of their cooperatives and control that capital democratically. Part of this capital is usually the common property of the cooperative. Members typically receive, if any, limited compensation on paid-in capital as a condition of their membership. Members allocate surpluses to one or more of the following purposes: a) the development of the cooperative, enabling the establishment of reserve funds, part of which shall be indivisible; b) benefits to members in proportion to their transactions with the cooperative; and c) support for other activities approved in the general assembly.
4) Autonomy and independence	Cooperatives are autonomous, self-help organizations controlled by their members. If they enter into agreements with other organizations, including public institutions, or raise external capital, they must do so on terms that ensure democratic control by their members and preserve the cooperative's autonomy.
5) Education, training, and information	Cooperatives promote the education and training of their members, elected representatives, and employees so that they can contribute effectively to the development of their cooperatives. They inform the general public, particularly young people and opinion leaders, about the nature and benefits of cooperation.
6) Cooperation among cooperatives	Cooperatives serve their members most effectively and strengthen the cooperative movement by working together through local, regional, national,



	and international structures.
7) Concern for community	Cooperatives work for the sustainable development of their communities through policies approved by their members.

Source: Büttnebender *et al.* (2019).

In order for this reconciliation to be achieved, the Brazilian legal framework establishes mandatory guidelines. Law No. 5,764 (Brazil, 1971) and the bylaws of each cooperative define the legal foundations upon which each organization structures its activities, allowing it to invest resources and develop programs aligned with its specific objectives, whether in credit, agricultural production, health, education, or other sectors.

The Institutional Agenda of Cooperativism – 2025, developed by the Organization of Brazilian Cooperatives (OCB System), defines the institutional structure of Brazilian cooperativism. This system is organized around three complementary organizations: the Organization of Brazilian Cooperatives (OCB), responsible for the political and institutional representation of the sector; National Service for Cooperative Learning (Sescoop), responsible for the education and training of members and workers; and the National Confederation of Cooperatives (CNCoop), dedicated to defending cooperative interests before government bodies and civil society. Together, these three organizations form an integrated system that strengthens the collective voice of cooperativism in political and social decision-making arenas (OCB System, 2025).

The wide integration of cooperativism across different sectors of the Brazilian economy has required the development of an organizational structure capable of representing the diversity of interests and activities within the movement (OCB System, 2025). In this context, the division into seven sectors — detailed in Table 3 — constitutes a mechanism of institutional specialization that facilitates the coordination of cooperatives, strengthens their political representation, and enhances their capacity for dialogue with society and public authorities.

Table 3 – Brazilian cooperativism sectors in numbers

Sector	Cooperatives	Members	Employment
Agribusiness	1.179	1.047.068	257.137
Consumer	221	2.347.402	16.006
Credit	700	17.946.703	111.911
Infrastructure	276	1.560.375	7.009
Health	702	254.505	139.772
Labor, Production of Goods and Services	641	193.813	12.964
Transportation	790	102.839	5.812
<b>Total</b>	<b>4.509</b>	<b>23.452.705</b>	<b>550.611</b>



Source: OCB System (2025).

The configuration presented in Table 3 reflects the very scope of cooperativism, whose organizations operate in both urban and rural areas, participating in different economic segments. For that matter, cooperatives play a relevant role in the provision of goods and services, contributing to income generation, productive inclusion, and the economic and social development of the territories in which they are embedded (OCB System, 2025).

Brazilian cooperativism has assumed increasing relevance in the national socioeconomic context, both due to the expansion of its social base and the strengthening of its economic and organizational capacity. In 2024, according to data from the Brazilian Cooperative Yearbook, the sector reached 23.45 million members, corresponding to 11.55% of the Brazilian population. Compared to the previous year, this number increased by 14.5%, highlighting the continuous expansion of the cooperative model and its growing integration into the country's productive dynamics. Currently, cooperatives already involve around 23% of the employed population and are organized into 4,509 enterprises distributed across 1,398 Brazilian municipalities.

This social expansion is accompanied by significant economic results. As presented in the Yearbook, the sector generated approximately BRL 692 billion in revenue and accumulated total assets of BRL 1.16 trillion, representing a 17% growth compared to the previous period (OCB System, 2024). Cooperatives generated BRL 38.9 billion in surpluses and contributed more than BRL 33.9 billion in taxes, recording a 70% increase in tax revenue compared to 2022. These indicators show that cooperativism not only expands opportunities for economic participation but also plays a relevant role in wealth creation and public revenue generation.

In social and labor terms, the sector employs 550,611 professionals, having increased the number of jobs by 5% in a context marked by challenges to formal employment (OCB System, 2024). It is also noteworthy that women account for 52% of total cooperative employees, with a strong presence in the Health (75%) and Credit (60%) sectors. Among cooperative members, women represent 41% of the membership base, reflecting important progress, although challenges remain regarding the expansion of female participation in decision-making spaces and collective ownership.

Organizational diversity is also a distinctive feature of Brazilian cooperativism. The agribusiness sector leads both in the number of cooperatives (1,179) and in the number of employees (257,137), followed by the Transportation, Health, and Credit sectors. From a territorial perspective, there is a higher concentration in the Southeast region, which accounts for 1,605 cooperatives, followed by the Northeast (856) and the South (825), highlighting the wide geographical reach of the movement across the national territory (OCB System, 2024).

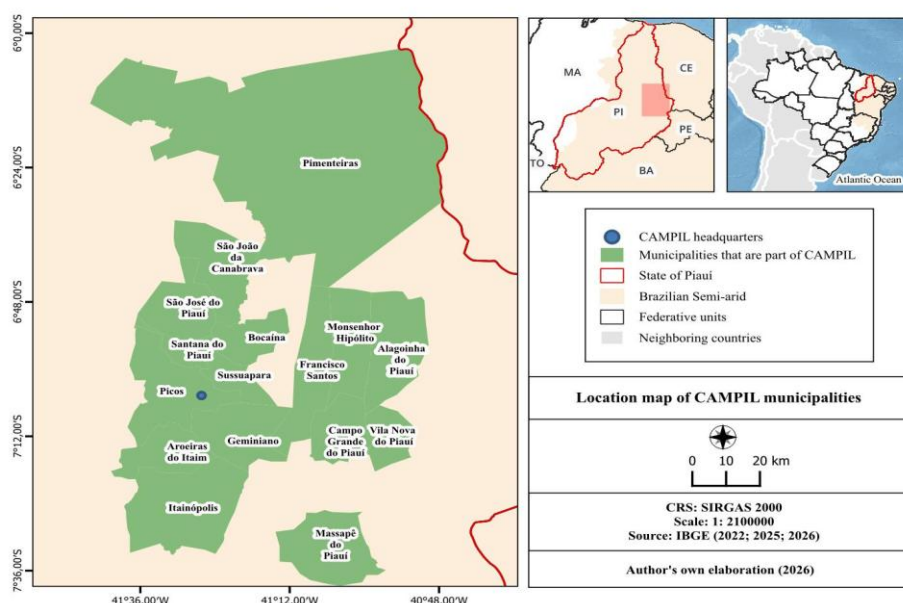
In the case of the honey production chain, cooperatives can play a decisive role in value addition, quality standardization, marketing, and the territorial coordination of production, especially in Semi-arid contexts, where living within ecological constraints requires adapted and socially embedded production strategies. Thus, beyond being merely an economic mechanism, beekeeping cooperativism can be understood as an expression of a collective rationality oriented toward the valorization of peasant labor, the permanence of rural families in the countryside, and the construction of rural development models committed to social justice and environmental responsibility (Almeida; Lorenzon; Tassinari, 2013).

It is from this interpretative framework that this study analyzes the experience of CAMPIL, seeking to understand its role in organizing the honey value chain in the Semi-arid region of Piauí and its contribution to the structuring of a more solidarity-based rural economy, territorially rooted and ecologically sustainable.

### 3 Methodology

This study is characterized as exploratory research with a qualitative approach, supported by both secondary and primary data of a quantitative and descriptive nature (Prodanov; Freitas, 2013). It focuses on the analysis of cooperativism in the honey production chain based on the experience of CAMPIL, located in the Semi-arid region of Piauí (Figure 1). The choice of CAMPIL is justified by its historical trajectory, territorial scope, insertion in regional and interstate markets, and its socioeconomic relevance for family farming and peasant communities in the region, constituting an emblematic case of collective organization within beekeeping in the northeastern Semi-arid area.

Figure 1 – Location of CAMPIL in the state of Piauí and in the Semi-arid Region



Source: IBGE (2025).



From a methodological standpoint, this study adopts the case study strategy, as it enables an in-depth understanding of a contemporary phenomenon embedded in a real and complex context. In this case, the role of beekeeping cooperativism as a mechanism for productive organization, commercialization, economic resilience, and socio-environmental sustainability. The research was developed through the articulation of four complementary axes of data collection and analysis, inspired by the methodological proposal of Soares (2022): (i) documentary and bibliographic review; (ii) secondary data analysis; (iii) primary data collection through field visits and semi-structured interviews; and (iv) spatial analysis of the territorial distribution of the cooperative and its members.

In the first stage, a documentary and bibliographic review was conducted based on institutional materials produced by CAMPIL, news reports, historical records, technical notes, content disseminated by organizations within the beekeeping sector and entities supporting family farming, as well as specialized literature on beekeeping, cooperativism, family farming, and rural development. This body of documentary evidence made it possible to reconstruct the cooperative's trajectory, its internal organizational structure, its membership criteria, its commercialization strategies, its physical infrastructure, and the main challenges it has faced over time.

In the second stage, secondary data from sources such as the Brazilian Honey Exporters Association (Abemel, 2024), academic studies, technical reports, cartographic databases, and institutional information provided by the cooperative itself were analyzed. These data were used to contextualize CAMPIL's experience within the regional and national landscape of the honey production chain, as well as to identify its area of operation, territorial insertion, production flows, and its integration with domestic and international markets. Information regarding the cooperative's infrastructure, honey marketing arrangements, organic certification, and participation in public policies and support programs for family farming

In the third stage, primary data were collected through a technical visit to CAMPIL's headquarters, located in the municipality of Picos, Piauí, and through semi-structured interviews with key actors within the cooperative. For analytical purposes, the testimonies of the cooperative's president, secretary, and a member beekeeper were considered, as they occupy distinct yet complementary positions within CAMPIL's organizational and productive structure. The interviews addressed topics such as the challenges faced by the cooperative, the impacts of climate change on production, the migration of beehives during periods of drought, the criteria for admitting new members, infrastructure and logistics, commercialization practices, relationships with middlemen, buyer market requirements, participation in public policies, institutional support, and collective actions aimed at environmental sustainability. It should be noted that the audio



recordings were transcribed using artificial intelligence and were subsequently reviewed and systematized for qualitative analysis purposes.

In the fourth stage, a spatial analysis was conducted based on data concerning the cooperative's area of operation, the location of its members, and the main road network, allowing for an examination of CAMPIL's territorialization and the differentiated distribution of its productive base. The cartographic representation made it possible to identify relative concentrations of members in municipalities such as Campo Grande do Piauí, Geminiano, and Picos, as well as lower densities in localities such as São João da Canabrava and Bocaina, highlighting spatial patterns relevant to understanding the organization of the honey production chain. This spatial dimension also enabled the relationship between the distribution of members and conditions of accessibility, collection logistics, and production outflow to be examined, all of which are key elements for the functioning of the cooperative.

The data analysis followed a qualitative interpretative approach, guided by triangulation procedures involving documents, secondary data, interviews, and spatial information. The contents were organized into analytical thematic axes, such as: (a) productive organization and cooperative governance; (b) infrastructure, logistics, and production flows; (c) commercialization, markets, and relationships with middlemen; (d) environmental sustainability and ecological dependence on the Caatinga biome; (e) public policies, institutional support, and structural constraints; and (f) social reproduction, permanence in rural areas, and the valorization of peasant labor. This systematization made it possible to understand how the cooperative articulates economic, territorial, environmental, and social dimensions in structuring the honey value chain.

The results are discussed in light of the literature on rural cooperativism, family farming, Agrarian Geography, and the Political Economy of the Peasantry, with an emphasis on the categories of territory, cooperation, social reproduction, sustainability, and peasant resistance. The study thus seeks to understand the extent to which CAMPIL contributes to strengthening the honey value chain, spatially organizing producers, reducing dependence on middlemen, adding value to production, expanding access to more demanding markets, and promoting fairer and more environmentally responsible forms of integrating beekeepers into regional, interstate, and international economic circuits.

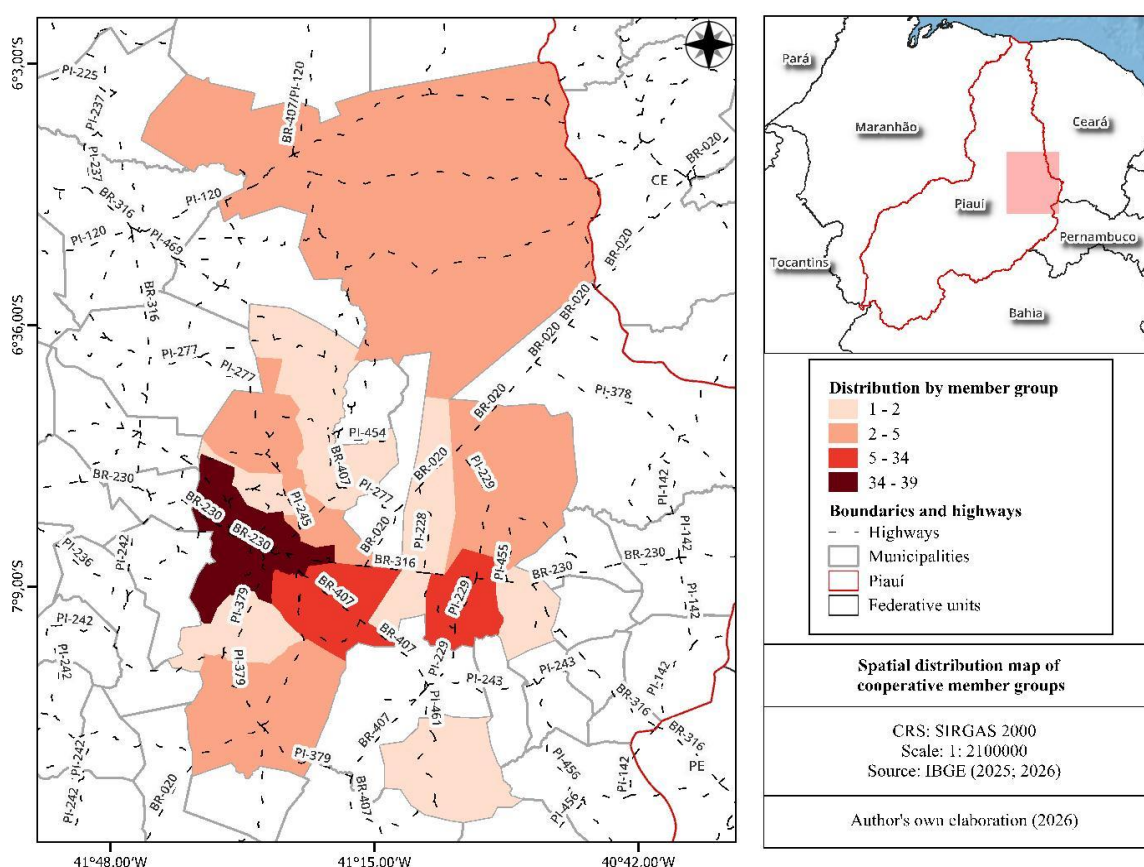
#### **4 Results and Discussion**

The beekeeping activity plays a relevant role in supporting producing families, contributing to increased income and improved living conditions in rural areas. By establishing itself as a complementary alternative to traditional agricultural activities, beekeeping expands the productive

base of family farms and promotes the strengthening of family farming. As highlighted by Araújo and Guimarães (2024), products derived from beekeeping, particularly honey, hold considerable economic importance, fostering the dynamization of local and regional economies.

Within the context of CAMPIL, this relevance of beekeeping assumes concrete territorial dimensions, expressed in the way producers are distributed and interconnected across the regional space. Figure 2 shows that cooperative members are concentrated primarily in municipalities located around Picos and in areas connected by the main road corridors, whereas more peripheral municipalities exhibit a lower relative density of members. This configuration suggests that the cooperative's activities are structured according to a selective territorial logic, in which geographical proximity, logistical accessibility, and regional integration directly influence the organization of the honey value chain.

Figure 2 – Spatial Distribution of CAMPIL Cooperative Members within the Cooperative's Area of Operation



Source: Econodata (2026).

It can be argued that the road network assumes strategic importance, as it conditions the mobility of producers, the collection and distribution of production, as well as access to technical assistance and marketing channels. CAMPIL not only brings producers together but also spatially organizes beekeeping activities, consolidating itself as a relevant institutional mediator for



strengthening family farming, valuing peasant labor, and fostering an environmentally responsible rural economy in the Semi-arid region of Piauí. This territorial centrality of the cooperative is also expressed in its capacity to coordinate the flow of production to different market scales, reaching the states of Ceará, Piauí, and Pernambuco.

The analysis of CAMPIL's financial and production statements for the years 2024 and 2025 reveals a cooperative undergoing a process of economic consolidation, with the capacity to generate value and participate in international markets. In 2024, according to the data presented in Table 4, CAMPIL marketed approximately 717 tons of honey, generating revenue of BRL 726,413.95 from sales, in addition to BRL 12,648.34 in financial income, totaling BRL 739,062.29. This significant production volume is a direct result of the cooperative arrangement, which enables the commercialization of production originating from dozens of rural communities dispersed throughout the Picos macroregion.

Table 4 – CAMPIL's Financial Statements (2024–2025)

Indicators	2024	2025 (jan.–aug.)
Honey production (kg)	717.000	465.120
Honey production (tons)	717,0	465,1
Average price (US\$/kg)	0,20	0,20
Sales revenue (BRL)	726.413,95	516.992,51
Financial income (BRL)	12.648,34	24.154,34
Total revenue (BRL)	739.062,29	541.146,85
Percentage allocated to beekeepers	35%	35%
Percentage allocated to employees	15%	15%
Percentage allocated to operating expenses	20%	20%
Percentage allocated to social initiatives and training	30%	30%

Source: CAMPIL (2026).

In 2025, considering only the period up to August 30, the cooperative had already marketed 465 tons of honey, generating BRL 516,992.51 in sales revenue and BRL 24,154.34 in financial income, reaching a total revenue of BRL 541,146.85. This partial result indicates a trend toward higher average revenue per ton, reflecting both the appreciation of honey in international markets and CAMPIL's strategy of operating through contracts linked to external prices, particularly those denominated in U.S. dollars.

However, quantitative data must be interpreted in light of the concrete challenges reported by the individuals who experience the cooperative's dynamics on a daily basis. The testimony of CAMPIL's president points to the main vulnerability of the activity: the ecological dependence of



production on the climatic conditions of the Semi-arid region. According to the cooperative leader:

*Nowadays, the cooperative has been suffering mainly from the decline in honey production. As our cooperative is located in the Semi-arid region of Piauí, rainfall has decreased in recent years, which makes production difficult because, without rain, there are no predominant flowering periods or vegetation cover in the Caatinga. It enters a period of drought and, many times, the cooperative members have to move their bees so that honey can be produced (President of CAMPIL, 2026).*

Beekeeping production, although widely recognized as a low-impact environmental activity, depends directly on the ecological integrity of the Caatinga biome and the regularity of the rainfall regime that characterizes the Semi-arid region. This condition demonstrates that the sustainability of the sector cannot be understood solely in terms of the adoption of management techniques or production protocols. As pointed out by Kahn *et al.* (2014), it results from a broader interaction between human labor, climatic conditions, and the biodiversity that sustains local ecosystems.

Although beekeeping remains strongly conditioned by climatic variations and the ecological integrity of the Caatinga biome, CAMPIL's recent trajectory demonstrates its growing integration into international markets. The commercialization of honey based on global price quotations indicates that local production has become integrated into broader circuits of circulation and economic valorization, connecting family farmers engaged in beekeeping to the dynamics of international markets.

In light of theories on agricultural cooperativism, this process can be interpreted as a reduction in the barriers historically associated with the economic isolation of small rural producers (Camargo *et al.*, 2024). Participation in global markets does not result solely from the individual productive capacity of beekeepers, but rather from the collective action enabled by the cooperative, which organizes production, expands the scale of commercialization, and creates the conditions necessary to meet the requirements of more competitive markets.

However, entry into these global networks does not occur in a linear or contradiction-free manner; rather, it is marked by economic and institutional constraints that shape the daily operations of the organization. As reported by the cooperative's representative, “*another factor that creates difficulties is that both domestic and international buyers impose many requirements for the purchase of honey*” (President of CAMPIL, 2026).

This is compounded by the financial fragility of the cooperative, as, according to her, “*the members do not pay a fee to be part of the cooperative; there are difficulties in paying employees; there is no financial circulation because honey production has decreased; and every month there are taxes to be paid*” (President of CAMPIL, 2026).

The statement reveals that entering more demanding markets, while expanding possibilities for product valorization, can also impose operational, sanitary, administrative, and fiscal costs that



are borne by financially vulnerable cooperative structure. The absence of a fixed membership fee, replaced by the donation of three 25-kilogram buckets of honey upon entry, reinforces the inclusive nature of the organization but also limits its capacity for sustained maintenance during periods of low production.

This reality is further deepened by the testimony of a cooperative beekeeper, which highlights how the effects of drought directly impact the survival of families. According to him, *“we go a long time without rain, honey production drops, and we depend on this production to survive. The vast majority of cooperative members do not have the means to carry out the migratory process with their bees”* (Cooperative beekeeper, 2026).

This testimony is particularly significant because it shifts the analysis from the institutional level to the level of peasant social reproduction: the reduction in production affects not only the cooperative’s indicators but also compromises household income and permanence in rural areas. By stating that many cooperative members do not have the conditions to carry out hive migration, the interviewee reveals an internal inequality in productive capacity, in which only part of the beekeepers is able to mobilize resources to adapt to drought cycles. This situation indicates that productive resilience in the Semi-arid region is directly associated with the availability of material, logistical, and financial means.

The mobility of beehives, described among cooperative members as the “rain path,” appears as a territorial strategy for coping with climatic irregularity. In the cooperative beekeeper’s words:

*Beekeepers who own a larger number of beehives carry out migration to the state of Maranhão, especially to the municipalities of Santa Luzia, Maranhãozinho, and Nova Olinda do Maranhão* (CAMPIL cooperative beekeeper, 2026).

The information was confirmed by the president, who added:

*Some cooperative members also send beehives to mangrove areas in Maranhão [...] this honey produced in the mangrove is not received by the cooperative for commercialization, as there is no market for this type of product [...] the honey has lower quality and a sweet-and-sour characteristic [...] many industries mix this honey with traditional honey in order to place it in the consumer market* (President of CAMPIL, 2026).

She also notes that there is migration to the state of Ceará, especially to the municipalities of Crato and Pacajus, although *“a decrease in this flow has been observed in recent years”* (President of CAMPIL, 2026).

The process, according to the president, “begins in May and only returns to its place of origin when the rains start” (President of CAMPIL, 2026). These testimonies reveal that beekeeping mobility is not merely a technical adjustment, but a complex territorial practice that



may involve costs, economic selectivity, and different patterns of product quality, reaffirming the centrality of space and climate in the organization of the honey value chain.

Another important aspect concerns the impacts of pesticide use in areas surrounding the production units. The cooperative beekeeper emphasized that “*the use of agrochemicals harms the bees*” (CAMPIL cooperative beekeeper, 2026), which is why the cooperative “*provides guidance to its members before the installation of beehives, assessing local conditions in order to avoid damage to honey quality and bee mortality*”.

This perception broadens the understanding of sustainability in beekeeping, showing that the preservation of production depends not only on the maintenance of native vegetation, but also on the control of external pressures associated with the conventional agricultural model. In this case, the prior guidance provided to cooperative members expresses a form of collectively constructed territorial regulation, in which honey quality, hive health, and the continuity of the activity depend on the careful management of the productive landscape.

In terms of commercialization, the testimony of CAMPIL’s secretary reveals the persistence of a classic structural problem in agrifood chains dominated by small producers: the role of middlemen. According to her:

*Some cooperative members still sell honey to middlemen, which harms the market [...]. Middlemen purchase honey at prices below market value and resell it to large industries at higher prices, harming both the beekeeper and the cooperative (Secretary of CAMPIL, 2026).*

From an analytical perspective, this statement makes explicit the persistence of mechanisms of commercial subordination even in contexts of well-established cooperative organization. Individual sales to intermediaries disrupt the collective logic of scale, weaken the cooperative’s bargaining power, and reduce its ability to negotiate fairer prices with industry. Thus, the presence of middlemen represents not merely a market distortion, but a concrete obstacle to the construction of peasant economic autonomy.

One of the most relevant aspects revealed by CAMPIL’s data is the way in which revenue is redistributed, reflecting an economic logic that differs from that of conventional capitalist enterprises. In 2024, of the total revenue collected, 35% was allocated directly to beekeepers, 15% to employees, 20% to the cooperative’s general expenses, and 30% to social initiatives and training programs. In 2025, the same logic was maintained, with 35% of revenue allocated to beekeepers, 15% to employees, 20% to operational expenses, and 30% to social and training activities. This distribution structure highlights that CAMPIL operates not merely as an intermediary enterprise, but as an instrument of the social reproduction of the peasantry. The share allocated to beekeepers ensures direct income for producer families, while the resources invested in social initiatives and



training programs materialize the cooperative principle of collective reinvestment in the territory.

This social dimension of the cooperative is reinforced by its participation in public policies. The secretary of CAMPIL (2026) reported that “*the cooperative participates in the family farming program,*” emphasizing that “*when sales are made within the state of Piauí, no ICMS tax is charged, but for other states the tax is applied.*” This observation demonstrates that CAMPIL’s operations also depend on institutional and fiscal frameworks that may either favor or restrict its competitiveness, particularly when commercialization extends beyond state boundaries. At the same time, the statement shows that participation in public programs constitutes an important element in sustaining the activity, although it is insufficient to fully offset the costs associated with interstate circulation.

With regard to institutional support, the president reported that the cooperative has received:

*Tax incentives and support from the federal government, including loans from Banco do Nordeste granted to cooperative members [...] many members did not repay these loans, and the debt ultimately remained under CAMPIL’s name (President of CAMPIL, 2026).*

The president also noted that the cooperative had received:

*Processing equipment kits provided through federal projects, including extractors, tables, and drums [...] as well as a parliamentary amendment from federal deputy Jesus Rodrigues, which made it possible to acquire a truck, meeting a need of the cooperative (President of CAMPIL, 2026).*

These testimonies demonstrate that public and institutional support played a relevant role in the material structuring of the cooperative, particularly in the acquisition of equipment and logistical resources. However, they also reveal that access to credit, when not accompanied by adequate repayment conditions and productive stability, can become a factor of institutional vulnerability.

Another important result is the association between cooperativism and environmental sustainability. The beekeeping production developed by CAMPIL is directly associated with the vegetation of the Caatinga, having as its main flowering species marmeleiro, angico-de-bezerro, caneleiro, jitirana, aroeira-do-sertão, cipó-itica, bamburral, and cajueiro. Among these, cipó-itica stands out, as its honey is valued in the international market for its organic characteristics, light color, and slow crystallization. This ecological basis of production reinforces the idea that the cooperative’s competitiveness is linked to the conservation of native vegetation, transforming local biodiversity into a productive and commercial asset.

The president herself reinforces this collective dimension of sustainability by stating that environmental actions are developed “*mainly during the assemblies,*” as well as through the recognition of symbolic dates such as:



*Beekeeper Day, on May 22, and Bee Day, on October 3 [...] in the training courses conducted by SEBRAE in partnership with CAMPIL, these dates are used to discuss the environment, bee protection, and the exchange of experiences among cooperative members (President of CAMPIL, 2026).*

The cooperative beekeeper stated that “*there is extensive guidance provided through WhatsApp groups, with the sharing of videos and news about sustainability, the protection of flowering seasons and bees,*” always with the objective of “*not harming the environment and preventing bee mortality*” (CAMPIL cooperative beekeeper, 2026).

These testimonies show that sustainability, in the case of CAMPIL, is not limited to organic certification or market requirements, but is materialized through educational practices, knowledge sharing, and everyday mechanisms of collective coordination that strengthen environmental awareness and the protection of the ecological conditions necessary for production.

In technical and productive terms, the president reported that cooperative members work mainly with:

Africanized bees (*Apis mellifera*), resulting from the crossbreeding of European and African bees and considered the most commercially productive; and the Italian bee (*Apis mellifera ligustica*), known for its docility and high productivity [...]. These species present significantly higher production volumes than native species, and honey produced by *Apis mellifera* constitutes the standard for commercialization, which facilitates the certification of organic honey, one of CAMPIL’s distinguishing features (President of CAMPIL, 2026).

This information is corroborated by the cooperative beekeeper, who highlighted africanized bees in particular, stating that “*they adapt very well to the Caatinga and to the climate of the Semi-arid region of Piauí, withstand high temperatures, and have a high resistance to diseases*” (CAMPIL cooperative beekeeper, 2026). Such testimonies demonstrate that the cooperative’s productive organization is also based on technical choices adapted to the environmental conditions of the Semi-arid region, articulating productivity, ecological adaptation, and commercial standardization.

CAMPIL’s experience materializes as a concrete mechanism of resistance against power asymmetries and the exploitative logic of commercial capital, historically embodied in the figure of middlemen. According to Büttgenbender *et al.* (2019), predatory intermediation captures and drains a large portion of the value generated in rural areas, deepening producers’ subordination. By internalizing critical stages such as processing, storage, laboratory quality control, packaging, and direct negotiation with external markets, the cooperative provides the institutional mediation necessary to break this dependency, retaining the economic surplus within the peasant circuit itself.

In CAMPIL’s case, cooperativism functions as a social technology that articulates market



participation, solidarity, and sustainability, enabling beekeeping to fulfill its role as a strategic activity for rural development in the Semi-arid region of Piauí. CAMPIL's experience confirms that cooperativism, when rooted in the territory and guided by principles of social and environmental justice, can transform the integration of family farmers into value chains, turning a traditional activity into the foundation of a more equitable, resilient, and sustainable rural development project.

## 5 Final Considerations

The present study aimed to analyze the role of cooperativism in the honey production chain through CAMPIL's experience, highlighting its contribution to the organization of producers, the valorization of peasant labor, and the construction of a fairer and more environmentally responsible rural economy. Based on the results presented, it is possible to affirm that CAMPIL constitutes a successful experience of rural cooperativism in the Brazilian Semi-arid region, from economic, social, and environmental perspectives.

The analyzed data demonstrate that the cooperative has achieved a high capacity for income generation, with significant production and commercialization volumes, integrating small-scale beekeepers into highly competitive domestic and international markets. This integration does not occur in a subordinate manner, as often happens when producers depend on middlemen, but rather through a collective organization that negotiates prices, secures contracts, and ensures greater economic stability for member households. In this sense, CAMPIL confirms that cooperativism is a central instrument for reducing the vulnerability of family farmers to market fluctuations and power asymmetries within the honey production chain.

Another fundamental aspect highlighted by the study is the logic of redistribution of the wealth produced. The allocation of significant shares of revenue to the beekeepers themselves, to the cooperative's workers, and to social and training initiatives reveals an economic rationality distinct from that which is guided exclusively by profit. It constitutes a form of cooperative economy that combines productive efficiency with social justice, strengthening the social reproduction of the peasantry and the permanence of families in rural areas.

Social actions and investments in training, productive infrastructure, and community support reinforce CAMPIL's role as an agent of territorial development. The cooperative not only organizes the sale of honey but also operates as a local institution capable of responding to emergencies, supporting public services, improving production conditions, and promoting the well-being of rural communities. In regions marked by structural fragilities and the absence of the State, this role is particularly significant, as it contributes to reducing vulnerabilities and enhancing



social resilience.

From an environmental perspective, CAMPIL's experience shows that cooperative beekeeping can be an ally in the conservation of the Caatinga and its biodiversity. The pursuit of certification, combined with the valorization of organic honey and fair trade, creates economic incentives for the preservation of native vegetation, turning environmental sustainability into a strategic component of the cooperative's competitiveness. In this way, production, conservation, and income become integrated within a single territorial project.

CAMPIL's trajectory confirms that cooperativism, when rooted in the territory and guided by principles of solidarity, economic fairness, and sustainability, is capable of transforming the integration of family farmers into agrifood chains. More than a market alternative, cooperative beekeeping emerges, in the case of CAMPIL, as a form of peasant resistance and a means of building rural development that articulates productive autonomy, social inclusion, and environmental responsibility in the Semi-arid region of Piauí.

## References

ALEIXO, D. L. *et al.* Mapeamento da flora apícola arbórea das regiões polos do estado do Piauí. **Revista Verde de Agroecologia e Desenvolvimento Sustentável**, [S.l.], v.9, n.4, p.262 - 270, 2014. Disponível em: <https://www.gvaa.com.br/revista/index.php/RVADS/article/view/3447>. Acesso em: 13 maio 2026.

ALMEIDA, C. T.; LORENZON, M. C.A.; TASSINARI, W. S. Identificação de fatores associados à ocorrência de doenças de abelhas africanizadas (*Apis mellifera* L.) em apiários do estado do Rio de Janeiro. **Revista Brasileira de Medicina Veterinária**, [S.l.], v. 35, n. 1, p. 33-40, 2013. Disponível em: [https://www.researchgate.net/publication/286217169\\_Identification\\_of\\_factors\\_associated\\_with\\_diseases\\_of\\_Africanized\\_honeybees\\_Apis\\_mellifera\\_L\\_on\\_apiaries\\_in\\_the\\_State\\_of\\_Rio\\_de\\_Janeiro](https://www.researchgate.net/publication/286217169_Identification_of_factors_associated_with_diseases_of_Africanized_honeybees_Apis_mellifera_L_on_apiaries_in_the_State_of_Rio_de_Janeiro). Acesso em: 14 maio 2026.

ALMEIDA, M. A. D; CARVALHO, C. M. S. **Apicultura**: uma oportunidade de negócio sustentável. Salvador: SEBRAE Bahia, 2009.

ARAÚJO, M. E. S.; GUIMARÃES, L. L. A importância econômica, ecológica e ambiental das abelhas para os apicultores de Madalena, Ceará. **Revista Brasileira de Educação do Campo**, [S.l.], v. 9, p.1-22, 2024. Disponível em: <https://periodicos.ufnt.edu.br/index.php/campo/article/view/17917>. Acesso em: 14 maio 2026.

ASSOCIAÇÃO BRASILEIRA DE EXPORTADORES DE MEL – ABEMEL. **Dados das exportações de mel – 2024**. São Paulo: Abemel, 2024.

BALBINO, V. A.; BINOTTO, E.; SIQUEIRA, E. S. Apicultura e responsabilidade social: desafios da produção e dificuldades em adotar práticas social e ambientalmente responsáveis. **REAd. Revista Eletrônica de Administração**, [S.l.], v. 21, n. 2, p. 348-377, 2015. Disponível em: <https://seer.ufrgs.br/index.php/read/article/view/44185>. Acesso em: 13 maio 2026.

BRASIL. Presidência da República. **Lei nº 5.764**, de 16 de dezembro de 1971. Define a Política Nacional de Cooperativismo, institui o regime jurídico das sociedades cooperativas, e dá outras providências. Brasília: Casa Civil, 1971. Disponível em: [https://www.planalto.gov.br/ccivil\\_03/leis/15764.htm](https://www.planalto.gov.br/ccivil_03/leis/15764.htm). Acesso



em: 11 jun. 2026.

BRASIL. Ministério da Agricultura, Pecuária e Abastecimento. **Estratégias de adaptação às mudanças do clima dos sistemas agropecuários brasileiros**. Brasília: MAPA, 2021.

BÜTTENBENDER, P. L. *et al.* Estudos sobre cooperativismo. In: BÜTTENBENDER, P. L. (org.). **Gestão de cooperativas: fundamentos, estudos e práticas**. Ijuí: Ed. Unijuí, 2019. p. 201-222.

CAMARGO, F. B. R. *et al.* O cooperativismo e a promoção do desenvolvimento sustentável: práticas em uma cooperativa de crédito. **Caderno pedagógico**, Curitiba, v. 21, n. 10, p. 1-21, 2024. Disponível em: <https://ojs.studiespublicacoes.com.br/ojs/index.php/cadped/article/view/9256>. Acesso em: 11 jun. 2026.

COOPERATIVA APÍCOLA DA MACRORREGIÃO DE PICOS – CAMPIL. 14 maio 2026. Disponível em: <https://www.piauicooperativo.coop.br/cooperativas/campil/>. Acesso em: 13 maio 2026.

CORREIA-OLIVEIRA M. E. *et al.* Apicultores do Estado de Sergipe, Brasil. **Scientia Plena**, [S.l.], v. 6, n. 1, p. 1-7, 2010. Disponível em: <https://www.scientiaplena.org.br/sp/article/view/1>. Acesso em: 14 maio 2026.

COUTO, R. H. N.; COUTO, L. A. **Apicultura: manejo e produtos**. 3. ed. Jaboticabal: FUNEP, 2006.

ECONODATA. **Campil**. 14 maio 2026. Disponível em: <https://www.econodata.com.br/consulta-empresa/10323376000190-cooperativa-apicola-da-macrorregiao-de-picos>. Acesso em: 14 maio 2026.

FIGUEIREDO, L.; SANTOS, L.; COSTA, G. Agroecologia como produção, ciência e movimento: a percepção dos agricultores do Assentamento João Batista II, em Castanhal-PA. **Cadernos de Agroecologia**, Rio de Janeiro, v.19, n.1, p. 1-7, 2024. Disponível em: <https://cadernos.aba-agroecologia.org.br/cadernos/article/view/9445>. Acesso em: 14 maio 2026.

HENRIQUE, R. G. *et al.* Perfil dos produtores familiares de mel no município de Serra do Mel – RN. **Revista Verde de Agroecologia e Desenvolvimento Sustentável**, Mossoró, v.3, n.4, p.29-41, 2008. Disponível em: [https://www.researchgate.net/publication/265249094\\_PERFIL\\_DOS\\_PRODUTORES\\_FAMILIARES\\_D\\_E\\_MEL\\_NO\\_MUNICIPIO\\_DE\\_SERRA\\_DO\\_MEL\\_-RN](https://www.researchgate.net/publication/265249094_PERFIL_DOS_PRODUTORES_FAMILIARES_D_E_MEL_NO_MUNICIPIO_DE_SERRA_DO_MEL_-RN). Acesso em: 14 maio 2026.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA – IBGE. **Censo Agropecuário**. Rio de Janeiro: IBGE, 2017. Disponível em: <https://www.ibge.gov.br/estatisticas/economicas/agricultura-e-pecuaria/21814-2017-censo-agropecuario.html>. Acesso em: 11 jun. 2026.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA – IBGE. **Pesquisa pecuária municipal**. Rio de Janeiro: IBGE, 2023. Disponível em: <https://sidra.ibge.gov.br/Tabela/74>. Acesso em: 11 jun. 2026.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA – IBGE. **Semiárido Brasileiro**. Rio de Janeiro: IBGE, 2025. Disponível em: <https://anda.ibge.gov.br/geociencias/cartas-e-mapas/redes-geograficas/15974-semiarido-brasileiro.html?=&t=downloads>. Acesso em: 14 maio 2026.

KHAN, A. S. *et al.* **Perfil da Apicultura no Nordeste Brasileiro**. Fortaleza: Banco do Nordeste do Brasil, 2014.

KLOSOWSKI, A. L. M.; KUASOSKI, M.; BONETTI, M. B. P. Apicultura brasileira: inovação e propriedade industrial. **Revista de Política Agrícola**, [S.l.], v. 29, n. 1, p. 41-58, 2020. Disponível em: <https://rpa.sede.embrapa.br/RPA/article/view/1461>. Acesso em: 12 jun. 2026.

LANDAU, E. C. Variação geográfica da apicultura (*Apis mellifera*, Apidae). In: LANDAU, E. C.; GUIMARAES, D. P. (eds.). **Dinâmica da produção agropecuária e da paisagem natural no Brasil**



**nas últimas décadas:** produtos de origem animal e da silvicultura. Brasília: Embrapa, 2020. p. 1703-1760.

LIMA, M. C.; ROCHA, S. A. **Efeitos dos agrotóxicos sobre as abelhas silvestres no Brasil:** proposta metodológica de acompanhamento. Brasília: Ibama, 2012.

LOURENÇO, M. S. M.; CABRAL, J. E. O. Apicultura e sustentabilidade: visão dos apicultores de Sobral (CE). **Revista em Agronegócio e Meio Ambiente**, Maringá, v.9, n.1, p.93-115, 2016. Disponível em: [https://www.researchgate.net/publication/299545956\\_Apicultura\\_e\\_Sustentabilidade\\_Visao\\_dos\\_Apicultores\\_de\\_Sobral\\_CE](https://www.researchgate.net/publication/299545956_Apicultura_e_Sustentabilidade_Visao_dos_Apicultores_de_Sobral_CE). Acesso em: 14 maio 2026.

MÁQUINA, D. A. *et al.* Desafios e dificuldades da prática de apicultura dos produtores assistidos pelo programa de engajamento comunitário da Fundação Aga Khan–Moçambique. **Cognitus Interdisciplinary Journal**, [S.l.], v. 2, n. 3, p. 667-679, 2025. Disponível em: <https://ojs.editoracognitus.com.br/index.php/revista/article/view/153>. Acesso em: 14 maio 2026.

PRODANOV, C. C.; FREITAS, E. C. **Metodologia do trabalho científico:** métodos e técnicas da pesquisa e do trabalho acadêmico. 2. ed. Novo Hamburgo: Feevale, 2013.

SABBAG, O. J.; NICODEMO, D. Viabilidade econômica para produção de mel em propriedade familiar. **Pesquisa Agropecuária Tropical**, Goiânia, v. 41, n. 1, p. 94-101, 2011. Disponível em: <https://revistas.ufg.br/pat/article/view/10414>. Acesso em: 14 maio 2026.

SISTEMA OCB. **Anuário do Cooperativismo Brasileiro – 2024**. Brasília: Sistema OCB, 2024. Disponível em: <https://somoscooperativismo-ce.coop.br/noticias/anuario-do-cooperativismo-brasil-chega-a-23-45-milhoes-de-cooperados>. Acesso em: 12 jun. 2026.

SISTEMA OCB. **Agenda Institucional do Cooperativismo – 2025**. Brasília: Sistema OCB, 2025.

SOARES, C. J. F. **Análise descritiva qualitativa**. Curitiba: CRV, 2022.

SOUZA, D. C. **Apicultura:** manual do agente de desenvolvimento rural. 2. ed. rev. Brasília: Sebrae, 2007.

VALENÇA, P. H. L. *et al.* A responsabilidade social e ambiental em uma pequena produção de mel de abelhas no sertão alagoano: um estudo de caso. **Aracê**, [S.l.], v. 7, n. 11, p.1-24, 2025. Disponível em: <https://periodicos.newsciencepubl.com/arace/article/view/9757>. Acesso em: 14 maio 2026.