

Migration, economic activity, and spatial reorganization of the population: a study on silkworm farming in Paraná, Brazil

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Introduction

Since the nineteenth century, the process of regional occupancy and demographics in the state of Paraná, Brazil, has been influenced by several migratory processes. In this context, the analysis of silkworm farming allows for the discussion of elements related to migration, economic activity, and spatial reorganization of the population. Silkworm breeding in Brazil was developed together with the coffee industry since 1848. It was initiated in Paraná in the 1930s with a migratory flow in the north of Paraná. Initially, silkworm farming was carried out by Japanese settlers and later became the staple of many rural family producers. Brazil became one of the main silk producers in the world during the twentieth century, and the state of São Paulo was the largest producer of cocoons until 1980, when Paraná became the main exporter in Brazil, particularly the northeastern region of Paraná, where the Silk Valley is located. This study focuses on the importance of considering the regional and demographic dynamics in the expansion of complementary economic activities. Although these activities may not have a significant impact on a national scale, they contribute to the complexity of migratory, economic, and social processes at a regional level.

This study is part of a research agenda developed by the London Migration Observatory, and its main focus was on the characteristics, influence, and significance of internal and international migrations that occurred in Paraná.

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Considering the historical records of the state of Paraná (BALHANA et al., 1969; NADALIN, 2002; WACHOWICZ, 2002), regional occupancy and social formation in the state of Paraná, since the nineteenth century, have been influenced by several migratory processes and by a complex process of population redistribution and regional occupancy, which were not always consensual, and involved the development and expansion of economic activities and the migratory flow of national and foreign migrants to national and international territories.

This migratory process allows the study of the occupation of different regions of Paraná, and underlies the development of several economic activities, the spatial distribution of the population due to interstate, intrastate, and international migration, and also to the distinct roles of private and public agencies involved in economic and development policies related to immigration and colonization.

The focus of this study was to evaluate the development of silkworm farming in Paraná and to discuss the association between migration, economic activities, and the redistribution and reorganization of the population throughout the territory.

Silkworm breeding was introduced in Brazil in 1848 and was developed using the production process adopted the coffee industry in São Paulo (PORTO, 2014; VIEIRA, 2014). Silkworm farming started in Paraná in the 1930s together with migratory flows in Northern Paraná to expand the farming area in the state. Silkworm farming was initially developed by the Japanese settlers and their descendants, and later became the source of income of several rural families. At present, silk production is a highly integrated productive chain, combining several economic activities and different forms of labor, including the cultivation of mulberry trees, breeding of silkworms, preparation of silk threads, and textile production (SEAB/DERAL, 2015; 2014; 2008).

Brazil has become one of the main silk producers worldwide in the twentieth century. The state of São Paulo was no longer the main cocoon producer in the 1980s when production moved to Paraná, and this state has been the largest Brazilian exporter since then. This process was marked by two moments: the increase in silk production between 1980 and 2010; and the post-2010 period, characterized by a progressive reduction in production, influenced by changes in the global demand for silk.

Consequently, the number of cocoon producers and jobs in the silk industry decreased. However, the productivity increased, particularly in Northeastern Paraná, and the export volume was maintained.

The direct effects of the producing regions on the population dynamics indicated that the state had to develop policies to stimulate silk production, with the involvement of state and federal institutions and universities and the development of the Technical Chamber of the Silk Complex in 2004 under the state government.

This policy allowed the development of local organizations and cooperatives to improve the silk production network in the state, and integrate local production with the global market (SEAB/DERAL, 2015).

Although this activity only had an impact on a local scale, the understanding of these processes may help elucidate the complexity of the transformations that occurred in rural and urban areas in a specific region of Paraná, where most of the demographical, social, economic, cultural, and political development is associated with an important agricultural area in Brazil in the twentieth century.

1 Historical context of silkworm farming in Brazil

Silkworm farming involves the breeding of silkworms for silk production, and this activity originated in China more than 3,000 years ago. In the sixth century, this activity expanded to European countries and reached Brazil around 1848, when King Don Pedro II created the Fluminense Imperial Silk Company in Rio de Janeiro with a focus on silk farming. Later, a second initiative was undertaken when, in 1992, the first Experimental Silkworm Farming Station was created in Barbacena, state of Minas Gerais (Porto, 2014).

Despite these two initiatives, the production of silkworm cocoons gained momentum in Brazil only after the 1930s, and was concentrated in the state of São Paulo. According to Porto (2014), two hallmarks of that expansion were the inauguration of the National Silk Industry in Campinas in 1923, and the establishment of the Bratac Silk Threading³ by the Japanese colony in the city of Bastos in 1940.

Later, an important hallmark in the advancement of silkworm farming in Paraná was the establishment of a Bratac branch in the 1970s in the city of Londrina, also financed and run by the Japanese communities located in North Paraná⁴.

The success of silkworm farming in São Paulo between 1940 and 1980 can be understood by considering two aspects. According to Porto (2014), on one hand, the Second World War stimulated the industrial production of silk because of the closure of Asian and European ports and the interest of the United States in the Brazilian production.

On the other hand, silkworm farming in São Paulo occurred concomitantly with coffee production and followed the expansion of railways, initially in the Western regions of São Paulo and later in Paraná, particularly in the north.

Paraná is the largest silk producer in Brazil and the largest producer in the Western world. At present, it is responsible for approximately 86% of the national

3 The name Bratac originated in the Brazilian Colonizing Society, or “Brazil Takushoku Kumiai” – BRATAC (PORTO, 2014, p. 293).

4 Information obtained at <http://www.bratac.com.br/bratac/pt/index.php>.

silkworm cocoon production, particularly in the north of Paraná, in the Silk Valley region, composed of 29 counties in the northwest and north of the state and small farmers. According to a 2013 municipal livestock study, 18 out of 20 of the largest cocoon-producing counties are located in Paraná and four of those are located in the Silk Valley (IBGE, 2013).

Brazil became one of the largest producers of silk worldwide in the twentieth century, and the state of São Paulo was the main cocoon producer until 1980. After this period, Paraná took the lead in silkworm farming at the national level and became the largest silk producer and exporter in Brazil.

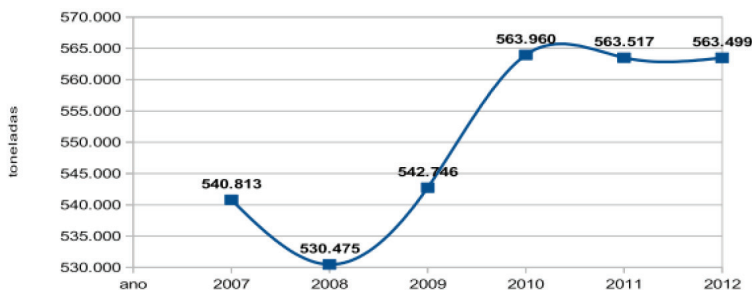
In 2010, silk production decreased because of the variation in the global demand for silk, and the amount of cocoon producers and jobs in the silk industry decreased. However, productivity increased, particularly in Northwestern Paraná, thus maintaining the export volume (SEAB/DERAL, 2015; 2014; 2008).

It is of note that the dynamics of the silkworm farming activity has been, since its inception, influenced by the international market. Chart 1 illustrates the global production during the most recent production period.

In 2012, the main cocoon producers moved to China, India, Uzbekistan, Brazil, Thailand, Iran, and Vietnam, and China and India were responsible for 65% and 26% of the world production, respectively. In this ranking, Brazil came in fourth and was the only Western country ranked among the main silkworm farmers of the world (SEAB/DERAL, 2015).

According to 2010 data, the Brazilian silk production is exported to Japan (main importer), Vietnam, and Italy and, to a lesser extent, France, South Korea, China, and Turkey.

Considering fabrics and other silk textile products, the production is exported to 55 countries, and the United States and Angola are the main importers (SEAB/DERAL, 2010).

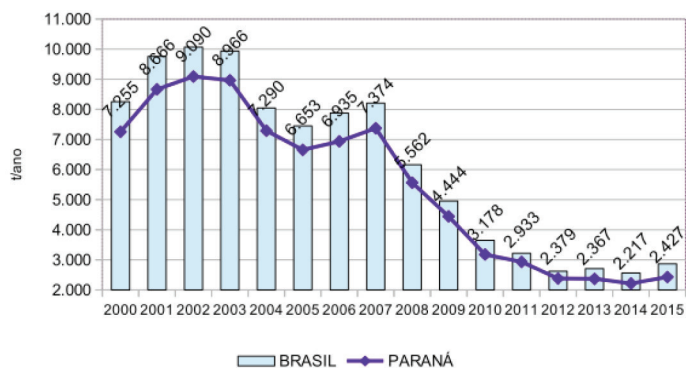


Fonte: FAOSTAT, 2014.

Chart 1 World supply of silkworm cocoons (in tons) in 2007–2012⁵

5 SEAB/DERAL, 2015, p. 2.

Considering the national production of cocoons, we noticed that, despite the continuous reduction in production between 2007 and 2015, the state of Paraná has maintained the position as the main producer in the last 15 years.



Fonte: IBGE- Pesquisa Pecuária Municipal – Elaboração SEAB/DERAL

Chart 2 Production of green silkworm cocoons (in tons) in Paraná and Brazil between 2000 and 2015⁶

Considering the national production in a global context during the most recent production period, in the following subsection we will discuss the silkworm farming activity, beginning in 1970, in two regions of Paraná: the first region includes the counties that compose the Silk Valley and the second group includes the counties that were the largest producers of silkworm cocoons in Paraná in 2014.

2 Population and counties in the expansion of the Paraná silkworm farming

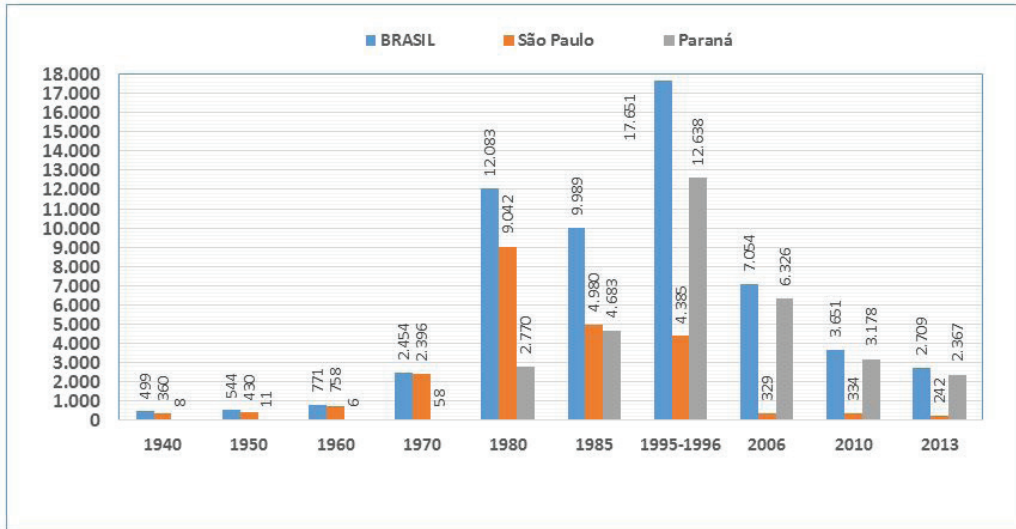
Before we investigate silkworm farming in Paraná, it is important to make a few considerations on the data source of silkworm cocoon production and demonstrate the growth of this activity in the two most important Federation Units. The data sources were the Agricultural Census from 1940 to 2006 and the municipal livestock study in 2010, 2013, and 2014.

The first agricultural census was developed together with the demographic census of 1920. However, that year was not registered in this study because agricultural censuses that inquired about silkworm cocoon production were made after 1940 and were available for developed regions and Federation Units. On the

⁶ SEAB/DERAL, 2015, pg.9.

other hand, it was possible to obtain that information on a municipal level after the 1950 census.

Graph 1 Silkworm cocoon production (in tons) in São Paulo and Paraná, Brazil, between 1940 and 2014.



Data source: IBGE. Agricultural Census for 1940 to 2006; Municipal Livestock Research for 2010 and 2014. [self-elaboration]

The first four agricultural and livestock census indicated that the increase in the national production of silkworm cocoons was small but continuous, beginning with 499 tons in 1940 and reaching 2,400 tons in 1970, and São Paulo had the largest silk production. During that same period, the production in Paraná presented an irregular dynamic and little importance in quantitative terms (Graph 1).

From 1980, Brazilian silkworm farming underwent important changes in the volume of production at the national level and in São Paulo and Paraná.

Between 1980 and 1996, there was a substantial increase in the production of silkworm cocoons in Brazil: from 12,000 tons in 1980, to approximately 10,000 tons in 1985, to more than 17,000 tons in 1995-1996.

The production in Paraná increased in this period: in 1980, the state detained approximately 23% of the silkworm farming activity, in 1985, the production in Paraná and São Paulo was similar, and accounted for more than 95% of the national output; starting in 1995, Paraná outperformed São Paulo and detained approximately 72% of the silkworm cocoon production.

Two factors may have influenced that change: one is of economic nature, and the other was related to demographics and migration. The economic factor

was the creation of factory units in Campinas in 1923 and Bastos in 1940 as a hallmark for the expansion of silkworm farming in the state of São Paulo, and the creation of the Bratac unit in Londrina, Paraná, in the 1970s.

With respect to demographic and migratory factors, the few studies that evaluated the growth, redistribution, and spatial reorganization of the population in Brazil and Paraná (BALTAR and BALTAR, 2014; IPARDES, 2006; MAGALHÃES, 2003; CUNHA and BAENINGER, 2006; FARIA, 1991; MARTINE and CAMARGO, 1984) indicate that the population of Paraná increased significantly during the twentieth century, particularly between 1940 and 1970, primarily because of the expansion of the agricultural areas in the northern regions of the state.

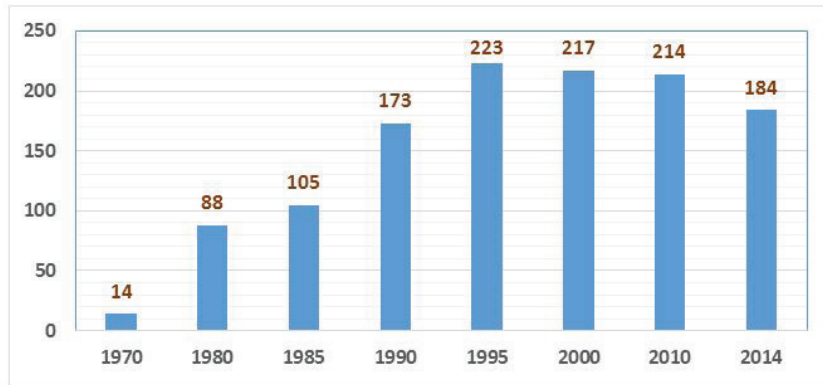
During the 1970s, the state underwent important economic changes, including limited areas for the expansion of agriculture and the economic focus of the state on industrial and urban activities, primarily in the metropolitan region of Curitiba (BALTAR and BALTAR, 2014; IPARDES, 2006; 2004).

We highlight that the significant increase in silk production in Paraná between 1980 and 1995 may have benefited from the population growth caused by the increase in agricultural production in this state because this demographic expansion was based primarily on small rural properties. Moreover, studies on silkworm farming (PORTO, 2014; VIEIRA, 2014; SEAB/DERAL, 2015; 2014; 2010; 2008) indicate the importance of the expansion of silkworm farming, together with the coffee industry, since the 1930s, as a strategy to assure the sustenance of small rural producers and their families in the period between coffee harvests.

Between 2006 and 2013, there was a steady decline in the national production of cocoons and a larger concentration of the production in Paraná. Some studies reported the influence of international markets on the dynamics of national production, and China was one of the main competitors of Brazil in this niche. However, several internal factors have contributed to the decrease in the national production.

A significant factor was the demographic dynamics of the main silkworm farming regions, located in northern Paraná. Official state government reports indicate that the rural exodus in these regions, particularly among youngsters, limited the expansion of this activity in the state (SEAB/DERAL, 2015; 2014; 2010; 2008).

Despite the decreased silk production in Brazil and Paraná, Brazil maintains its ranking as the largest western producer of silkworm cocoons, and Paraná concentrates more than 80% of the national production, all of which is exported.

Graph 2 Number of counties involved in silkworm farming in Paraná between 1970 and 2014.

Data source: IBGE. Agricultural Census of 1970 to 2000; Municipal Livestock Research of 2010 and 2014. [self-composition]

Between 1970 and 2014, there was a rapid increase in the number of counties involved in silkworm farming in Paraná. Only 14 counties produced silkworm cocoons in 1970 whereas 223 counties were involved in the production in 1995, corresponding to 56% of the total number of counties in Paraná. From 1995, the number of producing counties decreased and reached 184 in 2014.

In the most recent production period, silk production significantly decreased (Graph 3). In the last 12 years, the number of rural silk producers in Paraná has decreased drastically.

Graph 3 Number of silkworm farmers in Paraná between 2003 and 2015.

Data Source: SEAB/DERAL, 2015; 2010; 2008. [self-composition]

This decrease was directly correlated with the demographic dynamics of the producing counties, characterized by a rural exodus, which is ongoing, and the exodus of youngsters most significantly impacted the silkworm farming activity in the most recent production period (SEAB/DERAL, 2015; 2010; 2008).

3 The Silk Valley and the largest silk producers in Paraná

We analyzed the demographic dynamics and silkworm farming in Paraná in two regions: the first region comprises the counties located in the Silk Valley, and the second region comprises the counties that were the largest cocoon producers in 2014, according to the agricultural and livestock census.

Table 1 Characterization of the production regions.

COUNTIES LOCATED IN THE SILK VALLEY	COUNTIES WITH THE LARGEST PRODUCTION IN 2014
– 29 Counties	– 20 counties
– North Central and Northwest	– North Central, Northwest, “Norte Pioneiro,” West, and Mid-South
– Smallest population (2010) = 1,409 inhabitants	– Smallest population (2010) = 1,862 inhabitants
– Largest population (2010) = 357,077 inhabitants	– Largest population (2010) = 26,615 inhabitants
– % of counties with up to 20,000 inhabitants: 65%	– % of counties with up to 20,000 inhabitants: 85%

Raw data source: Demographic Census of 2010; Municipal livestock study of 2014.

The Silk Valley is a private region created in 2009 to promote silk production, and involves small family producers from 29 counties located on the Hydrographic Basin of Pirapo river⁷, and also constitutes a commercial brand of silk-based products.

The counties located in the Silk Valley were compared with the largest silk producers in 2014 to evaluate the correlation between silkworm farming and the migratory and demographic dynamics of the counties involved in this activity.

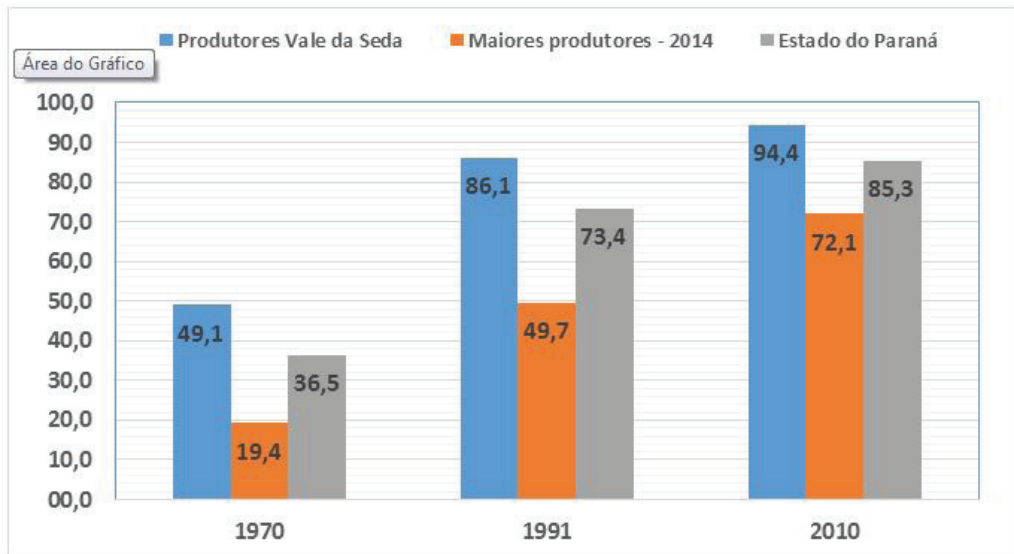
Chart 1 shows the size of these two study regions. The Silk Valley contains a hydrographic basin and its counties are located in the North Central and Northwest regions, which are two neighboring regions, and the largest silk

7 Information available on: < <http://valedaseda.com.br/>>.

producers are located in the North Central, Northwest, “Norte Pioneiro,” West, and Mid-South regions.

With respect to the population size, in the Silk Valley in 2010, the smallest county had less than 2000 inhabitants whereas the largest county had more than 300,000 inhabitants; moreover, 65% of these counties had a population smaller than 20,000 inhabitants. On the other hand, the population size of the largest producers in 2014 was smaller than 30,000 inhabitants, and 85% of these counties had less than 20,000 inhabitants.

Graph 4 Urbanization rate in Paraná by groups of counties between 1970 and 2010.

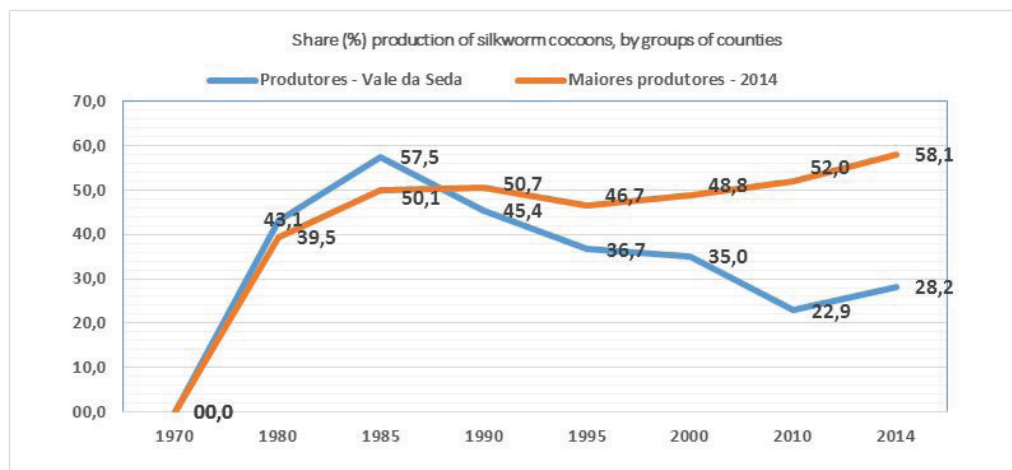


Data source: IBGE. Demographic Census, 1970-2010. [self-composition]

We observed different dynamics in the urbanization process between 1970 and 2010. With regard to the degree of urbanization in the state in 1970, almost two-thirds of the population of Paraná lives in rural areas⁸. In 1991, the rate of urbanization reached 73%, and in 2010, the urban population reached 85%.

The dynamics of the urbanization process in these two regions was distinct. On the one hand, the rate of urbanization in the Silk Valley was greater than that of Paraná in the three census periods. On the other hand, the rate of urbanization of the group of largest producers was lower than that in the state.

8 The urban transition in the state of Paraná will only occur in 1980, when approximately, 59% of the population will be concentrated in urban areas. (BALTAR and BALTAR, 2014).

Graph 5 Production of silkworm cocoons by groups of counties.

Data source: IBGE. Agricultural Census of 1970 to 2000; Municipal Livestock research of 2010 and 2014. [self-composition]

In contrast to the information on the level of urbanization and the market share of both regions in the production of silkworm cocoons at the state level, we observed different scenarios: first, silk production decreased in Silk Valley counties whose rate of urbanization was higher than the rate in the state, especially after 1985.

Second, silk production increased in the group of largest cocoon producers whose rate of urbanization was comparatively small starting in 1985.

Therefore, historically, silk production was higher in the Silk Valley in the 1980s; however, the importance of this region decreased progressively in 1990. Furthermore, the low production output in this region in 2009, when the Silk Valley was created, may have contributed to the small increase in production in the most recent production period.

Silk production in the group of largest producers, as a whole, started to increase in the second half of the 1980s and corresponded to approximately 60% of the production of silkworm cocoons of Paraná in 2014. This study supports the view that the larger production activity in this region is correlated with a larger rural population. However, further studies are necessary to test this hypothesis.

Conclusion

This study aimed to evaluate the correlation between the migratory and demographic dynamics and the expansion of silkworm farming in Paraná.

The analysis of the national silk production allowed the identification of two main areas of expansion of this activity in Paraná: the Silk Valley and the largest producers of silkworm in 2014, and the establishment of the correlation between silkworm farming and the demographic dynamics of the counties involved.

Therefore, the migratory and demographic dynamics favored the expansion of silkworm farming activities and became a decisive factor in the decrease in production in a more recent time frame.

Furthermore, this study aimed to elucidate the complexity and diversity of the process of rural exodus in the state of Paraná.

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