



ORIGINAL ARTICLE

Economic relevance of the potato in the agroindustrial and tourist development of São Francisco de Paula/RSFernanda Melo¹ , Marta Martins Barbosa Prestes² , Daniela Mueller de Lara³ , Marc François Richter^{4*} 

Abstract – This study investigates the economic relevance of potato production in São Francisco de Paula/RS, a municipality that stands out as the largest producer of the tuber in the state and 12th in Brazil. The research analyses the interrelationship between agriculture, industry and tourism, as evidenced by the impact of the Potato Gastronomy Festival, an event that values regional identity and strengthens the production chain. Using a qualitative, exploratory and descriptive approach, bibliographical surveys were carried out, as well as analysis of data from institutions such as IBGE, Emater and the Department of Agriculture. The results indicate that potato growing generates around R\$ 156 million a year, between 3,000 and 8,000 direct and indirect jobs and represents approximately 20 % of the municipality's primary income. However, challenges such as high production costs, dependence on pesticides and climate vulnerability are identified, highlighting the need for more sustainable agricultural practices. The study highlights the strategic role of potato in the economy and regional development, pointing to opportunities for innovation and productive diversification, as well as serving as a benchmark for other agricultural locations.

Keywords: Potato production chain. Agricultural production. Economic development. Sustainability. Tourism. Rio Grande do Sul.

Relevância econômica da batata inglesa no desenvolvimento agroindustrial e turístico de São Francisco de Paula/RS

Resumo – Este estudo investiga a relevância econômica da produção de batata inglesa em São Francisco de Paula/RS, município que se destaca como o maior produtor do tubérculo no estado e o 12º no Brasil. A pesquisa analisa a inter-relação entre agricultura, indústria e turismo, evidenciada pelo impacto da Festa Gastronômica da Batata, evento que valoriza a identidade regional e fortalece a cadeia produtiva. Utilizando uma abordagem qualitativa, exploratória e descritiva, foram realizadas pesquisas bibliográficas e análises de dados de instituições como o IBGE, a Emater e a Secretaria de Agricultura. Os resultados indicam que o cultivo da batata gera cerca de R\$ 156 milhões por ano, entre 3.000 e 8.000 empregos diretos e indiretos e representa aproximadamente 20% da renda primária do município. No entanto, desafios como altos custos de produção, dependência de pesticidas e vulnerabilidade climática são identificados, destacando a necessidade de práticas agrícolas mais sustentáveis. O estudo destaca o papel estratégico da batata inglesa na economia e no desenvolvimento regional, apontando oportunidades de inovação e diversificação produtiva, além de servir como referência para outras localidades agrícolas.

Palavras-chave: Cadeia produtiva da batata. Produção agrícola. Desenvolvimento econômico. Sustentabilidade. Turismo. Rio Grande do Sul.

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Introduction

The agricultural sector plays a strategic role in the economic and social development of various regions in Brazil, contributing significantly to job creation, municipal revenue and food security. In the context of agricultural production chains, certain crops are important not only because of the volumes produced, but also because of their ability to boost sectors such as the food industry and rural tourism, promoting integrated and sustainable territorial development.

One of these crops is the potato (*Solanum tuberosum* L.), one of the most widely consumed crops in the world and considered the third most important food crop globally, after wheat and rice. With its high adaptability and strong presence on the Brazilian table, the potato represents an important source of income generation, especially for small and medium-sized farms.

In Brazil, potato production accounts for about 1 % of world production and is one of the country's main vegetables, both for fresh consumption and for industrial processing. Historically, the state of Rio Grande do Sul played a leading role in national production, a position that currently belongs to Minas Gerais, although Rio Grande do Sul maintains a significant share of the national and regional market.

Particularly in the municipality of São Francisco de Paula/RS, located in the Serra Gaúcha, the potato has established itself as one of the pillars of the local economy. The municipality, which stands out as the largest producer of the potato in the state and 12th in the national ranking, links its agricultural production to the industrialization of food and gastronomic tourism, through initiatives such as the Potato Gastronomy Festival. This productive integration not only strengthens the local economic identity, but also generates significant social impacts, with the creation of

jobs and an increase in municipal revenue.

Originally from the Andes Mountains in South America, the potato (*S. tuberosum* L.) is an annual herbaceous plant from the Solanaceae family, considered the third most important food crop on the planet and the first non-grain commodity. It is one of the most important agricultural crops in the world, ranking fourth in global production volume, behind wheat, rice and maize. With an estimated production of more than 370 million tonnes per year, it plays a key role in food security, being an accessible source of carbohydrates and essential nutrients (Hu, 2025).

The tuber is made up of around: 80 % water; 16 % carbohydrates (mainly starch), 2 % protein; 1 % to 2 % fibre and; 0.1 % to 0.7 % sugars (glucose, fructose and sucrose). It adapts best to regions with mild temperatures between 18 °C and 22 °C, while high temperatures reduce tuber yields and impair root growth. Fertile soils with good aeration are recommended, as well as planting in flat areas that favour harvesting and avoid possible soil erosion (Silva; Lopes, 2015).

In Brazil, potato cultivation accounts for around 1 % of global production, consolidating its position as one of the country's main vegetables, both for fresh consumption and for industrial processing (IBGE, 2020). In addition, it stands out as a crop that is highly adaptable to different climatic conditions, making it strategic for facing challenges such as climate change and the need for agricultural diversification (EMBRAPA HORTALIÇAS, 2025).

On the national scene, until the 1940s, Rio Grande do Sul (RS) led national production, especially in the Pelotas region. Currently, the state of Minas Gerais (MG) is in first place, followed by Paraná (PR), São Paulo (SP) and RS (IBGE, 2020). In 2022, Brazilian potato production reached 3,889,797 tonnes, with an





average yield of 32,134 kg/ha and a production value of R\$ 5.48 billion, highlighting the crop's economic importance (Rio Grande do Sul, 2021). In the 2020-2022 triennium, RS had an average annual production of 426,972 tonnes, representing 11 % of national production, still surpassed by MG, PR and SP, with the four states together accounting for 82 % of national production (Rio Grande do Sul, 2021). In 2023, the value of production in the country was R\$ 8.17 billion, based on 4,188,704 tonnes produced in 123,455 hectares of harvested area, with an average yield of 33,929 kg/ha, the largest producer being the state of Minas Gerais (IBGE, 2024).

Potato production in the country is generally carried out on small farms, which account for 91 % of total production, generating wealth, jobs and developing regions (Marcomini, 2024). According to data from IBGE (2017), around 68 % of Brazilian potato producing establishments have properties of up to 20 hectares, 28 % are establishments with an area of between 20 and 100 hectares and only 4 % have an area of more than 100 hectares. The estimated number of producing establishments in the country is 35,172.

Some characteristics, such as ease of preparation, low consumer prices and availability in supermarkets throughout the year, as well as being a food with a rich source of carbohydrates, increase the demand for the product in the consumer market (Marcomini, 2024).

Potato consumption in Brazil has undergone changes, with a reduction in fresh consumption and an increase in demand for processed potatoes, such as frozen pre-fried potatoes, chips and crisps. This trend reflects changes in the population's eating habits, driven by the growth in consumption of ready meals and interest in practical, quick-to-prepare foods (FAO, 2019).

In Rio Grande do Sul, potatoes are also a very

important crop. The main producing regions are concentrated in the South (Pelotas, Canguçu, Cristal), Centre (Silveira Martins, Júlio de Castilhos) and North/Northeast/Serra/Hortênsias (São Francisco de Paula, Bom Jesus, Vacaria) (IBGE, 2020). The state's subtropical climate allows it to grow two crops a year, favouring production. Although the potato market in the state is mainly geared towards fresh consumption, the processing industry has been gaining ground in recent years.

The most popular cultivars in RS include Ágata, Baronesa, Catucha, Macaca, Cristal, Eliza and Monalisa (EMBRAPA HORTALIÇAS, 2025). Despite the change in national production leadership, potato remains a key crop for the state, generating jobs, boosting the economy and contributing to the population's food security. In 2023, potato sales at CEASA in Rio Grande do Sul totalled 51,341 tonnes, representing R\$ 168.86 million, or 18 % of the volume of the main vegetables (Rio Grande do Sul, 2024).

The growing demand for processed potatoes represents both a challenge and an opportunity for producers in Rio Grande do Sul, who must adapt to new market demands and invest in innovation to add value to production. In addition, incorporating agricultural technologies, improving distribution infrastructure and promoting sustainable practices can further strengthen the sector's competitiveness (Ahmad; Sharma, 2023).

Potato production can also be analysed from the perspective of the United Nations' Sustainable Development Goals (SDGs). The crop is directly related to several SDGs, such as SDG 2 (Zero Hunger and Sustainable Agriculture), which seeks to guarantee food security and promote sustainable agriculture, and SDG 12 (Responsible Consumption and Production), which encourages the implementation of sustainable agricultural practices and the reduction of food waste





(UN, 2015). The adoption of innovative agricultural technologies and environmentally responsible practices can help align potato production with the principles of sustainability, strengthening the sector's resilience to climate and economic challenges (Hu, 2025).

However, it is important to recognize that although potato production in the municipality is in line with some of the SDGs, such as SDG 2 (Zero Hunger and Sustainable Agriculture) and SDG 8 (Decent Work and Economic Growth), there are still significant challenges for this activity to be fully aligned with the principles of sustainability. Dependence on chemical inputs, high production costs, impacts on land use and pressure on local ecosystems, such as highland grasslands, show that there is a long way to go to fulfil targets such as SDG 12 (Responsible Consumption and Production) and SDG 13 (Action against Global Climate Change). Therefore, for the potato production chain to effectively move towards more sustainable production, it will be necessary to invest in the adoption of agro-ecological practices, the efficient management of natural resources, the reduction of environmental impacts and the implementation of traceability systems and certifications that guarantee greater socio-environmental responsibility.

São Francisco de Paula, located in the Serra Gaúcha, stands out as one of the main potato producing centers in Rio Grande do Sul. Production of the tuber in the municipality began around 1990, driven by favourable weather conditions, fertile land and the search for new growing areas. Since then, the growth of the activity has consolidated the municipality as the largest producer of potatoes in the state.

According to IBGE data (2020), the area planted in the municipality is 3,500 hectares, resulting in an average production of 80,000 tonnes per year. In 2021, revenue from the potato ICMS (Tax on the Circulation

of Goods and Services) accounted for approximately 20 % of the municipality's agricultural production revenue.

To further strengthen the region's economic profile and boost tourism, the municipality organises the annual 'Potato Gastronomy Festival'. The event brings together producers, restaurants and gastronomy professionals who create innovative dishes based on the tuber, promoting local culture and boosting the city's economy (Drops do Cotidiano, 2024). The event reinforces the role of agriculture in promoting economic and social development, connecting agricultural production to the municipality's cultural identity and sustainable tourism.

Despite its competitive advantages, potato farming in São Francisco de Paula/RS faces major challenges. The cost of production varies between R\$ 20,000 and R\$ 30,000 per hectare, and the prices paid to producers fluctuate according to supply and demand from other regions. Also, the dependence on pesticides, even those with lower toxicity, raises environmental concerns and challenges for the sustainability of the sector. In addition, climate vulnerability impacts productivity, making it essential to invest in risk mitigation strategies (EMBRAPA HORTALIÇAS, 2025).

Other obstacles include the need to improve road infrastructure to facilitate the flow of production and the fulfilment of environmental requirements for the operation of processing plants. However, the connection between agricultural production, industrialisation and gastronomic tourism has been an economic booster for the municipality, consolidating it as a hub for potato production in the state.

With adequate investment and public incentive policies, the potato can continue to drive the municipality's economic and social development,





ensuring its relevance on the state and national stage.

Given this context, the general aim of this study is to analyse the economic relevance of potato production in the municipality of São Francisco de Paula/RS, highlighting its influence on agro-industrial development, job creation, municipal revenue and integration with local tourism. The aim is also to understand the challenges faced by producers and the opportunities for adopting more sustainable practices.

The justification for this work lies in the economic importance of the potato production chain for the municipality, which has established itself as the largest producer of the tuber in Rio Grande do Sul and occupies a prominent position on the national scene. The analysis makes it possible not only to measure the economic impact of the activity, but also to subsidise public policies, rural development strategies and actions aimed at the sustainability of production.

To achieve this goal, the article is structured as follows: after this introduction, the Materials and Methods section is presented, which describes the research approach, the data sources and the procedures adopted. Next, the Results are discussed, covering the characterisation of potato production in the municipality, its historical evolution, a comparative analysis at state and national level, as well as the economic, social and environmental impacts. Finally, the Conclusion section summarises the main findings of the study, points out the challenges and suggests ways of strengthening the production chain, with an emphasis on sustainability and local economic development.

Material and Methods

This study was carried out in the municipality of São Francisco de Paula, located in the Hortênsias Region, in the north-east of the state of Rio Grande do Sul (Fig. 1). With an estimated population of 21,893

inhabitants (IBGE, 2025) and an altitude of 880 metres, the municipality has a subtropical climate and is located around 120 km from the capital, Porto Alegre (Latitude: 29° 26' 49" South; Longitude: 50° 34' 45" West). According to the IBGE (2025), São Francisco de Paula/RS has an area of 3,317.79 km², divided into seven districts: São Francisco de Paula, Cazusa Ferreira, Eletra, Juá, Lajeado Grande, Rincão dos Kroeff and Tainhas. The municipality's Gross Domestic Product (GDP) per capita/year is 46,934.89 for 2021.

The research adopted a qualitative, exploratory, descriptive and explanatory approach. The exploratory approach made it possible to investigate aspects that have been little studied, such as the economic relevance of the potato in terms of production development, job creation, municipal revenue and integration with agro-industry and local tourism in São Francisco de Paula/RS. There is also a lack of specific academic publications on this production chain in the municipality, which reinforces the importance of this study to fill this gap and provide information for researchers, producers and public managers. The descriptive research aimed to detail the economic and social impacts of production, while the explanatory approach aimed to identify the cause and effect relationships between potato production, local development and integration with sectors such as industry and tourism.

For theoretical background and data collection, information from secondary sources was used, including the Brazilian Institute of Geography and Statistics (IBGE) (<https://cidades.ibge.gov.br/>), EMATER-Ascar (www.emater.tche.br/), city hall documents and scientific articles accessed through academic research databases such as Google Scholar (<https://scholar.google.com.br>) and SciELO (<https://www.scielo.br/>). The data collection also





included the documentary analysis of materials provided by the Municipal Departments of Tourism, Agriculture and Economic Development of São Francisco de Paula/RS, obtained in 2022. These sources provided an

in-depth understanding of the economic, social and environmental aspects related to potato production in the municipality.

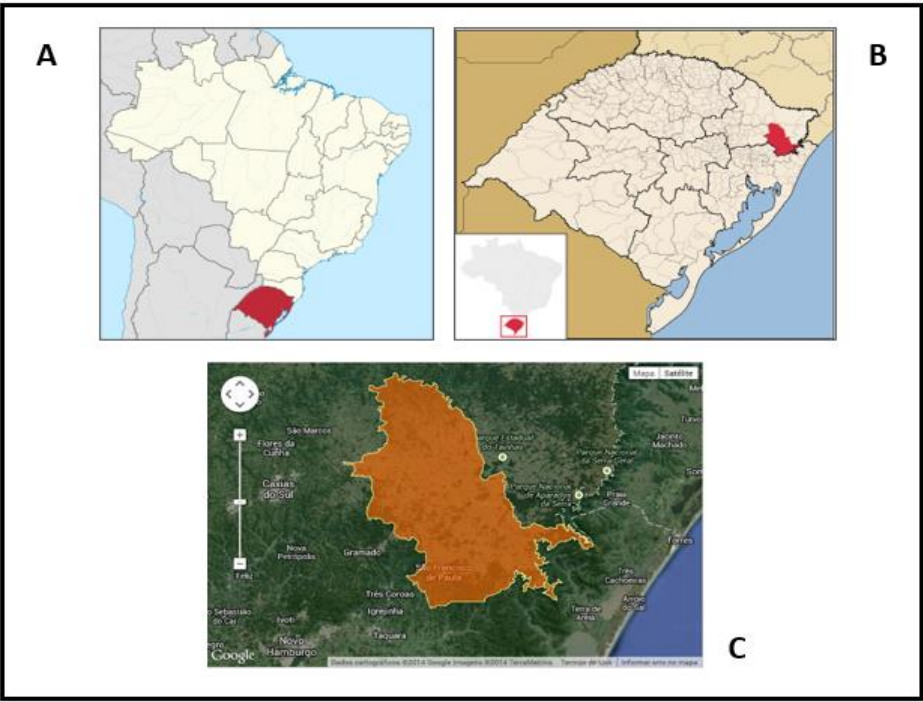


Figure 1. Location of the the State of Rio Grande do Sul in Brazil (A); location of municipality of São Francisco de Paula in the State of Rio Grande do Sul (B); and a focus on the municipality of São Francisco de Paula in the State of Rio Grande do Sul. 2025 (C). Source: Adapted by the authors from Google Maps (2021).

An important limitation of this study was the exclusive reliance on secondary sources, such as data provided by public institutions (IBGE, Emater) and municipal documents. Although these sources are reliable and widely used in similar studies, the lack of direct primary data collection can restrict the identification of specific perceptions of local producers and other actors involved in the production chain. To mitigate this limitation, data triangulation was adopted, comparing information from different bases (public statistics, technical documents and scientific articles),

ensuring greater consistency in the conclusions. In addition, the results were contextualized in state and national scenarios, allowing for an integrated view of the role of potato production in São Francisco de Paula/RS.

Results and Discussion

Potato production in São Francisco de Paula/RS stands out as an essential activity for the municipality's economic development, being one of the main producing centers in RS and the 12th largest in Brazil.





Agricultural activity in the municipality is favoured by favourable natural conditions, such as a subtropical climate and soils rich in organic matter, allowing for efficient cultivation and significant crop yields.

According to 2020 data, the area planted with potatoes in the municipality was 3,500 hectares, with full harvesting in the same period. Production reached a total of 87,500 tonnes, with an average yield of 25,000 kg per hectare, showing the productive efficiency of the methods adopted by local farmers. The total value of production was estimated at R\$ 172.38 million, reflecting the crop's economic importance for municipal revenue and income generation for producers (Rio Grande do Sul, 2021).

Historically, the area planted and the volumes produced have grown since the 1990s, when mechanisation of production intensified, facilitated by the municipality's favourable topography. As a result, the municipality has established itself as the main potato producer in the state, making a significant contribution to the local economy and generating direct and indirect jobs. Another important factor is the impact of potato production on the municipality's revenue, alongside livestock farming and forestry. The ICMS tax revenue reinforces the importance of potato growing as a source of funds for São Francisco de Paula/RS.

In addition to the domestic market, a portion of local production is exported to neighbouring countries such as Argentina and Uruguay (AGROLINK, 2021). The diversification of the production chain is also evident in the industrialisation of the tuber, with the highlight being the work of the Deutschips company, located in the municipality of São Francisco de Paula/RS, which exclusively uses potatoes from the municipality to make chips and straw potatoes. This process adds value to the product and expands the market possibilities for local producers.

Despite the success in production, the sector faces challenges. Production costs are high, ranging from R\$ 20,000 to R\$ 30,000 per hectare, depending on the level of technology used. The fluctuating prices paid to producers, determined by supply and demand in other regions, affect farmers' economic stability. In addition, issues related to the use of pesticides and product traceability require continuous attention to ensure sustainability and compliance with environmental regulations.

The promotion of potato production in the municipality is reinforced by events such as the 'Potato Gastronomy Festival', which celebrates local culture, attracts tourists and strengthens the identity of São Francisco de Paula/RS as a producer hub. The integration of agriculture, tourism and industrialisation reinforces the potential of the potato as a vector for economic and social development (Prefeitura de São Francisco de Paula, 2025).

With consolidated and constantly evolving production, São Francisco de Paula/RS continues to be a benchmark for potato growing in Rio Grande do Sul, strengthening its economy and contributing to the state and country's agricultural sector. Continuing this success depends on overcoming challenges, investing in innovation and adopting sustainable practices, ensuring the long-term viability of the activity.

Evolution of potato production in São Francisco de Paula/RS

Potato production in São Francisco de Paula/RS has grown significantly over the years, consolidating itself as a strategic economic activity for the municipality. This growth can be seen from historical data showing the evolution of the area planted, productivity and the value generated by production (Table 1).





Productivity almost tripled in the same period, going from 8,666 kg/ha to 25,000, and the average yield per hectare varied over time, peaking in 2016 at 30,000 kg/ha, driven by technological advances and improvements in agricultural management. Despite the fluctuations, average productivity remained high, consolidating São Francisco de Paula/RS as a reference point in potato production. The value generated by production also grew significantly, rising from R\$ 286,000 in 1994 to R\$ 172.4 million in 2020, with a peak of R\$ 302.4 million in 2016.

The evolution of production demonstrates the strengthening of agricultural activity in the municipality. In 1994, the planted area was just 150 hectares, while in 2020 this figure reached 3,500 hectares, reflecting the growth of the crop. Production has also increased significantly, from 1,300 tonnes in 1994 to 87,500 tonnes in 2020 (Fig. 2).

The advance of agricultural production, as seen in the expansion of potato cultivation in São Francisco de Paula/RS, is not without environmental impacts and changes in land use and cover. Studies such as that by Klein and Berreta (2023) warn of the effects of this expansion on the municipality's highland fields, demonstrating that the increase in agricultural areas and the intensification of activities such as forestry and livestock farming have contributed to the fragmentation of ecosystems, a reduction in biodiversity and pressure on ecosystem services. In the specific case of potato farming, although its economic contribution is significant, the intensive use of areas previously occupied by natural grasslands can generate cumulative impacts, requiring greater attention to the adoption of sustainable management practices and environmental conservation.

Table 1. Historical data on the main indicators of potato production in the municipality of São Francisco de Paula/RS.

Year	Planted Area (ha)	Production (tonnes)	Average Yield (kg/ha)	Production Value (R\$ thousand)
1994	150	1,300	8,666	286
1997	340	10,540	31,000	2,213
2000	620	12,260	19,774	2,513
2004	2,050	38,900	18,975	19,450
2008	3,800	94,100	24,763	77,633
2012	2,500	62,500	25,000	21,250
2016	3,600	108,000	30,000	302,400
2020	3,500	87,500	25,000	172,375

Source: IBGE (2020).

This phenomenon is not exclusive to the state of Rio Grande do Sul. Marinho, Barbosa and Gomes (2024) emphasise that, on the national scene, the challenges posed by climate change require public policies to move forward in articulating mitigation and

adaptation strategies, especially in territories where pressure on land use is growing rapidly due to the expansion of agricultural activities. This perspective is in direct dialogue with what has been observed in São Francisco de Paula and also in other production centers,





such as Mucugê (BA), a municipality which, according to the data presented in Table 2, leads national potato production, but also faces similar challenges related to territorial transformations and the environmental risks arising from agricultural expansion.

Analysing potato production trends in the municipality must therefore take into account not only economic indicators, but also the environmental and territorial implications of this growth. This reinforces the need to integrate more sustainable agricultural practices and public policies in line with the challenges of climate change and the conservation of local ecosystems, ensuring that economic development does not jeopardise the territory's environmental resilience.

The growth in production is attributed to factors such as favourable climatic and geographical conditions, the adoption of modern technologies, the mechanisation of farming and the use of efficient agricultural inputs (Ahmad; Sharma, 2023). Industrialisation has also boosted the sector, with companies such as Deuschips processing potatoes locally, adding value to the product. In addition, public

policies aimed at infrastructure and the promotion of tourism, through the ‘Potato Gastronomy Festival’, have strengthened the production chain.

Despite the challenges, such as high production costs and climate vulnerability, potato production has evolved. This growth has consolidated the activity as one of the main sources of income and employment in the region, since the potato production chain involves everything from cultivation to processing, industrialization and marketing of the product, generating many direct and indirect jobs in the municipality. In addition, the activity contributes significantly to municipal revenue, accounting for around 20 % of local primary production, and boosts complementary sectors such as transport, commerce, services and gastronomic tourism. This economic dynamism not only reinforces the importance of the potato in the state's agricultural scenario, but also positions it as a vector for territorial development, capable of integrating agriculture, agro-industry and tourism, promoting economic diversification and sustainability in the region..

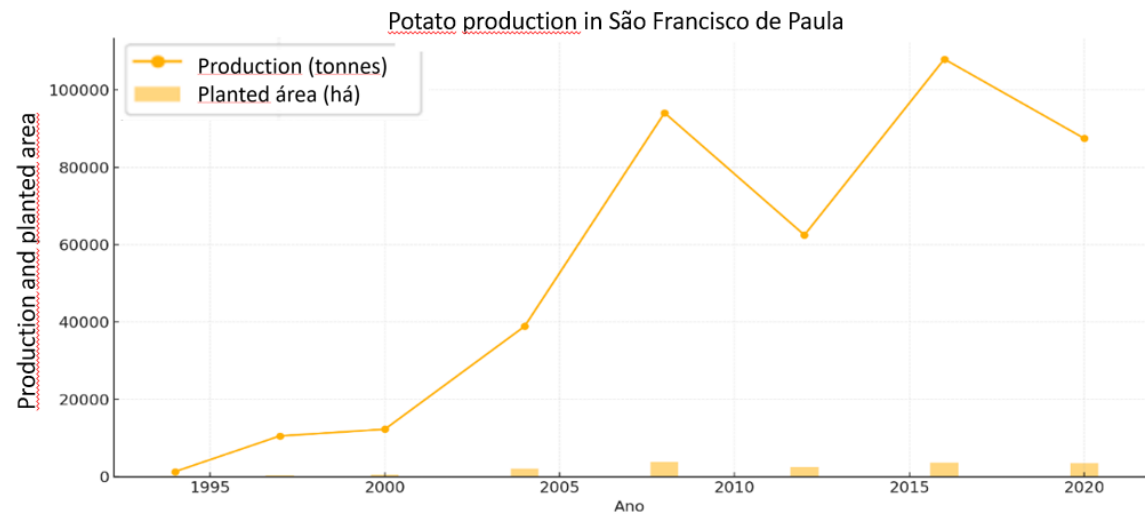


Figure 2. Evolution of the planted area and potato production in São Francisco de Paula/RS, between 1995 and 2020. Source: IBGE (2020).





Table 2. Production of the main producing municipalities in Brazil in 2020

Municipality	Production (tonnes)	Brazilian States	Production ranking
Mucugê	244,630	BA	1º
Perdizes	238,950	MG	2º
Casa Branca	160,000	SP	3º
Ibicoara	156,000	BA	4º
Cristalina	147,000	GO	5º
São Francisco de Paula	87,500	RS	12º

Source: adapted from IBGE (2020)

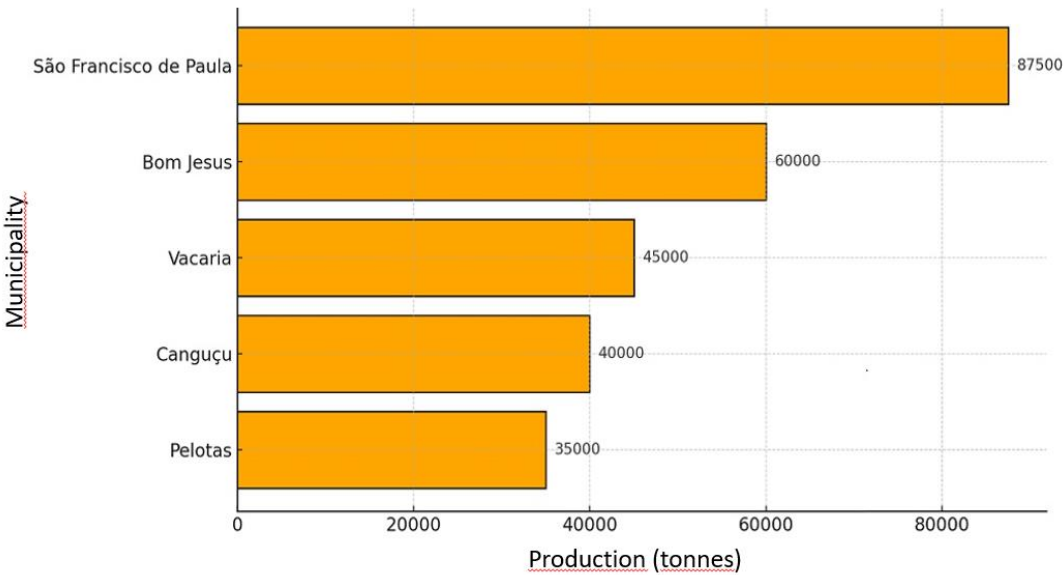


Figure 3: Potato production in the main municipalities in the state of Rio Grande do Sul. Source: IBGE (2020).

National comparison of potato production in the main producing municipalities

São Francisco de Paula/RS is the 12th largest potato producer in Brazil (Table 2). Analysis of the data presented in Table 2 reveals a production scenario that is highly concentrated in a few Brazilian municipalities, reflecting the territorial specialisation of potato farming in the country. It can be seen that the five largest producing municipalities (Mucugê/BA, Perdizes/MG, Casa Branca/SP, Ibicoara/BA and Cristalina/GO)

together account for significant volumes of production, much higher than those recorded in São Francisco de Paula/RS, which ranks 12th. This difference can be explained by a series of structural and territorial factors. The leading municipalities, especially those located in the states of Minas Gerais, São Paulo, Bahia and Goiás, have highly favourable soil and climate conditions, greater availability of flat areas, intensive use of technology, more consolidated irrigation systems and a strongly structured agro-industry. In addition,





production in these territories is often destined for large consumer markets and to supply processing industries, which contributes to the scale of production.

However, despite the quantitative difference, São Francisco de Paula's position in the national ranking is highly expressive, especially when you consider the context of Rio Grande do Sul, where the municipality is the isolated leader in state production. Furthermore, unlike other large production municipalities, production in São Francisco de Paula is carried out in a territory with challenging topographical characteristics, a subtropical climate and a predominance of small and medium-sized properties, which demonstrates a high degree of production organisation, economic resilience and efficiency in agricultural management.

Another important aspect is that, while other production centers are primarily geared towards the fresh market or large industries, São Francisco de Paula has managed to add value through strategic links with gastronomic tourism and the local agro-industry, exemplified by the work of the Deuschips company and the Potato Gastronomy Festival. This development model, which combines agricultural production, processing and tourism, increases the economic impact of the activity and reinforces the territorial importance of the crop, even though in terms of absolute production the municipality is not among the five largest in the country.

Therefore, the analysis in Table 2 should not be limited to production volume alone, but should be contextualised within the socio-economic and productive characteristics of each territory, allowing us to understand that the relevance of São Francisco de Paula transcends the quantity produced, and is directly related to its capacity to generate value creation, promote local development and strengthen the region's economic profile.

State comparison of potato production in the main producing municipalities in RS

Within the state of Rio Grande do Sul, São Francisco de Paula stands out as the largest producer of potatoes, surpassing other relevant municipalities in the cultivation of the tuber (Fig. 3).

As shown in Fig. 3, the municipality of São Francisco de Paula/RS leads state production, consolidating its position as one of the state's agricultural pillars. This performance reinforces RS's position as the fourth largest potato producer in Brazil, being an important supplier both for domestic consumption and for supplying other regions.

While Mucugê/BA and Perdizes/MG dominate national production, São Francisco de Paula/RS maintains a strategic position within RS and is relevant on the Brazilian scene. Its state leadership reflects the economic and agricultural impact of this crop, which benefits from favourable climatic conditions, developed production infrastructure and integration with local industry.

Potato production in São Francisco de Paula/RS plays a crucial role in generating employment and is one of the main sources of income for the local population. Direct jobs include workers involved in preparing the soil, planting, cultural management, harvesting and processing the tuber, as well as operators of agricultural machinery. Most of these workers are local residents, which contributes to strengthening the local economy.

Indirect jobs are generated mainly during the harvest period and include pickers for manual harvesting, transporters, outsourced service professionals and employees of the processing plants. These jobs also include employees in the local industry, such as Deuschips, which uses only potatoes produced in the municipality to make chips and straw potatoes, adding value to production.





In addition, the activity drives other economic sectors, such as tourism and services related to the Potato Gastronomy Festival, which attracts visitors and creates temporary job opportunities. In this way, potato production not only supports thousands of families, but also promotes the socio-economic development of São Francisco de Paula/RS.

Potato production in São Francisco de Paula/RS is one of the municipality's main sources of tax revenue, strengthening municipal finances and generating important resources for investment in infrastructure and public services. This contribution is reinforced by the growing value addition of production, which is boosted by the presence of processing plants and local industrialisation.

In addition to the potato, the municipality's value creation is made up of other sectors such as beef cattle, poultry and forestry. In 2016, primary production, which includes these sectors, accounted for 61.88 % of the municipality's total value addition, surpassing trade (17.64 %), industry (17.25 %) and services (3.23 %). Within this context, the potato stands out as one of the most important products in the crop-growing sector, representing a significant portion of the local agricultural economy. This relevance, compared to other sectors, reflects the municipality's ability to take advantage of its natural conditions and invest in agricultural practices that drive economic development and generate a positive impact on tax collection and sustainable growth in the region.

The Deuschips company uses only raw materials from the municipality, which adds value to local agricultural production and strengthens the regional economy (Frazão, 2021). Since it was founded, the company has been expanding its operations and reaching other markets, consolidating its position as a reference point in the food sector and promoting

economic development in the region.

The company's contribution to the local economy is significant, not only because it industrialises potatoes, but also because it generates around 200 direct jobs, as well as other indirect jobs. The company provides job opportunities for local residents in its industrial and administrative operations, as well as encouraging the production chain by creating constant demand for potatoes grown in the region. This integration between agriculture and industry guarantees stability for local producers and fosters sustainable economic growth. In addition, it plays an important role in the municipality's tax collection and in strengthening regional identity by valorising one of the municipality's main agricultural products.

For the municipality, which is the largest producer of potatoes in the state and 12th in the country, generating a value of R\$ 156 million in 2020, the amount reflects not only the direct marketing of the product, but also the value addition provided by processing units and industrialisation, as in the case of Deuschips, a company that uses exclusively local potatoes to manufacture chips and potato sticks. The activity is also responsible for 20 % of the municipality's primary production ICMS revenue, making a significant contribution (Prefeitura de São Francisco de Paula, 2025).

The potato production chain, which ranges from cultivation to transport and processing, is responsible for generating between 3,000 and 8,000 direct and indirect jobs. This income generation strengthens the local economy, reducing migration and ensuring opportunities for the local population. In addition, the Potato Gastronomy Festival promotes the integration of the primary sector with tourism, valorising the product and attracting visitors.

However, production faces significant challenges.





The high cost of production, between R\$ 20,000 and R\$ 30,000 per hectare, limits producers' profits, especially given the volatility of the prices paid, which vary according to supply and demand in other regions. Dependence on pesticides, even those with lower toxicity, poses environmental and sustainability challenges, especially given the growing demand for traceability and environmentally responsible practices (Zikankuba *et al.*, 2019). In addition, the need to maintain local infrastructure, such as roads for transporting production, and environmental licensing for processing plants require continuous investment and attention.

On the other hand, the outlook for the sector is promising. The growth in demand for processed potatoes, such as chips and pre-fried potatoes, opens up opportunities to expand the market and diversify products. The integration of agriculture and industry demonstrates the municipality's potential to add value to production. Investments in agricultural technology, such as irrigation and precision fertilisation, and the strengthening of public policies to support the sector can increase efficiency and reduce costs (Pereira; Castro, 2022). In addition, encouraging gastronomic tourism, with events celebrating the potato, helps to consolidate the municipality's identity as an agricultural and tourist center. With coordinated efforts, potato production in São Francisco de Paula/RS can continue to boost the municipality's economic and social development, promoting sustainable growth and economic inclusion.

Comparative Analysis of Potato Production: Brazil and the World

Potato production in São Francisco de Paula/RS demonstrates significant outcomes, both nationally and internationally, standing out for its productivity and regional economic impact. Compared to other

production centers in Brazil and around the world, the municipality has similarities and particularities that reinforce its relevance in the sector.

On the national scene, the potato is one of the main agricultural crops, with a total production of 3,767,769 tonnes in 2020, concentrated in the states of Minas Gerais, Paraná, São Paulo and Rio Grande do Sul. Minas Gerais leads national production, with municipalities such as Perdizes, which produces around 238,950 tonnes a year, while São Francisco de Paula, with 87,500 tonnes, ranks 12th. The national average productivity is 32,134 kg/ha, slightly higher than that of São Francisco de Paula (25,000 kg/ha), which is due to the climatic, structural and technological differences between the producing regions (Rio Grande do Sul, 2021).

One of the distinguishing features of the municipality in Rio Grande do Sul is its integration with the agro-industrial sector, exemplified by the work of Deuschips, which adds value to production by transforming potatoes into processed products. In other Brazilian states, most production is destined for fresh consumption, while São Francisco de Paula stands out for its progress in industrial processing and production traceability, in line with global trends towards sustainable consumption.

On the world stage, countries like China and India dominate potato production, with average yields ranging from 20,000 to 40,000 kg/ha, depending on the technology used (Chulet *et al.*, 2017; Singh; Singh; Lal, 2022; Wang *et al.*, 2023). In the United States and European countries such as Germany and the Netherlands, production is highly mechanised, guaranteeing yields of over 40,000 kg/ha in some regions (Goffart *et al.*, 2022). Although São Francisco de Paula/RS does not reach this level of productivity, its model for integrating agriculture, industry and tourism





is similar to European systems, especially those found in regions such as Tuscany (Italy), Provence (France) and Andalusia (Spain), where there is a strong link between agricultural production chains, small and medium-sized agro-industries and rural and gastronomic tourism. This integration makes it possible not only to add value to local products, but also to diversify sources of income, strengthen cultural identity and promote the sustainable economic development of the territory.

The municipality's position in the national and international potato-growing sector highlights its economic and production potential, and it has become a benchmark for other localities seeking agricultural development combined with industrialisation and technological innovation. In the local context, technological innovation in the potato production chain is mainly associated with the modernisation of production processes, with the adoption of practices such as the mechanisation of planting and harvesting, the use of irrigation systems, the application of more efficient inputs, as well as the traceability of production and the strengthening of the local agro-industry, which adds value by processing the tuber into products such as potato chips and straw.

Prospects and Challenges for Potato Production

International studies highlight the growing demand for processed potatoes, such as chips and pre-fried potatoes, driven by changes in consumer habits (Hu, 2025; EMBRAPA HORTALIÇAS, 2025). This trend is also reflected in São Francisco de Paula/RS, where the Deutchips company and events such as the Potato Gastronomy Festival encourage industrialisation and tourism linked to the cultivation of the tuber. However, challenges such as high production costs and dependence on agricultural inputs are obstacles faced by both local and global producers, reinforcing the need for

innovation and the adoption of sustainable practices (FAO, 2019; IBGE, 2020).

The results observed in São Francisco de Paula reflect both the characteristics of the national production sector and global trends in potato growing. According to the FAO (2022), countries like China and India dominate world potato production, but face similar challenges, such as the need for technological modernisation and the growing demand for product traceability. In addition, the integration of agricultural production and industrialisation strengthens the sector's competitiveness, a strategy already observed in São Francisco de Paula.

The municipality is in line with international initiatives aimed at diversifying products and enhancing production chains (Quintam; Assunção, 2023). However, it faces similar challenges to other regions of Brazil and the world, such as the need to increase production efficiency and ensure the sustainability of the activity. Compared to other studies, local research reaffirms the relevance of the potato as an economic and social engine, pointing to promising paths for integrating agriculture, industry and tourism.

Potato Gastronomy Festival

The São Francisco de Paula/RS Potato Gastronomy Festival is an annual event that, since its creation in 2019, has been consolidated as one of the main expressions of the value addition of the local agricultural production, especially the potato, strengthening its articulation with tourism, gastronomy and the cultural identity of the municipality. The event, which traditionally takes place in May, lasts an average of three days and attracts both locals and tourists from the region and other states (Prefeitura de São Francisco de Paula, 2023).

In addition to promoting the potato as a key





player in the local economy, the festival plays a strategic role in generating temporary jobs and income, boosting sectors such as hotels, gastronomy, commerce and services. In recent editions, the event has recorded an estimated economic turnover of around R\$ 1 million, taking into account sales of food, handicrafts, regional products and turnover in the accommodation and tourism sector. The number of visitors is around 6,000 during the entire period of the event, which represents a significant impact for a medium-sized municipality like São Francisco de Paula (Jornal Tribuna, 2025).

The festival features a gastronomic square, where restaurants, farmers, local agro-industries and entrepreneurs sell typical dishes made with potatoes, promoting regional cuisine and encouraging the consumption of local products. In addition, the programme includes cultural presentations, show classes and cooking panels with renowned chefs, regional product fairs, workshops on potato cultivation and handling, as well as musical and theatrical attractions and recreational activities for children (Jornal Tribuna, 2025).

The festival's cultural significance transcends the simple commercialisation of food, as it represents a space for valuing local identity, the history of family farming and the integration of tradition and innovation. The event also strengthens the community's sense of belonging, promotes the revival of traditional culinary practices and encourages sustainable tourism practices by highlighting local produce as a tourist attraction. Culturally, the festival reinforces the promotion of local identity, potato production as a regional symbol and the integration of agriculture, agro-industry and tourism.

In symbolic terms, the Potato Gastronomy Festival reflects the development model adopted in the municipality, which seeks to integrate the agricultural, agro-industrial and tourism sectors in a complementary

and sustainable way. Through this event, the potato ceases to be just an agricultural product and becomes recognised as an identity element of the territory, strengthening both the economy and local culture.

Analysing the Sustainability of Potato Growing in the Municipality

Although potato production in São Francisco de Paula/RS, plays an essential role in local economic development, it presents important challenges in terms of the territory's environmental sustainability. The intensification of this agricultural activity requires specific care to minimise negative impacts on the environment, such as soil degradation, excessive use of pesticides and high consumption of water resources. Historically, potato cultivation in the municipality has undergone a transition from highly toxic pesticides to less aggressive products, but even so, the frequent application of chemical inputs represents a significant obstacle to sustainability (Salas; Töfoli, 2017).

Dependence on pesticides, even those classified as less toxic, continues to pose environmental and sustainability challenges, especially in a context of growing demands for traceability, quality and environmentally responsible practices. As discussed by Zikankuba *et al.* (2019), the inappropriate use of pesticides, coupled with weaknesses in regulation, inspection and management, can result in significant impacts on both the environment - such as contamination of soils, water resources and damage to biodiversity - and food safety, due to the presence of residues in food. This shows that even in production systems that adopt technological advances and less toxic pesticides, there are still structural challenges related to risk management, the socio-environmental responsibility of agricultural production and the need for more effective policies to ensure sustainable





production chains.

From the point of view of conserving natural resources, inappropriate practices can contribute to soil erosion, siltation and contamination of watercourses, especially in areas close to springs and streams (Jung *et al.*, 2024). Recent studies, such as the one by Klein and Berreta (2023), warn of the effects of agricultural expansion on the high altitude grasslands in São Francisco de Paula, with impacts on biodiversity and fragmentation of natural ecosystems. Although these effects are not exclusive to potato farming, the territorial pressure exerted by this crop requires preventative measures and more consistent sustainable management strategies.

Initiatives such as traceability and certification of good agricultural practices, implemented by some producers and encouraged by public policies, have the potential to mitigate these impacts. Traceability allows for stricter control of the use of inputs, ensuring that they are applied within environmental standards and with less risk to the ecosystem (Pellegrini; Barbosa, 2023). In addition, the sustainability of the local agricultural sector is also directly related to the efficient use of water, especially in the face of increased demand for irrigation during periods of drought. Modern technologies, such as precision irrigation systems and integrated pest management, can reduce both water consumption and dependence on chemical pesticides, promoting a better balance between production and environmental conservation (Salas; Töfoli, 2017).

When one analyses the sustainability of the potato production chain in the municipality, one sees an ambivalent scenario: on the one hand, there is economic vitality, job creation and links with sectors such as tourism and agro-industry; on the other, structural challenges remain in terms of the intensive use of natural resources and the lack of more widespread agro-

ecological practices. For agricultural production to effectively advance towards sustainability, it will be necessary to increase investments in environmentally orientated technological innovation, continuous training for farmers and public policies that encourage crop diversification, conservationist management and the protection of strategic ecosystems.

Events such as the Potato Gastronomy Festival can also act as platforms for raising environmental awareness, by including debates on responsible agricultural practices in their programme and by valuing producers committed to sustainable methods. In this way, São Francisco de Paula has the opportunity to consolidate itself as a reference territory in the promotion of economically viable, socially fair and environmentally balanced agriculture - in line with the goals of sustainable development.

Conclusion

Potato production in São Francisco de Paula, Rio Grande do Sul, has become an extremely important economic, social, and cultural activity. For the municipality, this activity represents the main driving force behind the local economy, responsible for an annual turnover of approximately R\$ 156 million, generating between 3,000 and 8,000 direct and indirect jobs and contributing around 20 % of the municipality's primary sector revenue. These figures reflect not only the economic impact of agricultural activity, but also its ability to boost complementary sectors such as agro-industry and gastronomic tourism.

The development of processing plants and local industry, represented by companies such as Deuschips, adds value to production, expands markets and strengthens the municipality's economic profile. Added to this is the role of the Potato Gastronomy Festival, which is consolidating itself as an instrument for





cultural promotion, promoting tourism and strengthening integration between the agricultural, industrial and service sectors.

Despite the progress made and the consolidation of the municipality as a production center in the state, the activity faces significant challenges. High production costs, dependence on chemical inputs and climate vulnerability impose limitations on the sector's economic and environmental sustainability. These challenges demand the adoption of more sustainable agricultural practices, investments in management technologies, irrigation, traceability and public policies that strengthen the competitiveness of local producers.

It is important to recognise that this study has limitations inherent in its methodological approach, based exclusively on secondary data. Although this strategy allowed for a comprehensive and well-founded analysis, it did not take into account the perceptions, daily challenges and experiences of the local actors directly involved in the production chain. It is therefore recommended that future research incorporate qualitative methodologies capable of enriching the understanding of the socio-economic, environmental and cultural impacts resulting from the expansion of potato farming in the territory.

Even so, the results presented here make a significant contribution to understanding the strategic role of the potato in regional economic development. The study provides relevant input for the formulation of public policies, rural development strategies, economic diversification and the promotion of sustainable practices. The continued strengthening of the potato production chain will therefore depend on the ability to balance economic growth, innovation, environmental responsibility and social development, guaranteeing the long-term sustainability of the activity.

Acknowledgements

The authors would like to thank EMATER in São Francisco de Paula for providing the secondary data.

Conflict of Interests

The authors declare that the research was conducted in the absence of any potential conflicts of interest.

Ethical Statements

The authors confirm that the ethical guidelines adopted by the journal were followed by this work, and all authors agree with the submission, content and transfer of the publication rights of the article to the journal. They also declare that the work has not been previously published nor is it being considered for publication in another journal.

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