

THE TRAJECTORY OF SUGARCANE IN BRAZIL: AN INTERDISCIPLINARY ANALYSIS OF TERRITORIAL EXPANSION AND SOCIO-ENVIRONMENTAL IMPACTS

Jaciane Aparecida Jesus da Cruz¹

RODRIGUES, Gelze Serrat de Souza Campos; ROSS, Jurandyr Luciano Sanches. *A trajetória da cana-de-açúcar no Brasil: perspectivas geográficas, históricas e ambientais*. Uberlândia: EDUFU, 2020. 272 p.

The book *A trajetória da cana-de-açúcar no Brasil: perspectivas geográfica, histórica e ambiental* [The Trajectory of Sugarcane in Brazil: Geographical, Historical, and Environmental Perspectives], written by geographers Gelze Serrat de Souza Campos Rodrigues and Jurandyr Luciano Sanches Ross, was published by EDUFU (the Federal University of Uberlândia Press) in 2020. The volume examines the history and the effects of sugarcane in Brazil, integrating geographical, historical, and ecological perspectives. It analyzes the evolution of this crop from the colonial era to the present day, highlighting how physical, economic, political, and social factors shaped its expansion and persistence in Brazil over the course of five centuries.

Over its 272 pages, the authors guide the reader through a narrative that weaves together bibliographical research, documentation, and empirical analysis, offering a comprehensive perspective on the territorial arrangements, technological innovations, and socio-environmental effects stemming from the cultivation and industrialization of sugarcane.

The opening chapter, “*Inicia-se o percurso da cana-de-açúcar no Brasil*” [“The Course of Sugarcane Begins in Brazil”], addresses the early stages of sugarcane production in the country, underscoring the natural and historical circumstances that enabled its growth. The authors explain how the geography of colonial Brazil—characterized by fertile soils, suitable topography, and a tropical climate—was crucial in the selection of sugarcane as the principal agricultural commodity. The Portuguese

¹Master’s student in the Postgraduate Program in Atlantic History and the African Diaspora at the State University of Santa Cruz (PPGH-UESC). Researcher in Urban History and Studies on the Cacao-Growing Region, currently developing a dissertation entitled “Lavigne and Pessoa Decades: Urban Interventions in Ilhéus (1924–1943).” Member of the Study Group on Economic History and the History of Economic Thought (GEHEPE-UESC). Contact: jacyjcruz@gmail.com. ORCID: <https://orcid.org/0009-0002-9448-2321>.



introduced sugarcane in the mid-sixteenth century, initially in São Vicente and later in the captaincies of Pernambuco and Bahia, which became major centers of production.

In this chapter, the authors examine the role of sugar as the first major colonial enterprise and discuss the relevance of physical factors, such as water availability and topography, in the construction of *engenhos* (sugar mills). They also explore how the expansion of sugarcane fields shaped the colonization process and the economic structure of that period.

This chapter offers a thorough and detailed assessment of the initial conditions that enabled the development of sugarcane cultivation in Brazil. The strength of the text lies in the authors' ability to integrate physical geography and history, clearly elucidating how Brazil's natural particularities were essential to the success of this crop. This approach distinguishes the chapter from others that tend to focus solely on the economic or social dimensions of colonization.

However, one aspect that could have been further developed is the social dynamic associated with the establishment of sugar mills and the impacts of this economic structure on local communities, particularly regarding the use of Indigenous and African labor. Although the chapter is primarily centered on geography, a more detailed analysis of the social and political interactions of the period would broaden the understanding of sugarcane's role in shaping colonial Brazil.

The second chapter, “Uma transição sutil: dos engenhos centrais às usinas” [“A Subtle Transition: From Central Mills to Industrial Plants”], discusses the shift from the system of *engenhos centrais* (central mills) to modern sugar factories in Brazil. With the decline of traditional *engenhos banguês* at the end of the nineteenth century, the sugar industry underwent modernization, resulting first in the rise of central mills and later in the establishment of factories.

These central mills were created to meet the demand for greater productivity, standing out for their use of advanced technologies and their greater capacity for sugar production and processing. Factories, in turn, marked a new stage of industrialization in the sector, introducing technical innovations and a more unified and automated production process. The chapter also addresses the effects of these changes on the spatial organization of production, which came to require greater proximity to logistical infrastructure and consumer markets.

This chapter offers an accurate and detailed assessment of the modernization of Brazil's sugar industry, emphasizing the transition from traditional mills to contemporary factories. Its strength lies in the way the authors connect technological development to structural changes in sugar production, revealing the interconnection between economic, technical, and geographic factors. Their justification for the emergence of central mills and their innovative characteristics is robust, demonstrating the importance of industrialization in transforming the sector.

Nevertheless, the text could delve further into the social consequences of this transformation, particularly concerning the labor force. Despite its clear focus on mechanization and technological change, a more critical examination of how these shifts affected workers—especially regarding the replacement of human labor by automation—would strengthen the analysis. Moreover, the environmental impacts of this new production stage could have been explored more deeply, considering the significant consequences that increased production brought to ecosystems.

The third chapter, “*Surge o novo polo canavieiro*” [“A New Sugarcane Hub Emerges”], examines the shift of the industry's productive center from the Northeast to the Southeast, focusing on the state of São Paulo from the early twentieth century onward. This movement was stimulated by several factors, including government strategy, technological advances, and the expansion of the railway network, which facilitated transportation and distribution.

The authors explain how the Southeast—particularly São Paulo—consolidated itself as Brazil's new sugarcane hub, benefiting from a more favorable political environment and proximity to consumer markets. Government policies promoting alcohol production were crucial in establishing this new center of activity. They also explore the socio-environmental impacts of this expansion and how it reshaped Brazil's agricultural and industrial landscape.

The chapter presents a robust evaluation of the shift of sugarcane production to the Southeast, effectively clarifying the factors behind this transition. The text underscores the connection between governmental planning and the sugar sector, demonstrating how public policies can shape territorial and economic structures. The

discussion of the railway network and its importance to transportation is particularly noteworthy, as it highlights the essential role of infrastructure in the industry's success.

Yet, the chapter could have further explored the regional inequalities stemming from this geographic shift. The transfer of sugarcane production from the Northeast to the Southeast imposed a new economic configuration on Brazil, with major consequences for regions that lost prominence. A more detailed study of the social and economic effects on former leading producers, such as Pernambuco and Bahia, and the resulting impact on local economies and labor dynamics, would enrich the analysis.

The fourth chapter, “A agroindústria sucroalcooleira e o proálcool” [“The Sugar-Alcohol Agroindustry and Proálcool”], examines the crisis of Brazil's sugar sector during the 1970s and 1980s and the implementation of Proálcool, the National Alcohol Program, as the government's response to the oil crisis. Launched in 1975, the program sought to replace fossil fuels with ethanol derived from sugarcane, stimulating large-scale alcohol production. The authors analyze how Proálcool reshaped the sugar-alcohol industry, fostering technological progress and the modernization of ethanol production.

The chapter also discusses the program's socio-economic effects, which brought economic advantages to the sector but also posed challenges—particularly during the late-1980s crisis, when falling oil prices destabilized the ethanol market. It outlines the three stages of Proálcool, from its creation to its deregulation in the 1990s, and explores the environmental impacts resulting from sugarcane expansion during this period.

This chapter provides a detailed and well-organized assessment of Proálcool, one of the most significant initiatives in Brazil's energy trajectory. The authors clearly articulate the program's importance for diversifying the national energy mix, highlighting the technological advances it spurred in ethanol production. A major strength of the chapter is its ability to link political, economic, and technological issues, demonstrating how Proálcool was shaped by global crises and government decisions.

However, the text could have probed more deeply into the social and ecological consequences of expanding sugarcane production for ethanol. Although the authors mention these socio-environmental effects, they treat them only briefly. The relocation of production to more vulnerable areas, such as the Cerrado, and the impacts on local communities and ecosystems deserve closer scrutiny. Additionally, the late-1980s crisis

that led to deregulation could have been explored in greater depth to show the challenges producers faced and the effects on the labor market.

The final chapter, “Continuidades e descontinuidades: a agroindústria sucroenergética” [“Continuities and Discontinuities: The Sugar-Energy Agroindustry”], discusses the transformation of the sugar-alcohol industry into the sugar-energy industry from the 1990s to the early twenty-first century. Sugarcane production expanded with deregulation and technological advancements, integrating the production of sugar, ethanol, and electricity generated from bagasse. This chapter focuses on recent strategies of industrial expansion, such as the use of biofuels and the introduction of flex-fuel technologies, which positioned Brazil as a global leader in ethanol production.

The authors also discuss sustainability concerns and the environmental effects of sugarcane expansion, examining measures taken to mitigate negative impacts, such as eliminating cane-field burning and adopting mechanized harvesting. The chapter concludes by highlighting the role of the sugar-energy industry in the contemporary context and its prospects for the future.

This chapter offers a comprehensive overview of the transformation of Brazil’s sugar-energy sector, addressing the technological advancements and sustainability challenges faced by the industry in recent decades. A key strength is its discussion of flex-fuel technology, which transformed the biofuel market and enabled Brazil to consolidate its global leadership in ethanol production. The authors’ engagement with issues of sustainability and sectoral development is especially pertinent, given growing global concern over climate change and energy transitions.

Nonetheless, the chapter could have further explored the social consequences of industrial modernization, such as the impact of automation on labor. Replacing manual labor with mechanized harvesting brought environmental benefits, including the phasing out of pre-harvest burning, but also resulted in unemployment in regions where manual cutting had been the main source of income. Although the authors mention these challenges, they do so only briefly, limiting the depth of their critique of the transition to sugar-energy production.

Despite these limitations, the chapter provides a persuasive synthesis of the transformations in the sugar-energy industry and its future challenges. The interplay of

technological, economic, and environmental dimensions stands out, and the text concludes convincingly by addressing the role of sugarcane in the low-carbon economy—an increasingly relevant topic in global sustainability debates.

The book thus represents a valuable contribution to studies on the history of sugarcane and its influence on Brazil. It stands out for its interdisciplinary approach, weaving together geography, history, economics, and ecology to examine changes in the sugarcane agroindustry across different periods, from colonial Brazil to the twenty-first century. Throughout its pages, the authors draw clear connections between the physical and territorial elements that shaped sugarcane cultivation and the political and technological transformations that molded the sector. This perspective enables a comprehensive understanding of how Brazil rose to become the world's leading producer of sugar and ethanol.

The book offers abundant historical, geographical, and cartographic information. It goes beyond merely describing key moments in the sugar industry's history, situating the economic, political, and technological transformations that reshaped the sector. The way the authors connect the physical characteristics of the Brazilian territory to the viability of sugarcane production is particularly well conceived. By emphasizing elements such as climate, topography, and soils, the work offers a detailed perspective on why sugarcane became one of the pillars of Brazil's economy.

Moreover, the book excels in its engagement with environmental issues, an aspect often overlooked in studies of the agricultural sector. The discussion of the socio-environmental effects of the sugarcane expansion—especially in recent decades—makes the book highly relevant to current sustainability debates.

However, despite its numerous strengths, the work presents some limitations. One of the main challenges is the use of highly technical language in several sections, particularly those addressing physical geography and cultivation methods. The use of specialized terminology may hinder reading for individuals without training in the relevant fields, limiting the book's audience to academics and specialists. Simplifying the language or providing additional explanations would broaden the text's accessibility.

Another aspect that could be improved is the assessment of the social effects of the expansion and modernization of the sugarcane industry. Although the authors address economic and environmental aspects in detail, social issues—such as the historical use of

enslaved labor and the consequences of mechanization for rural unemployment—receive more limited treatment. A more detailed examination of labor conditions in plantations and factories throughout history would provide a broader critical perspective, balancing discussions of technological innovation with the sector’s social realities.

Furthermore, the book could have enriched its analysis by incorporating more robust comparisons with other major global sugarcane producers, such as Cuba and India. Although its focus is Brazil, a global comparative approach would offer a broader perspective and highlight the specificities of Brazilian production within the world context.

Overall, this work is essential for readers seeking to understand the history of sugarcane in Brazil and its connection to the country’s economic and territorial development. Through its detailed analysis and interdisciplinary approach, the book constitutes a significant contribution to researchers and specialists in the field.