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Marching Rows of Coffee: The Pursuit of Modern Agriculture in Brazil, 1950–1990

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Doctor of Philosophy

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Abstract

Marching Rows of Coffee: The Pursuit of Modern Agriculture in Brazil, 1950–1990

By

Jonathan Earl Coulis

For nearly two centuries, coffee growing has been a driving force in Brazilian agriculture and a crucial national export. Even as the crop retained its centrality, the agricultural system that produced it continually changed. This dissertation investigates the particularly transformative period between 1950 and 1990, a time when "modernization" became a watchword for government planners and technocrats. I highlight how definitions of modernization changed over time, as did the participants and the role of the state. Shifting relationships between state ideologies of development, markets and the individuals operating in them, and environmental factors shaped the goals of and approaches to modernization. In emphasizing the evolving understandings of what modernization entailed, this dissertation argues against the notion of a clear "traditional" versus "modern" binary in agriculture.

In the 1950s, Brazilian politicians lamented the persistent economic importance of coffee farming as an emblem of the nation's past that perpetuated underdevelopment. In the 1960s, the government-operated Brazilian Coffee Institute (IBC) launched efforts to modernize the industry, employing rural extension to encourage farmers to increase farm productivity. A debilitating coffee fungus in 1970, followed by a destructive frost in 1975, prompted planners to modify their approaches and reshaped the environmental geography of Brazilian coffee growing. The government incentivized farmers to plant coffee in Minas Gerais state using new technologies, machines, fertilizers and pesticides, and farm organization—markers of modernization. By the 1980s, the IBC celebrated rising levels of coffee productivity, but also recognized that the ever-evolving goals of modernization remained elusive. Economic crises in the 1980s revealed the fragility of the IBC's model as the government curtailed economic and technical support for farmers.

Over these decades, a consensus developed in the centers of expertise that agriculture needed to modernize and could in fact achieve that goal. The development of this shared conviction served to normalize "modernization" as an ideology. This ideology persisted after the military dictatorship (1964-1985) fell from power and private industry and international entities increasingly defined aspirational visions of modern agriculture. This dissertation helps us understand an important continuity in development thought and its attendant ideologies amid political, economic, and environmental transitions.

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Marching Rows of Coffee: The Pursuit of Modern Agriculture in Brazil, 1950-1990

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Acronyms

ACAR	Associação de Crédito e Assistência Rural
ABCAR	Associação Brasileira de Crédito e Assistência Rural
CONTAG	Conferência Nacional dos Trabalhadores na Agricultura
CIFC	Centro de Investigações das Ferrugens do Cafeeiro
DAC	Departamento de Assistência à Cafeicultura
EMATER	Empresa de Assistência Técnica e Extensão Rural do Estado de Minas Gerais
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuária
ETR	Estatuto do Trabalhador Rural
FAEMG	Federação da Agricultura e Pecuária do Estado de Minas Gerais
FAO	United Nations Food and Agriculture Organization
FETAEMG	Federação dos Trabalhadores na Agricultura do Estado de Minas Gerais
FJP	Fundação João Pinheiro
FUNFERTIL	Fundo de Estímulo Financeiro ao uso de Fertilizantes e Suplementos Minerais
GERCA	Grupo Executivo de Racionalização da Cafeicultura
IAA	Instituto do Açúcar e do Álcool
IAC	Instituto Agronômico de Campinas
IAI	American International Association
IBC	Instituto Brasileiro do Café
IBEC	International Basic Economy Company
ICA	International Coffee Agreement
INCRA	Instituto Nacional de Colonização e Reforma Agrária
OAS	Organization of American States
OCCCRBAR	Office for Coordination of Commercial and Cultural Relations Between the American Republics
OCIAA	Office of the Coordinator of Inter-American Affairs
PIPAEMG	Programa Integrada de Pesquisa Agropecuária do Estado de Minas Gerais
PRRC	Plano de Renovação e Revigoramento dos Cafezais
SRB	Sociedade Rural Brasileira
USAID	United States Agency for International Development

Introduction

In 1979, Brazil's federal minister of agriculture, Alysson Paulinelli, proclaimed that "agriculture today is not simply important, it is the only hope to save Brazil's economy."[1] Paulinelli made this claim in his last days as minister, while receiving an award from the Minas Gerais Agricultural Federation (Federação da Agricultura do Estado de Minas Gerais—FAEMG), which represented farmers in the state. FAEMG president José Àlvares Filho presented the award to recognize Paulinelli's contribution to the transformation of agriculture in the southeastern state of Minas Gerais, and in Brazil as a whole. At the ceremony, Àlvares Filho offered his own historical perspective: "Brazilian agriculture had been relegated to a secondary role for so long… without any possibility of progress and modernization… even though it had always contributed the largest share to the national economy."[2] He further described how Brazil's national development strategy had for years "marginalized" agriculture while prioritizing industrial growth. But all this changed, Àlvares Filho noted triumphantly in reference to Paulinelli, when agriculture broke free from stagnation, "as a Phoenix rises from the ashes… for a period of golden prosperity."[3]

Àlvares Filho may have indulged in dramatic rhetoric, but he accurately identified a major transformation in Brazilian agriculture. Driven by government investment in modernization programs from the late 1950s to the late 1980s, agriculture played an increasingly central role in the national economy, generating export revenue, foodstuffs for a growing and urbanizing population, and materials to fuel industrial growth. From around 1960 to 1980, Brazilian farmers more than doubled the amount of land under cultivation, and increased national

[1] No author, "Paulinelli: Agricultura é a única esperança," *O Ruralista,* April 1979, 1.
[2] "Paulinelli: Agricultura é a única esperança," 1.
[3] "Paulinelli: Agricultura é a única esperança," 1.

agricultural productivity (measured by kilograms of crops grown per hectare) by around 30 percent.[4] These national statistics understate the regional changes that occurred in the southeast of Brazil where planners most focused their resources. The cultivation of specific crops underwent remarkable transformations, especially export commodities that generated revenue and balanced foreign trade. Government planners implemented programs to change where farmers grew crops and how they organized their farms. These programs offered credit incentives and technical advice, in addition to subsidizing the costs of agricultural chemicals (petroleum-based fertilizers and pesticides especially), selected plant varieties, and labor-saving machines.

The metaphor of a phoenix rising from the ashes referred to the process of agricultural modernization that democratic and dictatorial governments alike pursued during this period. It is not a coincidence that a farmer from Minas Gerais like Àlvares Filho would use this language, as government-led modernization programs helped drive coffee planting in his state. In the 1950s, farmers in Minas Gerais contributed only a small fraction of Brazil's national coffee harvest. At the time, the bulk of the nation's coffee was grown in the states of Paraná and São Paulo, to the south of Minas Gerais. Starting in the late 1960s and continuing to the mid 1980s, Brazilian state planners incentivized farmers to plant coffee in Minas Gerais, and simultaneously diminished support for it in Paraná. These efforts made Minas Gerais the national leader in coffee growing by the early 1980s, while cultivation in Paraná dramatically declined. This remarkable geographical transformation in coffee planting represented one component of a state-led modernization campaign. How farmers grew the crop also changed: some adopted new technologies, machines, fertilizers and pesticides, and modified the spatial organization of their

[4] Herbert S. Klein and Francisco Vidal Luna, *Feeding the World: Brazil's Transformation into a Modern Agricultural Economy* (Cambridge: Cambridge University Press, 2019), 41.

farms. These markers of modernization were each intended to increase coffee yields and incomes, and captured the principles of modernization at the time: the pursuit of higher levels of productivity through science and technology.

Paulinelli played a key role in these transformations, especially in Minas Gerais (MG). He graduated in agronomy from the Superior School of Agriculture in Lavras (MG), where he became a professor of agronomy in 1959, and the director in 1967. Paulinelli then moved into politics as the Minas Gerais secretary of agriculture from 1971 to 1974, when he supported programs to plant modern coffee in the state.[5] In 1974, he became the federal minister of agriculture, an influential post in Brazil's military dictatorship (1964-1985). With Paulinelli steering federal agricultural policy during General Ernesto Geisel's presidency (1974-1979), the government aggressively accelerated state investment in agriculture, seeing it as a key component of national economic growth. In Minas Gerais, coffee was the primary target of government modernization efforts.

Paulinelli's belief in the merits of scientific agricultural knowledge informed his approach to designing policy and promoting modernization. Yet when he received his award from FAEMG in 1979 the national economy was teetering on the brink of disaster. The national debt had increased in the mid-1970s, and it grew further still when international interest rates surged after the 1979 oil shock.[6] But describing agriculture as Brazil's "only hope" revealed Paulinelli's singular commitment to the modernization project, and his belief that it offered progressive and beneficial solutions for both farmers and the nation. Paulinelli's position demonstrated how through decades of state-led programs to promote agricultural modernization,

[5] Centro de Pesquisa e Documentação de História Contemporânea do Brasil (CPDOC), *Alysson Paulinelli*, Fundação Getúlio Vargas (accessed August, 2019).
[6] Werner Baer, *The Brazilian Economy: Growth and Development, 7th ed* (Colorado: Lynne Rienner Publishers, 2014), 76-83.

an overarching ideology emerged that privileged scientific and technology-dependent farming focused on productivity. This model proved remarkably durable and persisted for decades in Brazil, even after the military dictatorship fell from power in 1985 and the subsequent government withdrew its direct support for defining and promoting agricultural modernization.

Argument

This dissertation examines how state-led modernization programs shaped the Brazilian coffee industry from 1950 to 1990. I demonstrate how a confluence of political, economic, technological, and environmental factors intersected to spur dramatic transformations in the coffee sector. In the 1950s, Brazilian politicians criticized the nation's reliance on coffee growing, framing it as an emblem of the past that perpetuated social and economic backwardness and underdevelopment. By the 1980s, however, planners celebrated the transformation of Brazilian coffee into a technologically advanced crop, the product of modernization programs designed to remodel coffee growing regions and amplify the contribution of agriculture to the nation's economic growth and developmental aims.

I argue that studying coffee modernization as a historical process in a specific period and social context disrupts the notion of a clear "traditional" and "modern" binary in agriculture. Rather, locating modernization in Brazil's coffee industry from 1950 to 1990 itself as the subject of historical study, reveals a more complicated process and even patterns of continuity. I highlight these procedural aspects and contingent changes that built towards a different mode of coffee growing. I show how the goals and approaches to modernization were periodically reshaped by the changing relationships between state ideologies of development, markets and the individuals operating in them, and the natural components of coffee agriculture.

Paulinelli endorsed agricultural modernization as part of the pursuit of an ideal: modern agriculture. What he and other planners and experts meant by "modern" remained surprisingly stable over decades. It constituted an imagined endpoint, a state in which farmers and their supporters would have exerted their will over nature and enjoyed ever-increasing bounties. But coffee could never reach such a plateau of "modernity" in absolute terms because the endpoint constantly slipped over the horizon. Neither farmers nor planners could achieve it because doing so would betray the core ideology: a constant aspiration for change within a narrow, albeit evolving, set of acceptable parameters. According to this view, modernity had no more sinister enemy than stagnation because it must forever be pursued. Farmers and their stewards and guides in the state must always engage in modernization, the mechanism propelling them toward their ever-receding ideal.

Modernization, then, was a process. It depended on participation between the state and farmers, with frequent adaptation and buy-in from both sides. Between 1950 and 1990, farmers operated in concert with state technicians to create dramatic changes. Even as the state ideal of the "modern" persisted, definitions of modernization changed over time, as did the participants, and the role of the state. Examining how these changing definitions influenced programs and institutional operations offers opportunities to identify and explain their impact on a series of actors, regions, and environments. I address why planners sought to modernize the coffee industry, how they devised their programs, and who participated. I also assess the impact of coffee modernization efforts on agricultural regions, farmers, and workers. This state-led project depended on a sustained investment of resources, through which the Brazilian government for decades demonstrated its steadfast commitment to remaining the world's leading coffee

producer. Yet, there was nothing natural about coffee growing in Brazil, neither where nor how it was cultivated.

The federal government's approaches to modernization and the terms it used to describe the concept changed over time but operated within an overarching set of ideas. The bulk of the programs to modernize coffee proceeded through the federally-run Brazilian Coffee Institute (IBC), which the government founded in 1952. At different times, planners cited the need to "rationalize" coffee, which usually referred to promoting better use of land, resources, or known practices. Alternatively, they championed "renovation," typically meaning efforts to plant new coffee fields. Finally, planners often used "technification" to promote the adoption of technology and know-how, including organizing farms in a manner that maximized how much they would benefit from new technology. Together, these terms helped give substance to the ideology of agricultural modernization, and belief in a notion that agriculture both needed and could achieve improvement.

The central goal of raising agricultural productivity linked the various modernization programs designed to transform coffee growing regions. The IBC employed economists, agronomists, and agricultural technicians to design national plans to increase productivity. Their measurements typically relied on yields, referring to the number of coffee beans produced by a coffee tree, or a collection of trees on a measured area of land. The use of yield as a measurement was not novel, but it lent structure to modernization efforts because it enabled the IBC's experts to demarcate low-productivity and high-productivity coffee plants, farms, and regions. The categories of low and high productivity were applied not just to the trees themselves, but also to the farmers and the methods they used to grow coffee. The IBC cycled

through goals to either eradicate low-productivity coffee trees or incentivize planting high-productivity fields—two interconnected components of modernization efforts.

To plant new coffee fields, the IBC incentivized farmers to acquire technologies and techniques that would increase yields and, theoretically, profitability. These incentives changed over time but tended to include fertilizers, pesticides, herbicides, and labor-saving machines. The IBC also facilitated farmers' access to subsidized credit. The IBC's experts believed that coffee modernization also required a change in farmers' worldviews that would turn the amateur "farmer" into a professional "agriculturalist" who ran their farm as an administrator. These markers of modern coffee growing were also shaped by classifications of farmers and their farms. Those farmers not using chemical inputs were defined as "anti-economic" by the IBC, a term that permeated conversations on coffee and agriculture more broadly. The vocabulary describing the antithesis of "modern" – e.g. "anti-economic", "traditional", and "low-productivity"– quickly became metonyms for an unchanging and degenerative agricultural landscape.

The focus of this dissertation moves geographically by following ideas, programs, and plants. I begin in Minas Gerais in the 1950s, where the state government and international partners formed the Association of Credit and Rural Assistance (Associação de Crédito e Assistência Rural—ACAR) to spur agricultural change. ACAR's planners formed a model of rural extension that became standard practice by the federal government in agricultural modernization programs. I then follow the IBC's efforts to reduce the number of coffee trees through the main coffee growing regions of São Paulo and Paraná in the 1960s, specifically targeting low-productivity plants. By the late 1960s, planners shifted their program and committed to planting coffee in ways they considered modern. Environmental events profoundly

shaped their plans. Before the 1960s, soil erosion and nutritional exhaustion were the key factors that influenced farmers' choices to abandon or plant coffee in certain regions. After the 1960s, the IBC played the central role in determining where farmers planted coffee. I trace how the government's decision to increase coffee planting in Minas Gerais was driven in part by the arrival of a debilitating coffee fungus in 1970, and a major frost that devastated coffee fields in Paraná in 1975.

From 1960 to the early 1980s, billions of coffee trees fell in Paraná and parts of São Paulo state. In the same period billions more were planted, most of them in Minas Gerais. Coffee represented a crucial commodity for the Brazilian government. Its commitment to modernizing the crop fit within the decisive political shift in the 1960s to prioritize agricultural export commodities. Planners applied a similar modernizing approach to other crops: planting more productive seeds, employing machines, using fertilizers and pesticides, and bringing new land under cultivation. But state planners viewed coffee modernization as a key to unlocking broader agrarian transformations. As coffee growing declined in Paraná, government incentives contributed to a boom in soybean and wheat cultivation in that state. Further, coffee research on climates and soils in Minas Gerais later informed how planners promoted agriculture in the cerrado, a savannah-like region west of Minas Gerais.

Transformations in Brazil's coffee industry tell a story of both the crop and the nation. Most coffee farmers pursued modernization through state programs. But the economic crisis in the 1980s revealed the fragility of the IBC's model. Government officials reduced the institution's operational capacity and curtailed subsidies for farmers. As prices of chemicals and credit soared, coffee growing became increasingly expensive. Large-scale farmers proved better equipped to withstand the crisis. The prominent role of the state in coffee growing, however, did

not endure. The fall of the military regime (1985) and return to civil government ushered in economic reforms to reduce the state's direct role in the economy, resulting in the IBC's closure in 1990. Nevertheless, the ideology of agricultural modernization persisted as private industry and international entities took the lead in defining the aspirational vision of modern agriculture. In the following sections I discuss key themes and review the scholarly literature, outline the actors and sources that feature in this dissertation, and provide a brief chapter overview. First, I offer a rapid overview of coffee's arrival and history in Brazil.

Figure 0.1: Map of Brazil, 2019. Highlighted states include Minas Gerais, São Paulo, and Paraná.[7]

[7] Map of Brazil. Political boundaries shapefiles sourced from the Database of Global Administrative Areas: https://gadm.org/download_country_v3.html. Mesoregion boundaries sourced from the Instituto Brasileiro de

Figure 0.2: Map of Minas Gerais, 2019. The highlighted regions include the Sul de Minas to the southwest and the Zona da Mata to the southeast.[8]

The Coffee Bean Becomes Brazilian

For most people in the global north "coffee" refers to a beverage. Those who drink it likely have tastes and preferences and some possess an ever-increasing vocabulary of roasting and brewing styles. Most consumers are less concerned with where their coffee beans are grown,

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Geografia e Estatística, city locations sourced from GeoNames: https://www.geonames.org/. Emory University, 2019, OpenStreetMaps.

[8] Map of Minas Gerais, Political boundaries shapefiles sourced from the Database of Global Administrative Areas: https://gadm.org/download_country_v3.html. Mesoregion boundaries sourced from the Instituto Brasileiro de Geografia e Estatística, city locations sourced from GeoNames: https://www.geonames.org/. Emory University, 2019, OpenStreetMaps.

although interest in origins is gradually increasing. Yet, green coffee beans that pass through fire, grinders, and steam, come from a plant that was intentionally pushed into soil, cultivated, harvested, and processed by workers in the global tropics.

Native to the forests of east Africa, the genus *Coffea* includes over a hundred species, of which arabica coffee (*Coffea arabica*) is the most popularly cultivated and consumed. Arabica is the default species of "coffee" referred to in this study.[9] A coffee tree usually grows with a central trunk from which off-shooting branches support deep green leaves that appear almost wax-covered. Most plants flower once a year, emerging from the base of the leaves. After pollination the flowers are replaced by fruit, or "cherries," that grow in clusters along branches.[10] Each fruit usually contains two green beans encased in mucus and a parchment. After drying and roasting, the beans take on a dark brown color and conform to the common image of "coffee."

Over the course of roughly five centuries, coffee growing spread throughout much of the global tropics. Colonial power relations, enterprising producers, and nation states seeking to benefit through international trade shaped the dispersion of coffee planting, often at the expense of virgin forests and reliant on worker exploitation.[11] In broad terms, arabica first traveled from what is today Ethiopia or Kenya to Yemen during the fifteenth and sixteenth centuries.[12] From there Dutch traders transported plants to Holland and later to Ceylon (Sri Lanka) in the mid-

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[9] Shawn Steinman, "Why does Coffee Taste That Way? Notes from the Field," in *Coffee: A Comprehensive Guide to the Bean, the Beverage, and the Industry*, eds. Robert W. Thurston, Jonathan Morris, and Shawn Steinman (London: Rowman & Littlefield, 2013), 297.
[10] Gregory Dicum and Nina Luttinger, *The Coffee Book: Anatomy of an Industry from Crop to the Last Drop* (New York: The New Press, 1999), 39.
[11] William Gervase Clarence-Smith and Steven Topik, eds. *The Global Coffee Economy in Africa, Asia, and Latin America, 1500-1989* (Cambridge: Cambridge University Press, 2003); Mark Pendergrast, *Uncommon Grounds: The History of Coffee and How it Transformed our World* (New York: Basic Books, 2010).
[12] Michel Tuchscherer, "Coffee in the Red Sea Area from the Sixteenth to the Nineteenth Century," in *The Global Coffee Economy*, eds. William Gervase Clarence-Smith and Steven Topik (Cambridge: Cambridge University Press, 2003), 51-66.

seventeenth century, and then plants were circulated through the Indian Ocean basin.[13] Coffee first crossed the Atlantic Ocean when European travelers successfully transported plants to Martinique in the early eighteenth century.[14]

Coffee also arrived in Brazil in the early eighteenth century. Planting took hold gradually in the northeast of the country, generally grown for enslaved people and household consumption. After Brazil gained independence from Portugal in 1822, coffee growing rapidly expanded in the emerging Brazilian Empire (1822-1889). A confluence of accessible virgin forests, appropriate climates, a large slave labor force, and willing investors in Brazil coincided with environmental and political problems that reduced production in other international coffee growing regions.[15] Coffee production in Brazil rapidly increased. Brazil exported roughly 13,000 metric tons of coffee in 1823. By 1940 these exports increased to 78,000 metric tons, and by 1901 to an astounding 885,000, contributing nearly 80 percent of all the arabica coffee grown commercially in the world.[16]

National production statistics elide the geographic mobility of coffee growing in Brazil. The first major coffee boom in Brazil centered on the Paraíba Valley in the southeastern state of Rio de Janeiro, spilling into São Paulo and Minas Gerais states. The 1850s to the 1880s represented the "golden decade" for Rio de Janeiro planters before soil erosion drove productivity in the region downward.[17] A second and more intense period of coffee planting

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[13] William Harrison Ukers, *All About Coffee* (New York: The Tea and Coffee Trade Journal Company, 1922), 6; Steven Topik, "The Integration of the World Coffee Market," *The Global Coffee Economy*, 27-28.
[14] Topik, "The Integration of the World Coffee Market," 22-23.
[15] Topik, "The Integration of the World Coffee Market," 31.
[16] Mario Samper and Radin Fernando, "Appendix: Historical Statistics of Coffee Production and Trade from 1700 to 1960" in *The Global Coffee Economy*, 432-434.
[17] Hildete Pereira de Melo, "Coffee and Development of the Rio de Janeiro Economy, 1888-1920," in *The Global Coffee Economy,* 383; Stanley Stein, *Vassouras: A Brazilian Coffee County, 1850-1900* (Cambridge: Harvard University Press, 1957).

extended from roughly 1880 to 1930, principally in the state of São Paulo moving westward and flowing into Paraná and southern Minas Gerais.[18]

In the early twentieth century, Brazilian coffee growers and politicians designed policies to control coffee overproduction and prevent dramatic price crashes.[19] Their national efforts failed to prevent plummeting trade prices after the 1930 economic crisis. At that time, coffee accounted for 70 percent of Brazilian export receipts and served as the primary method to balance foreign trade.[20] After Getúlio Vargas seized the Brazilian presidency (1930-1945; and elected between 1950-1954), the federal government founded the National Coffee Council (Conselho Nacional do Café) in 1931 to manage some aspects of production and trade, which became the National Coffee Department (Departamento Nacional do Café) two years later. Placing coffee-governing institutions under the ministry of finance rather than the ministry of agriculture reflected the crop's centrality to the national economy. In 1931, the Brazilian government also began destroying coffee stocks to reduce oversupply.[21] Over the course of thirteen years, the government either burned or dumped into the sea roughly 78 million sacks (60 kilos per sack) of coffee.[22]

The opening lyric of Frank Sinatra's 1946 "Coffee Song" told a story of Brazil: "Way down among Brazilians, Coffee beans grow by the billions, So they've got to find those extra cups to fill…They've got a zillion tons of coffee in Brazil."[23] While the "Coffee Song" focused

[18] Sergio Silva, *Expansão cafeeira e origens da indústria no Brasil* (São Paulo: Alfa-Omega, 1976), 12.
[19] Thomas H Holloway, *The Brazilian Coffee Valorization of 1906: Regional Politics and Economic Dependence* (Madison: The Society Press of the State Historical Society of Wisconsin, 1975).
[20] Mario Rolim Telles, "Speech at the Third Interstate Coffee Convention, September 14, 1929," in *The Spice Mill*, (October 1929).
[21] Ana Luiza Martins, *História do café* (São Paulo: Editoria Contexto, 2008), 243.
[22] Boris Fausto, *A Concise History of Brazil* (Cambridge: Cambridge University Press, 2014), 200.
[23] Bob Hilliard and Dick Miles, *The Coffee Song,* performed by Frank Sinatra, 1946.

solely on Brazil, exporters found those "extra cups to fill" as international markets reopened after the Second World War. Rising trade prices prompted further planting in Brazil and elsewhere.[24]

By the 1950s, the center of coffee cultivation in Brazil shifted southward from São Paulo to the northwest of Paraná state. Large-scale farmers migrated to Paraná in search of cheaper land and lower costs, while small-scale farmers took the opportunity to purchase their first farms.[25] Speculative buying and selling of land in Paraná rapidly expanded the coffee growing frontier to capitalize on high prices.[26] In 1953, the Paraná-based newspaper aptly named *A Pioneira* (The Pioneer) celebrated images of clear-cut forests, trumpeting how the "purple earth of the north paranaense soil is today incorporated in the state economy."[27]

As coffee planting boomed, the federal government strengthened governance over the national industry. In 1952, Vargas created the IBC to coordinate national coffee policy, including minimum purchasing prices and commercialization networks. The IBC also implemented an "exchange confiscation," essentially a tax on exported coffee to finance the institution's activities, in addition to other government projects.[28] The IBC's leadership structure accorded influence to coffee farmer representatives, but in a diminished role compared to prior decades when many coffee producers also held influential political positions.[29]

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[24] Dicum and Luttinger, *The Coffee Book*, 80.
[25] Nadir Apparecida Cancian, "Cafeicultura paranaense: 1900-1970" (PhD diss. Universidade de São Paulo, 1977), 78.
[26] Warren Dean, *With Broadax and Firebrand: Destruction of the Brazilian Atlantic Forest* (Berkeley: University of California Press, 1995), 269.
[27] Silvio Fróis de Abreu, "A cafeicultura norte paranaense," *A Pioneira*, 1953, 9.
[28] Paulo R. Beskow, Agricultura e política agrícola no contexto brasileiro da industrialização do pós-guerra (1946-1964), *Estudos Sociedade e Agricultura* V.7, N.1 (April, 1999); Cliff Welch, *The Seed Was Planted: The São Paulo Roots of Brazil's Rural Labor Movement, 1924-1964* (University Park: The Pennsylvania State University Press, 1999), 159.
[29] CPDOC, *Instituto Brasileiro do Café*, Fundação Getúlio Vargas (accessed August, 2019).

Paraná's geographic location south of São Paulo pushed coffee planting into areas that regularly faced the threat of harmful frosts.[30] Temperatures fell below zero degrees Celsius in Paraná in 1953 and again in 1955, reducing coffee production in the short term. Ironically, market speculation pushed prices higher and motivated new investments in coffee planting. In 1954, between the two frosts, Paraná's state government held the First Global Coffee Congress, with an optimistic slogan that "coffee will repeat in Paraná the miracles it made in São Paulo," reflecting the sense of euphoria around the potential benefits of coffee growing.[31] From 1940 to 1960, Paraná's share of national production grew from 5 to 47 percent.[32]

In 1957, coffee still accounted for 58 percent of Brazil's export receipts despite growth in industrial manufacturing and other agricultural export crops.[33] But in the late 1950s, global coffee production outstripped market demand, as it had in previous decades, and trade prices declined.[34] Unlike the earlier periods of overproduction, the government sought strategies to avoid purchasing and stockpiling excess beans. In 1958, the federal government declared that "we do not want Brazil to be the largest buyer of Brazilian Coffee."[35] This goal would undergird state intervention in the coffee sector over the following decades. In this context, the Brazilian government pushed for international governance over the coffee trade and began national efforts to reshape coffee growing and agriculture in southeast and southern Brazil.

Literature Review and Key Themes

Coffee and Commodity Governance

[30] Robert W. Thurston, "Introduction," in *Coffee: A Comprehensive*, 2.
[31] Image of poster found in Ana Luiza Martins, *História do café* (São Paulo: Editoria Contexto, 2008), 250.
[32] Governo do Estado do Paraná, Secretaria de Agricultura, *O Paraná e a economia cafeeira* (1963), 1, 13.
[33] Baer, *The Brazilian Economy*, 50.
[34] Dicum and Luttinger, *The Coffee Book*, 83.
[35] No author, "Novos entendimentos com o sr. Lucas Lopes," *O Estado de S. Paulo*, 24 October, 1958, 54.

As a globally-traded commodity, coffee provides a useful lens for investigating connectivity between states, institutions, people, and environments. While cultivated today in over a hundred countries, Brazil's long-held position as the world's largest producer means that the country has considerably influenced the shape of the international marketplace. Brazil's export decisions influenced the choices of other international coffee growers, institutions, and governments. Brazilian coffee, filling the segment of mass commodity coffee that was generally considered average or worse in terms of international quality, provided a comparative baseline for other producers.[36]

Coffee has received considerable academic attention due to the central role it has played in Brazil's national history. Two major historiographical currents have examined broader historical transitions by studying coffee: a first current investigated coffee labor to understand abolition and the transition from slavery to alternative labor systems at the end of the nineteenth century.[37] A second current debated how coffee profits factored into the industrialization of São Paulo in the early twentieth century, or questioned the role of coffee growers as entrepreneurs in the process of industrialization.[38]

Historical studies of Brazilian coffee tend to frame the 1930 economic crisis and political transition into the Vargas Era as a narrative endpoint. Scholars point to the rupture in the coffee

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[36] Mario Samper K., "The Historical Construction of Quality and Competitiveness, A Preliminary Discussion of Coffee Commodity Chains," in *The Global Coffee Economy*, chapter 5.

[37] Stein, *Vassouras*; Warren Dean, *Rio Claro: A Brazilian Plantation System, 1820-1920* (Stanford: Stanford University Press, 1976); Thomas Holloway, *Immigrants on the Land: Coffee and Society in São Paulo, 1886-1930* (Chapel Hill: University of North Carolina Press, 1980).

[38] For studies on industrialization see: Celso Furtado, *Formação econômica do Brasil* (Rio de Janeiro: Fundo de Cultura, 1959); Warren Dean, *The Industrialization of São Paulo, 1800-1945* (Austin: University of Texas Press, 1969); Sergio Silva, *Expansão cafeeira e origens da indústria no Brasil* (São Paulo: Alfa-Omega, 1976). For studies on coffee barons as entrepreneurs see Steven Topik, *The Political Economy of the Brazilian State, 1889-1930* (Austin: University of Texas Press, 1987); Mauricio Font, *Coffee, Contention and Change in the Making of Modern Brazil* (Oxford: Basil Blackwell, 1990); Rogério Naques Faleiros, *Fronteiras do café: fazendeiros e "colonos" no interior paulista, 1917-1937* (São Paulo: Universidade do Sagrado Coração, 2010).

trade as part of the larger Latin American commodity boom turning to bust.[39] Descriptions of the coffee industry and the 1930 crisis privilege a São Paulo-centric narrative that emphasizes this moment as a turning point in which industry gained importance relative to agriculture. Rather than a story of decline, I demonstrate how coffee was reincorporated as a central commodity in the state's developmental agenda, and how the crop was highly mobile geographically. Brazil has maintained its position as the global leader in coffee production and exports. Domestically, coffee remained Brazil's leading agricultural export until the 1970s.

As with most commodities, market prices partially shaped the choices of farmers who grew coffee as a cash crop. During my period of study, global market prices were set by international and national institutions, which played significant regulatory roles in many facets of the coffee industry. The 1962 International Coffee Agreement (ICA), which lasted until 1989, established export quotas for each producing nation, to regulate coffee trade flows and set minimum prices to prevent crashes. Sociologist John Talbot and economist Robert Bates effectively assess the role of the ICA in maintaining higher prices, and valorize the agreement's operations relative to its goals.[40] My research contributes a national perspective on this global agreement. The ICA helped to trigger dramatic transformations in how and where coffee was grown in Brazil. The higher prices for coffee under the ICA helped underwrite state-led modernization programs. When coffee prices were too low, adaptations were less economically viable.

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[39] William Roseberry, "Introduction," in *Coffee, Society, and Power in Latin America*, eds Wiliam Roseberry, Lowell Gudmundson, and Mario Samper Kutschbach (Baltimore: The Johns Hopkins University Press, 1995), 2-3; Steven C. Topik and Allen Wells, eds., *The Second Conquest of Latin America: Coffee, Henequen, and Oil during the Export Boom, 1850-1930* (Austin: University of Texas Press, 1998).

[40] John Talbot, *Grounds for Agreement: The Political Economy of the Coffee Commodity Chain* (London: Rowman & Littlefield Publishers, 2004); Robert H Bates, *Open-Economy Politics: The Political Economy of the World Coffee Trade* (Princeton: Princeton University Press, 1997).

State-Led Development

Twentieth-century Brazilian political leaders consistently foregrounded the goal of economic growth and development in their rhetoric. After the Second World War (1939–1945), changes in government revealed the ideological differences between visions of development and the methods adopted to achieve it.[41] Broadly speaking, President Juscelino Kubitschek (1956-1961) supported mostly market-led development, while President João Goulart (1961-1964) intervened more readily with government resources. In 1964, the Brazilian armed forces orchestrated a coup that deposed Goulart, resulting in the establishment of a military government that remained in power until 1985. By the late 1960s, military leaders had intensified state intervention in the economy, while maintaining a popular rhetoric valorizing the market.[42]

The ideology of developmentalism of the late 1950s and early 1960s emphasized domestic industrialization. Planners adopted this approach to break with the past, which they associated with dependence on agriculture, and to launch Brazil to industrialized status.[43] Deemphasized federal investment in agriculture, however, should not suggest sectoral stagnation. ACAR in Minas Gerais in the 1950s provided an example of how state-level government and international organizations pursued innovative ways to spur agricultural change. The ideas and approaches fashioned through ACAR informed how federal planners designed agricultural programs in the 1960s, when policies shifted to incorporate agriculture as a cornerstone of developmentalism.

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[41] Rafael R. Ioris, *Transforming Brazil: A History of National Development in the Postwar Era* (New York: Routledge, Taylor and Francis Group, 2014), 17-18.
[42] Thomas Skidmore, *The Politics of Military Rule in Brazil, 1964-1985* (New York: Oxford University Press, 1988), 91-92
[43] Dean, *With Broadax and Firebrand*, 266; Wilson Suzigan, *Indústria brasileira: origem e desenvolvimento* (São Paulo: Hucitec, 2000); Ioris, *Transforming Brazil*; Oliver J. Dinius, *Brazil's Steel City: Developmentalism, Strategic Power, and Industrial Relations in Volta Redonda, 1941-1964* (Stanford: Stanford University Press, 2011), Introduction.

In their recent book, historian Herbert Klein and economist Francisco Vidal Luna identify the early 1960s as the beginning point of an agricultural "revolution" in Brazil.[44] This revolution was spurred by the state, designed to increase the cultivation of foodstuffs and export crops, and to provide raw materials to accelerate industrialization.[45] Klein and Luna's national and regional analysis traces the remarkable increases in crop diversification and productivity in the 1960s and 1970s, especially in the south and southeast of Brazil. Coffee is a peripheral concern in their study, yet my research demonstrates how the commodity played a key role in the state's developmental agenda—first as a representation of backward agricultural practices that needed to be eradicated, and then as a target and exemplar of modernization itself.

Klein and Luna's study acknowledges the crucial role of the military regime in driving agricultural modernization programs, but they locate these changes over a longer arc that stretched before and after the dictatorship (1964-1985). Coffee programs exhibited similar continuities, but I also trace the roots of agricultural developmental ideas and methods to the 1950s and early 1960s, showing continuity not just for a single commodity but also in the emergence of an ideology. Studies of state-led agricultural programs in other Latin American countries reveal similar continuities, often maintained by government bureaucracies that persisted despite political ruptures.[46]

Anthropological studies offer particularly keen analyses of development, and of the distance between programmatic objectives and their results in practice. Anthropologist James Ferguson critiqued how academic studies of development programs aim to interrogate what went

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[44] Herbert S. Klein and Francisco Vidal Luna, *Feeding the World: Brazil's Transformation into a Modern Agricultural Economy* (Cambridge: Cambridge University Press, 2019), 3.
[45] Klein and Luna, *Feeding the World*, 405.
[46] Heidi Tinsman, *Buying into the Regime: Grapes and Consumption in Cold War Chile and the United States* (Durham: Duke University Press, 2014); Thomas Miller Klubock, *La Frontera: Forests and Ecological Conflict in Chile's Frontier Territory* (Durham: Duke University Press, 2014); Christopher R. Boyer, *Political Landscapes: Forests, Conservation, and Community in Mexico* (Durham: Duke University Press, 2015).

"wrong" and how to fix it.[47] Focusing instead on the impact of projects in Lesotho, Ferguson highlights how development initiatives generate ideas that play a role in refashioning the worldviews of institutional actors and the subjects with whom they engage.[48] Tania Murray Li identifies how experts, in her case in Indonesia, both defined problems and offered technical solutions that justified their actions.[49] Furthermore, claims to expertise allowed technocrats to criticize other actors for failing to fully adopt their advice. In a Latin American context, anthropologist Arturo Escobar identifies the construction of discourses of development and underdevelopment that mutually informed a "progressive capitalization of production conditions."[50] Modernization programs in the Brazilian coffee industry reflected the trends outlined above, especially in the valorization of technical solutions to problems identified by experts, and how development programs contributed to entrenching bureaucratic state power.

Technocratic Modernization

The Brazilian state's approach to modernizing the coffee industry fundamentally relied upon the actions of technocrats. The term technocrat refers to specialized professionals associated with public institutions who claimed knowledge that affirmed their expertise.[51] The term most often refers to economic or financial specialists employed by the state for their expertise, but it is not exclusive to them.[52] I trace the role of technocrats in driving modernization

[47] James Ferguson, *The Anti-Politics Machine: Development, Depoliticization, and Bureaucratic Power in Lesotho* (Cambridge, Cambridge University Press, 1990), 10.
[48] Ferguson, *The Anti-Politics Machine,* xv.
[49] Tania Murray Li, *The Will to Improve: Governmentality, Development and the Practice of Politics* (Durham: Duke University Press, 2007), 7.
[50] Arturo Escobar, *Encountering Development: The Making and Unmaking of the Third World* (Princeton: Princeton University Press, 1995), 200.
[51] For a longer consideration of the different conceptions of technocrats, see Miguel A. Centeno and Patricio Silva, *The Politics of Expertise in Latin America* (London: Palgrave Macmillan, 1998), 2-5.
[52] Eduardo Dargent, *Technocracy and Democracy in Latin America: The Experts Running Government* (Cambridge: Cambridge University Press, 2015), 2.

as it emerged in Minas Gerais through the programs of ACAR in the 1950s. The institution fashioned a model of rural extension, where technocrats played the central role of conveying knowledge and technology to farmers through long-term relationships. The federal government nationalized the model in the late 1950s, and later adopted rural extension as a central vehicle for programs designed to transform agriculture. In doing so, technocrats provided the interface between macro-level policy and on-the-ground farming practices. In the programs to modernize coffee, this middle ground encompassed a number of activities, such as designing institutional programs, conducting research, growing coffee on experimental farms, and engaging with farmers.

Using technocrats to define and solve perceived social, economic, or environmental problems was not novel in Brazil. Historian Eve Buckley's study of Brazil's drought-response agency in northeast Brazil highlights the active role of agronomists and civil engineers starting in the early twentieth century. Buckley's technocrats sought to address issues of poverty and drought but struggled to navigate "the conflicting agendas of landowners, federal bureaucrats, and agricultural workers."[53] Politics, she argues, lay outside these technicians' expertise, although their work was inherently political. By the 1960s, the social and political context had shifted, and technocrats worked towards a form of scientific transformation endorsed by the state, and theoretically in service of landowners, smoothing the operational structure.

Technocratic modernization appealed to democratic and dictatorial governments alike, who similarly strove to transform agriculture in pursuit of national economic development. But it also represented a non-radical approach to changing agrarian regions.[54] Rather than addressing

[53] Eve E. Buckley, *Technocrats and the Politics of Drought and Development in Twentieth-Century Brazil* (Chapel Hill: University of North Carolina Press, 2017), 3.
[54] Maria Teresa Lousa da Fonseca, *A extensão rural no Brasil, um projeto educativo para o capital* (São Paulo: Edições Loyola, 1985).

calls to redistribute land ownership, farmers could theoretically increase their farm's profitability by intensifying production on their land.[55] This approach avoided threatening the underlying social structures that had changed little since the colonial era, and coincided ideologically with the west in the cold war context. Moreover, Brazil's approach to agricultural modernization dialogued with the so-called agricultural "green revolution," which similarly privileged technocratic and technological approaches to agricultural development.[56]

The military dictatorship's approach to managing the country's economy relied heavily on civilian technocrats. In 1967 state officials remodeled the Brazilian Coffee Institute, stripping large-scale coffee farmers of their administrative power and replacing them with technocrats and politicians.[57] The IBC empowered technocrats as the source of scientific agricultural knowledge, who designed and articulated modernization programs. My research on agronomists who worked in coffee programs adds insight into how rural extension operated. Agronomists framed their work as distinctly apolitical and in the name of national economic development, despite working under a military dictatorship. Further, the abstract goals of development provided technocrats with agency over devising strategies and methods to engage farmers. Agronomists and technicians designed and promoted a vision of modern coffee fields, while operating within a set of parameters that strove for higher plant yields and greater farm productivity.

The model of technocratic development changed the possibilities for coffee growing. Most coffee research and technology were created in Brazil, or through south-south cooperation

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[55] Guilherme Costa Delgado, "The Agrarian Question and Agribusiness in Brazil," in *Challenging Social Inequality: The Landless Rural Workers Movement and Agrarian Reform in Brazil*, ed. Miguel Carter (Durham: Duke University Press, 2015), 44-45.

[56] The term "Green Revolution" was coined in 1968 to represent efforts to increase food production by implementing scientific approaches to agriculture to feed growing populations. Perceptions of global food problems stemmed from the quantitative assessments of world food programs in the early twentieth century and aimed to transfer knowledge and resources from industrial nations to poorer ones. See Nick Cullather, *The Hungry World: America's Cold War Battle Against Poverty in Asia* (Massachusetts: Harvard University Press, 2010).

[57] Verena Stolcke, *Coffee Planters, Workers and Wives* (New York: St. Martin's Press, 1988), 114.

with researchers from other coffee-growing countries. Student and professional exchange programs with U.S. universities provided training in the methods of U.S. agricultural modernization, but the science of coffee as a tropical crop tended to emerge from Brazilian institutions. Moreover, Brazilian coffee research influenced other coffee growing countries, as plant varieties identified in Brazil became popular elsewhere in Latin America.[58] In the case of Brazil, innovation came through state institutions—as opposed to private institutions—placing authority over science and research firmly in the hands of technocrats rather than foreign actors.

Environment and Society

All agricultural systems attempt to reorganize the natural world, while simultaneously depending on and responding to the ecological processes that enable their functioning.[59] Institutions and technocrats pursuing agricultural development shaped their efforts with ideas about the potential of environments for specific crops. For coffee, researchers sought to modify regional environments largely through technological innovations that created new possibilities to cultivate. Government planners intensified investment in science and technology to turn nutritionally-lacking lands into productive agricultural spaces. Historian Thomas Rogers identifies similar actions by the Brazilian state to grow sugarcane in areas previously deemed inappropriate.[60] This approach aligned with global trends towards more intensive use of chemicals and plant research to battle crop diseases and maladies and increase productivity.[61]

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[58] Jim Waller, M. Bigger and R.J. Hillocks, *Coffee Pests, Diseases and their Management* (Wallingford, Oxfordshire: CABI, 2007), 22; Luis Alberto Cuéllar, "Colombia," in *Coffee: A Comprehensive Guide*, 149.
[59] Donald Worster, "Transformations of the Earth: Toward and Agroecological Perspective in History," *The Journal of American History* Vol. 76, No. 4 (March: 1990): 1105.
[60] Thomas D. Rogers, *The Deepest Wounds: A Labor and Environmental History of Sugar in Northeast Brazil* (Chapel Hill: University of North Carolina Press, 2010), 183-184.
[61] Soluri, *Banana Cultures*, 2006; Steve Marquardt, "'Green Havoc:' Panama Disease, Environmental Change, and Labor Process in the Central American Banana Industry," *The American Historical Review* (2001); Steve

My research highlights a scenario in which environmental events shaped large-scale agricultural planning, prompting reconsideration of what constituted appropriate ecologies for a crop. Environmental factors always influenced where farmers grew coffee.[62] But in the 1970s, environmental threats motivated a concerted government response to reshape the national coffee landscape. First, after the arrival of a debilitating coffee fungus in 1970, researchers drew on international expertise and recalculated the significance of rain patterns and land elevation to limit the disease's impact.[63] Second, a major frost in 1975 motivated planners to target coffee planting in areas less prone to freezing. Both factors made Minas Gerais state more appealing for coffee growing.

As agronomists and technicians formed relationships with farmers to plant new coffee fields, they nurtured a vision of science's capacity to subdue nature and conquer environmental threats. Yet, planting coffee fields in Minas Gerais in the 1970s and 1980s did not resolve all the problems associated with coffee monoculture. The rows of monoculture coffee trees that sprawled across farms had the potential to be highly productive, but they were also fragile. Planting selected seed varieties, applying fertilizers, pesticides, and fungicides, and employing machines in the pursuit of high productivity increased expenses. Economic crises in the 1980s made it difficult for some farmers to sustain the model of modern coffee, revealing one component of fragility. Ecological factors revealed another component, since farmers who planted coffee in sub-optimal lands relied increasingly on technological solutions. Like all crops, consistent cultivation of coffee in a region offers a "breeding ground" for pests and diseases,

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Marquardt, "Pesticides, Parakeets, and Unions in the Costa Rican Banana Industry, 1938-1962" *Latin American Research Review* Vol. 37, No. 2 (2002): 3-36.

[62] Warren Dean, "The Green Wave of Coffee: Beginnings of Tropical Agricultural Research in Brazil, 1885-1900," *The Hispanic American Historical Review,* Vol.69, No.1 (Feb., 1989): 91-115; Dean, *With Broadax and Firebrand,* chapter 8.

[63] Stuart McCook, "Global Rust Belt: *Hemileia vastatrix* and the Ecological Integration of World Coffee Production since 1850," *Journal of Global History* Vol 1. No. 2 (July 2006), 177-195.

which increase in severity over time.[64] Agronomists and researchers responded to these challenges by striving to further manage complex environments by refining their modernization strategies: they sought solutions through the development of new plant varieties, agricultural chemicals, and machines.

Actors and Sources

Many of the voices that populate this dissertation are those of technocrats, and specifically agronomists and technicians. Agronomists were formally educated in agricultural systems and usually concerned with crop production. Agricultural technicians lacked agronomy degrees but had training in specific areas or technologies associated with farming. Both agronomists and technicians generally possessed agricultural knowledge that outstripped that of higher-level politicians, composing an intermediary segment between state planners who established macro-economic goals, on the one hand, and farmers on the other. I am most interested in the role of technocrats as researchers who established programmatic goals, and as intermediaries who engaged with coffee growers.

ACAR and the IBC frequently acknowledged their need for trained agronomists to operate programs. Many of the agronomists I interviewed were of a similar age and had begun working for the IBC in the mid to late 1960s. They studied at a handful of schools in either São Paulo or Minas Gerais. Their professors used a curriculum that featured coffee research based on publications from the Agronomic Institute of Campinas (Instituto Agronômico de Campinas—IAC), Brazil's leading agricultural research center. Alysson Paulinelli taught many of the future

[64] Alan L. Olmstead and Paul W. Rhode, "The Red Queen and the Hard Reds: Productivity Growth in American Wheat, 1800-1940," *The National Bureau of Economic Research* (No. 8863, March 2002): 946.

IBC agronomists while working at the Superior Agricultural School in Lavras, Minas Gerais in the 1960s.

Coffee farmers also played a prominent role in the evolution of coffee growing by working with agronomists, signing contracts with state agencies, and participating in the modernization project. The term "coffee farmer" should not suggest a monolithic profile.[65] The IBC classified farmers in terms of landholding, where large-scale farms possessed over 100 hectares, small-scale farms comprised ten hectares or fewer, and middle-scale farms fell in between. Not all farmers dedicated all their land to coffee growing, nor did they necessarily remain as coffee farmers in perpetuity. Moreover, the size of land-holding did not guarantee mutual interests or desires either between or within categories—issues facing a farmer with 1000 hectares differed considerably from those facing one with 7 hectares. That said, growing coffee ensured some shared interests, including market prices, ecological threats, and agricultural knowledge, to name a few.

Research on the history of coffee in Brazil has largely emphasized the actions of men, either eliding the role of women or restricting them to romanticized images. Historian Ana Luiza Martin's recent study of coffee in Brazil emphasizes the agency of women over the farm and home economy during the colonial and imperial periods.[66] For the republican era, anthropologist Verena Stolcke's research highlights the crucial dual roles of women as workers and household managers of coffee laboring families.[67] Most of the actors who emerge prominently in my research are men, but not exclusively. Brazilian newspapers often highlighted the stories of

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[65] Robert Rice, "A Place Unbecoming: The Coffee Farm of Northern Latin America," *Geographical Review* Vol. 89, 4 (1999): 554-79; Sarah Lyon, *Coffee and Community: Maya Farmers and Fair-Trade Markets* (Boulder: University Press of Colorado, 2011); Paige West, *From Modern Production to Imagined Primitive: The Social World of Coffee from Papua New Guinea* (Durham: Duke University Press, 2012).
[66] Ana Luiza Martins, *História do café* (São Paulo: Editoria Contexto, 2008), 268-270.
[67] Stolcke, *Coffee Planters.*

women and their children working as temporary laborers. These narratives emphasized themes of exploitation and marginalization, but also acknowledged that women composed a large segment of the coffee workforce, especially during the harvest. Focusing on technocrats reveals how the central role of women as home economic technicians in the 1950s was significantly diminished as programmatic goals increasingly prioritized agriculture. Seen through my sources, the practice of agricultural modernization by technocrats and farmers alike was male dominated.

The sources for this dissertation include interviews, archival material, government and institutional publications, and newspapers. Much of my period of study coincides with Brazil's military dictatorship (1964-1985), which raises challenges regarding the accuracy of publications and the preservation of material. The IBC's publications generally lacked internal critiques but offered insights into operations and assessments of farmer participation. The IBC's annual harvest reports were verified by the International Coffee Organization. These reports tracked planting and production, and their accuracy mattered for future International Coffee Agreement negotiations, for establishing trade prices, and for securing foreign loans.

Most of the documents created at the IBC's local offices were destroyed in the transition from dictatorship to civilian governance in 1985 or following the institution's closure in 1990. The lost archives included region-specific farmer agreements and agronomic plans. Surveys and planning documents, however, survived in the IBC's regional headquarters in Varginha, Minas Gerais. These documents include agronomist training manuals, climatic assessments, crop plans, and experimental farm assessments. This material informed my analysis of the institution's approach to planting coffee in Minas Gerais. To understand the interactions between technocrats and farmers, I conducted oral histories and interviews with former agronomists from the IBC and other agricultural institutions involved in coffee programs. Their narratives provided insight into

daily operations, aspirations, farmer relations, and overall assessments. In my interviews, very few people spoke of the military government or of the democratic transition. Rather, they described their work as driving material changes in coffee farming that directly contributed to national economic development.

Newspapers offer useful resources to contextualize institutional reports and individual testimonials. *O Estado de S. Paulo* held a prominent position as one of the main national publications and issued a weekly supplemental section on agriculture.[68] *O Estado de S. Paulo*'s distribution likely reached a middle- and upper-class audience in the state of São Paulo and other major cities. However, advertisements that targeted farmers suggested a broader reach that included agrarian areas. Regional newspapers from both Paraná and Minas Gerais states provided more human narratives related to agricultural transformations, especially during environmental crises. These sources highlighted the experiences of people working in agriculture and coffee in different municipalities, offering themes beyond the functions of high politics or institutions.

Under the military regime, many newspapers and other media were subject to censorship, especially in the early 1970s.[69] The recent opening of *O Estado de S. Paulo*'s censored material indicates that agriculture remained a low priority for censors, but this observation overlooks the possibility of publishers self-censoring. As a whole, the newspapers used in this dissertation generally promoted agricultural modernization and often celebrated the IBC's new planting programs. They also consistently carried advertising for farming chemicals, machines, finance, and employment opportunities. By the late 1970s, when official censorship declined and

[68] João Castanho Dias, *A imprensa rural no Brasil* (São Paulo: Barleus, 2011), 92.
[69] Nina Schneider, *Brazilian Propaganda: Legitimizing an Authoritarian Regime* (Gainesville: University Press of Florida, 2014), 14.

economic crisis struck Brazil, more critical voices emerged in newsprint. These voices included those of intellectuals, economists, agronomists, organizations representing coffee farmers, and rural worker unions. Yet despite the publication of critical viewpoints, the overall position of mainstream newspapers trumpeted agricultural modernization, often through a nationalist developmental rhetoric.

Chapter Summary:

This dissertation contains five chapters divided into three sections. They collectively tell the story of a multi-decade state-led effort to modernize coffee, how government plans were formed and remodeled, and how programs were designed to engage farmers to participate. The first two chapters examine the creation and operations of institutions designed to transform agrarian regions. Chapter One focuses on the creation, expansion, and evolution of ACAR. I examine how initial efforts to improve the lives of agrarian families in the early 1950s were redesigned by ACAR into a robust program that prioritized higher levels of farm productivity by the end of the decade. Further, ACAR operated as a site where international and national agrarian development ideas gradually fused into a rural extension ideology.

ACAR's nationalization in 1956 contributed to rural extension becoming the primary vehicle for state-led agricultural programs. ACAR's research and technician training in Minas Gerais informed how other state-level governments designed their programs for agricultural transformation. Planners framed their efforts as fundamentally educational and designed to change how farmers managed their farms. In practice, the ACAR model led to the establishment of a network of offices in agrarian regions, providing the infrastructure to work directly with farmers. In the 1960s, when the federal government launched coffee planting programs in Minas

Gerais, ACAR became a cornerstone partner that facilitated the rapid growth of the industry in the state through their rural extension networks.

Chapter Two examines the operations of the Executive Group for the Rationalization of Coffee Growing (Grupo Executivo de Racionalização da Cafeicultura—GERCA). Founded in 1961 under the auspices of the IBC, the government mandated GERCA to transform the agricultural landscape of coffee growing regions. Over the course of the 1960s, GERCA's operations divided into three phases: initial efforts to eradicate coffee under a democratic government (1961-1964), a second more forceful eradication program under the military regime (1965-1967), and lastly coffee growing's incorporation into a concerted modernization program (1967-1969). The institute's operations responded to political transitions, changing economic contexts, environmental factors, and rapidly changing access to agricultural technology.

As a mid-level government institution, GERCA provided a vehicle through which state planners experimented with programs to promote agricultural modernization. Each approach reflected the different ways that governments envisioned the relationship between agricultural and national development. While GERCA's multi-modal strategies to spur agricultural change revealed a consistent developmental ethos, in practice their myriad programs drove profound changes in coffee growing areas. By the late 1960s, planners firmly embraced a framework for coffee modernization that guided massive planting over the following decade. By the 1970s, planting coffee through GERCA firmly confirmed the crop's centrality to the government's emphasis on agro-industrial, export-focused production.

The second set of chapters follow the ideas and actors established through ACAR and GERCA, and show how planners responded to natural phenomena and adapted their strategies to coffee-focused programs. Chapter Three examines how the *Hemileia vastatrix* fungus commonly

known as “coffee leaf rust” reached Brazil only months after the federal government announced initiatives to plant new modern coffee fields. The coffee rust imperiled the entire Brazilian coffee industry, as the fungus attacks the leaves of the coffee tree, decreasing the amount of coffee cherries produced for the annual harvest. State planners responded to the arrival and spread of the rust first with efforts to eradicate it, then to contain it geographically, until ultimately, they developed technologies and strategies to manage the impact of the fungus on the farms.

Through trial and error in the early 1970s, planners refashioned the existing model of modern coffee and fused it with new technologies and agricultural chemicals. Climatology researchers identified Minas Gerais as particularly suitable for modern coffee growing since the state possessed beneficial rain patterns and land elevation that naturally lessened the threat and impact of fungus. Additional measures to mitigate the threat and impact of fungus included fungicide spraying, varietal research for rust-resistant plants, and the calculated spatial organization of coffee trees on farms to facilitate greater mechanization. The new methods to lessen the impact of the rust gradually and procedurally recreated the state’s definition of modern coffee. How the state and its cohort of experts responded to the rust in the early 1970s ultimately accelerated pre-existing aspirations for agricultural modernization, catalyzing the investment of national institutions in scientific research and rural extension. At this decisive moment, Brazilian government planners chose to increase their investment in coffee growing, rather than abandon the crop.

Responses to the rust changed the model for modern coffee growing in Brazil, but in the early 1970s planting new fields did not immediately change its geography. The state of Paraná continued to grow the most coffee, and most farms only slowly adopted the processes that state planners deemed modern. Chapter Four examines the impact of a devastating frost that struck the

coffee growing regions of Paraná and parts of São Paulo in 1975. The frost was not entirely unexpected; Paraná had experienced a number of frosts during the 1960s and early 1970s. But the 1975 event stood out for the concerted response by state planners to change the agricultural landscape in southern Brazil, using incentives and policies to shift the coffee frontier northward while promoting other agricultural activities in the former coffee growing regions. These choices modified the geography of agriculture and opportunities for agricultural workers. These trends had already been underway, but the 1975 frost provided the rationale for the government to emphatically pursue existing projects of agricultural transformation.

The fifth chapter examines the construction of coffee fields in Minas Gerais that conformed to what planners deemed modern, and investigates the limitations of the state's agricultural model. Farmers planted coffee in Minas Gerais with the support of financial incentives subsidized by the government, technical assistance sourced through the state-operated IBC, and partnerships with ACAR's network of agricultural stations. Planting in the state stemmed from three prominent and interconnected factors. First, the government's approach to agricultural development provided a commitment to modernizing coffee and willingness to reconfigure the national geography of coffee production. Second, environmental events changed how planners and farmers evaluated coffee farming and appropriate ecologies. Lastly, technological changes and agronomic research made it possible to turn nutritionally lacking soils in Minas Gerais into productive coffee fields. Turning lands deemed marginal into productive spaces represented a victory for Brazilian science and correlated with the military regime's emphasis on agriculture in national development goals.

I also examine the continued evolution of what modernization entailed in Minas Gerais through the 1970s and early 1980s, as agronomists and researchers consistently aspired for ever

higher productivity. I correlate the expansion and intensification of coffee growing in Minas Gerais with the personal accounts of IBC employees who were active in shaping programs and operations on the ground. Their narratives demonstrated the expanding boundaries of what modernization entailed, as well as persistent support for the ideology of rural extension. Yet in the 1980s, economic crises exposed the fissures in the model as the IBC's operational capacity declined. The economic crises of the 1980s and fall of the military dictatorship in 1985 constrained the operations of the IBC and revealed social tensions associated with modern coffee agriculture. Some farmers who adopted technologies and agricultural chemicals were unable to manage rising costs as the government withdrew subsidies while prices for agricultural inputs and credit soared. The erosion of the IBC affected the social organization of coffee growing regions, impacting the lives of growers, laborers, and actors engaged in Minas Gerais. Yet in the decades after 1989, the broader project of modernization would continue, albeit in an altered form and driven by private-sector capital investors, cooperatives, and institutions.

Chapter One: Building a Model for Agricultural Change in Minas Gerais, 1948-1965

In 2016, I met with Marisa Dulce Pereira, a former technician for the Association of Credit and Rural Assistance (Associação de Crédito e Assistência Rural—ACAR). ACAR was founded in 1948 as an agrarian development initiative for Minas Gerais state. We discussed the origins and transformations of the institution, including the work of its employees and the impact they had on agricultural change in the state. Pereira's professional history closely followed the arc of ACAR. She started working as a technical assistant in 1952, later becoming a regional coordinator before directing youth outreach programs from the central headquarters in Belo Horizonte, the capital of Minas Gerais.[70] We met at the "centro de memória" of the Minas Gerais State Company of Technical Assistance and Rural Extensions (Empresa de Assistência Técnica e Extensão Rural do Estado de Minas Gerais—EMATER), a museum and archive located in ACAR's former headquarters. Politicians transformed ACAR into EMATER in 1975, but even today the museum presents a strong historical connection with ACAR that stresses continuity over seven decades. Visitors are greeted by a United States-made Jeep with ACAR seals emblazoned on its sides at the entrance of the museum—a symbol that embodied the notion of technology overcoming rough terrain to reach distant and isolated families.

During our conversation, Pereira sketched three different moments to highlight ACAR's approaches to stimulating agrarian development. Her first depiction of ACAR's activities in the early 1950s focused on the household table of an agricultural family. Pereira described two technicians, a man and a woman, sitting with a family to discuss the problems they faced and

[70] Marisa Dulce Pereira, interview by author, Belo Horizonte, Minas Gerais, February, 2016.

potential solutions. In her recollection the families almost always outlined a variety of issues that prioritized problems with the home, then crops or livestock, and finally health.

Her second portrayal captured the theme of transformation among adults and youth who participated in ACAR's programs. The institution's employees partnered with rural families to create individual projects focused on growing crops, rearing livestock, or improving home economics. For Pereira, this was where "development happened," in the home and the fields, at the individual level. She emphasized the themes of education, learning to use credit and farm administration, and in the process changing the "amateur" farmer into the "professional" that the technicians envisioned. Pereira framed the changes as essential since "the [rural] interior [of the country] was an absolute mess," with poor quality of life indicators. Her third portrayal focused on ACAR's increasing "orientation around technology" in the late 1950s that emphasized raising yields and productivity in the farmers' fields.[71] These three portrayals show an arc in ACAR's strategies to promote agrarian development, from collaboration, to capacity building, to technological diffusion.

Pereira's three snapshots highlight the considerable changes in ACAR's approach to agrarian development. What they overlook is the process of how the institution's pursuit of development transformed at an operational level. This chapter examines the creation, expansion, and transformations of ACAR, which was founded in partnership with the U.S.-based American International Association (AIA) and the Minas Gerais state government.[72] I examine how initial efforts to improve the lives of agrarian families in the early 1950s transformed into a robust program that prioritized increasing farm production by the end of the decade. I argue that ACAR

[71] Pereira, interview.
[72] Minas Gerais State Government, *Lei Registro número 12.854, Convênio celebrado entre o Governo do Estado de Minas Gerais e a Associação Internacional Americana* (Belo Horizonte: 6 December, 1948), 1.

operated as a site where international and national agrarian development ideas were integrated into the institution's operations, and gradually coalesced into a rural extension ideology.

The term rural extension refers to extending ideas and processes into rural areas. In a broader context, "rural extension" does not have a specific definition but generally refers to the conveyance of knowledge, practices, and technical advice from an expert to a farmer. The term "rural" typically referred to regions with agricultural or livestock rearing activities. Brazilian planners sometimes described rural extension as a service, signifying a laborious process of engagement performed by experts to facilitate access to technology and know-how. While ACAR's initial goals aimed to better the lives of farming families by facilitating access to credit and providing expertise to improve farms and homes, the institution's operations changed in response to shifting institutional, political, and economic contexts. Over the 1950s, ACAR created a model of rural extension that prioritized increasing agricultural production and educating farmers as a long-term initiative. Planners portrayed rural extension as a bridge that connected research and policy, with farmers who grew crops, reared livestock, and most ambitiously, thought about themselves as farm administrators. By the early 1960s, rural extension provided both an organizing principal for institutional operations, and also a way to articulate a top-down model that promoted a specific type of agrarian change.

If rural extension represented a bridge to reach farmers, then trained agronomists, technicians, and the rural offices they populated represented the operational infrastructure. The experts, sometimes referred to as extensionists ("extensionistas"), carried the ideas and technologies to farmers. Through repeated efforts to accelerate agrarian development, ACAR's planners modified how extensionists engaged farmers. Their approaches evolved in diagnosing and offering solutions to a variety of perceived problems. Thus, what rural extension entailed in

practice remained malleable since ACAR's policymakers consistently maintained an ambitious but vague rhetorical goal to "intensify" agricultural production and improve the social and economic lives of those in rural Minas Gerais.[73] This goal contrasted with how planners generally described the agrarian region as underdeveloped, backwards, or traditional. These descriptions served as abstract counterpoints to what ACAR's planners envisioned, namely an equally abstract idea of a rationally organized agricultural sector.

The nationalization of the ACAR model in 1956 rapidly expanded the government's capacity to reach farmers and accelerated the integration of rural extension as standard practice. As the flagship institution, Minas Gerais' research and technician training informed how other state-level governments designed their programs for agricultural change. In the early 1960s, the federal government became more involved in agricultural development initiatives and incorporated rural extension to encourage the cultivation of crops they deemed most valuable for national development.

While the material results of ACAR's programs proved significant over its decades of operation, planners often complained of a disconnect with farmers and lamented the slow pace of change. While perhaps sincere, planners' critiques rarely accounted for the frequent changes to and expansions of their own development goals. Failing to fully reach the goals provided justification for continued pursuit. Beyond ACAR's results from working with farmers, the agency's actions played a key role in stabilizing the terms and demonstrating the utility of rural extension practices. Subsequently, for several decades the Brazilian federal government mobilized rural extension as a vehicle to implement massive agricultural transformation schemes. As will be discussed in the next chapter, starting in the early 1960s, the government

[73] Minas Gerais State Government, *Convênio celebrado*, 1.

fundamentally relied on rural extension to reach famers and promote a vision of "modern" coffee fields in Brazil. The coffee-focused programs were one initiative among many that contributed to a period of rapid agricultural growth, especially in the 1970s. These state-led programs privileged investment in export agriculture and aimed to increase levels of farm productivity—a very different approach compared with ACAR's initial aims of improving the standard of living for small-scale agricultural families.

Paths of Development Converge in Minas Gerais

Marisa Dulce Pereira's depiction of an underdeveloped rural setting in Minas Gerais stemmed from decades of similar rhetoric, which was not restricted to the state. Brazilian politicians and elites frequently described rural areas as suffering from the problem of low farm and worker productivity. A clear case took place in 1878, at the remarkable Agrarian Congress (Congresso Agrícola) that brought together agricultural elites from Rio de Janeiro, São Paulo, Minas Gerais and Espírito Santo. Though focused on the prospective end of slavery and an impending labor crisis, the attendees also discussed ambitions to convert indigenous laborers into more efficient workers, and how fazendeiros (large-scale landowners) accessed financial credit.[74]

Minas Gerais state played an influential role in national politics during Brazil's First Republic (1889-1930), typified by a political partnership with São Paulo in which the two states alternated control over the office of the presidency.[75] Yet the agricultural landscape of Minas Gerais differed considerably from that of São Paulo, where large-scale coffee fields boomed. Minas Gerais' farmers tended to diversify their activities among different crops, including

[74] Congresso Agrícola: Collecção de Documentos (Rio de Janeiro: Typ. Nacional, 1878).
[75] Amilcar Vianna Martins Filho, *A Economia política do café com leite, 1900-1930* (Belo Horizonte: Editora UFMG, 1981); Rogério Naques Faleeiros, *Fronteiras do café: fazendeiros e "colonos" no interior paulista: 1917-1937* (São Paulo: Universidade do Sagrado Coração, 2010), 19-36.

coffee. Moreover, farms in Minas Gerais averaged around one third the size of São Paulo's.[76] In an effort to spur economic renewal in the state, prominent *mineiro* politician João Pinheiro da Silva organized an Agrarian, Commercial and Industrial Congress in 1903. Called in part to respond to persistent low coffee prices, elites in Minas Gerais met to discuss agricultural diversification and ways to improve production. They called for greater adoption of technologies, the creation of networks to distribute seeds, and the circulation of information about plant maladies in the state.[77] These objectives reflected early conceptions of technical assistance, wrapped rhetorically in Pinheiro's aim to create jobs and serve the needs of the population.[78]

The creation of the Agricultural School of Lavras, Minas Gerais in 1908 signaled clear efforts to improve agriculture in the south of the state. Founded as an evangelical institution to promote agricultural education, American Benjamin H. Hunnicutt became its first director. Hunnicutt graduated from Mississippi State University in agricultural studies in 1905, before traveling to Brazil on a Presbyterian mission in 1907.[79] At Lavras, he encouraged the adoption of machines and equipment to improve crop yields. Research focused mainly on corn but also experimented with soybeans and the introduction of new breeds of cattle and swine.[80] The school created technician training courses and crop experimentation programs using corn varieties donated by the Minas Gerais Secretary of Agriculture and the Brazilian Ministry of

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[76] Carlos Prates, *A Lavoura e a indústria da zona da mata* (Belo Horizonte, 1906); Amilcar Vianna Martins Filho, *O Segredo de Minas: a origem do estilo mineiro de fazer política,1899-1930* (Belo Horizonte: Crisálida, 2009), 29.
[77] Otávio Soares Dulci, *Política e recuperação econômica em Minas Gerais* (Belo Horizonte: Editora UFMG, 1999), 46.
[78] Similar conversations had circulated in São Paulo state decades before. See Warren Dean, "The Green Wave of Coffee: Beginnings of Tropical Agricultural Research in Brazil, 1885-1900," *The Hispanic American Historical Review* Vol. 69, No. 1 (Feb., 1989): 91-115.
[79] Gerald H. Anderson, ed. *Biographical Dictionary of Christian Missions* (Grand Rapids: William B. Eerdmans Publishing Company, 1999), 310.
[80] Ângelo Constâncio Rodrigues, "A Escola Superior de Agricultura de Lavras/ESAL e a Universidade Federal de Lavras/UFLA—a trajetória de uma transformação" (PhD diss., Universidade Federal do Rio de Janeiro, 2013), 67-68.

Agriculture.[81] Remaining the director at Lavras until 1926, Hunnicutt's agricultural research efforts integrated Brazilian governing institutions, U.S. expertise and models for agricultural development, along with local experimentation to select preferred plant varieties. The strategies employed at Lavras foreshadowed later state-wide efforts to spur agricultural development.

After the 1929 economic crisis, the rhetoric of Minas Gerais' politicians increasingly highlighted the theme of economic stagnation. Historian Otávio Soares Dulci traces policy cycles during the early twentieth century to show how politicians envisioned different paths to economic growth in the state. In the 1930s, policies promoted cereal crops and raw materials for industrial growth.[82] During World War II (1939-1945), politicians shifted investment more directly to industrial activities.[83] After the war, however, state approaches to economic growth sought an equilibrium between agriculture and industry, promoting international investment and partnerships.[84] As governor of Minas Gerais (1947-1951), Milton Campos mobilized similar rhetoric and a receptivity towards international investment, which provided a promising context for the creation of ACAR.

The origins of ACAR were rooted in the political and economic collaboration between the United States and Brazil during and after World War II. The U.S. launched a variety of initiatives following the war's outbreak to strengthen political ties with countries in Latin America.[85] In August 1940, U.S. President Franklin D. Roosevelt created the Office for Coordination of Commercial and Cultural Relations Between the American Republics (OCCCRBAR) to enhance economic and cultural collaboration between the United States and

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[81] No author, "An American Agricultural School in Brazil," *The South American: A Journal for All Interested in Latin American Affairs* (New York: June 1919), 9.
[82] Dulci, *Política e recuperação*, 65, 139.
[83] Dulci, *Política e recuperação*, 70.
[84] Dulci, *Política e recuperação*, 78.
[85] Antônio Pedro Tota, *O imperialismo sedutor: A americanização do Brasil na época da Segunda Guerra* (São Paulo: Companhia das letras, 2000), Introduction.

Latin America. Roosevelt appointed Nelson Aldrich Rockefeller as the director. The son of wealthy industrialist John D. Rockefeller Jr., Nelson Rockefeller had previously represented U.S. companies in Latin America and called for programs to improve economic and social conditions in the region.[86]

In July 1941, Roosevelt expanded U.S. efforts towards hemispheric integration and transformed the OCCCRBAR to the Office of the Coordinator of Inter-American Affairs (OCIAA). With Nelson Rockefeller as coordinator, the OCIAA initiated a series of activities to build cultural ties and bolster trade between the United States and other nations in the Americas.[87] The cultural linkages that flourished at the time are well documented: the number of flights and shipping lines increased, as did the exchange of high-art and cultural performances. Brazil played a prominent role in U.S. efforts to broaden hemispheric collaboration.[88] Filmmaker Walt Disney's travels to Brazil resulted in the creation of the cartoon parrot Zé Carioca based on a caricature of Rio de Janeiro's inhabitants, which became a fixture in Disney's films.[89] In 1943, Rockefeller`s office collaborated with Walt Disney to produce *The Winged Scourge*, an educational film to promote public health and awareness about malaria in Brazil.[90]

The international coffee trade became another cornerstone of hemispheric wartime relations. Many Latin American economies relied heavily on coffee exports.[91] Fearful that

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[86] Tota, *O imperialismo sedutor*, 26.
[87] United States Federal Government, Executive Order 8849, July 30, 1941.
[88] Frank D. McCann Jr., *The Brazilian-American Alliance, 1937-1945*, 2nd ed. (Princeton University Press, 2015); Thomas Skidmore, *Politics in Brazil, 1930-1964: An Experiment in Democracy* (New York: Oxford University Press, 1967).
[89] Daryle Williams, *Culture Wars in Brazil: The First Vargas Regime, 1930-1945* (Durham, Duke University Press, 2001), 200; Chris Dunn, *Brutality Garden: Tropicália and the Emergence of a Brazilian Counterculture* (Chapel Hill: University of North Carolina Press, 2001), 27.
[90] Tota, *O imperialismo sedutor*, 41. Public health films in Brazil fit within a broader U.S. led propaganda initiative in Latin America. See Seth Fein, "Everyday Forms of Transnational Collaboration: U.S. Film Propaganda in Cold War Mexico," in *Close Encounters of Empire: Writing the Cultural History of U.S.-Latin American Relations* (Durham: Duke University Press, 1998), 400-450.
[91] Mark Pendergrast, *Uncommon Grounds: The History of Coffee and How it Transformed Our World* (New York: Basic Books, 2010), 199-214.

restrictions on international trade or lower prices would drive Latin American coffee economies to ruin, the U.S. government collaborated with Latin American governments to divide the U.S. market among the major coffee producers, ensuring stable market access and prices.[92] These efforts reached a peak from 1941 to 1943, when the U.S. government underwrote the entire unshipped balance of Brazil's coffee crop, ensuring that the coffee would be purchased, albeit amid price disputes.[93]

The end of World War II changed the terms of U.S. engagement in Brazil and in Latin America writ large. Rather than sector-focused programs such as the coffee agreements described above, U.S. efforts shifted towards promoting national economic development more generally. The OCIAA described Brazil as having "barely stepped off the oxcart before stepping on the airplane," in reference to the great economic disparity in the nation and its potential to expedite economic growth. They recognized that Brazil possessed an "enormous endowment of natural resources."[94] These observations fit within the changing global rhetoric on post-war recovery and economic growth later termed "developmentalism."[95] This approach held that "underdeveloped" countries could achieve rapid economic growth through a series of political and institutional changes, further hastened with international financial investment.[96]

Brazilian national politics dramatically shifted in the same period when governance transitioned from authoritarian to democratic rule after Getúlio Vargas was deposed in 1945.[97] Democratically elected president Eurico Dutra took office in 1946 and pursued policies of

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[92] Robert H. Bates, *Open-Economy Politics: The Political Economy of the World Coffee Trade* (Princeton: Princeton University Press, 1997), 88.
[93] United States Department of Defense, Department of the Army, *The March of Time- Brazil* (1945). https://catalog.archives.gov/id/24381
[94] Office of the Coordinator of the Inter-American Affairs (Washington, 1944), 18.
[95] Arturo Escobar, *Encountering Development: The Making and Unmaking of the Third World* (Princeton: Princeton University Press, 1995), Introduction.
[96] Escobar, *Encountering Development*, 74-75.
[97] Robert M. Levine, *Father of the Poor?: Vargas and his Era* (New York: Cambridge University Press, 1998), 73.

market liberalization. By 1947, worsening economic conditions prompted a shift in policy, and the Brazilian government invested in enormous infrastructure projects, building roads, ports, and dams.[98] Industrial development initiatives in Brazil were fueled by capital investment from the U.S. At the same time the value of agricultural commodities generally declined as global markets reintegrated. The decline in commodity prices posed a problem since Brazil continued to depend heavily on coffee exports to generate U.S. dollars and balance its foreign trade receipts.[99] Brazilian politicians sought to attract international investment and collaboration to boost the economy.

Nelson Rockefeller's engagement in Latin America after the war shifted to the private sector where he continued to promote economic development and advocated for policies to prevent the spread of communism.[100] In 1946, Rockefeller founded the American International Association (AIA) as a philanthropic agency. The AIA aimed to improve agriculture and health, themes that paralleled Rockefeller's time as the coordinator of the Inter-American Affairs organization. In addition to the AIA, in January 1947, Rockefeller also created a for-profit agency, the International Basic Economy Company (IBEC), intended to boost business in Latin America.[101] While the AIA declared its intention to engage across Latin America, its activities focused on Brazil and Venezuela. This geographic focus can be explained by Rockefeller's previous experiences in these two countries.[102]

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[98] Rafael R. Ioris, *Transforming Brazil: A History of National Development in the Postwar Era* (New York: Routledge, 2014), 17-18; Skidmore, *Politics in Brazil*, 70-71.
[99] Ioris, *Transforming Brazil*, 19.
[100] Antônio Pedro Tota, *O Amigo Americano: Nelson Rockefeller e o Brasil* (São Paulo: Companhia das Letras, 2014), 170.
[101] Claiton Marcio da Silva, "Nelson Rockefeller e a atuação da American International Association for Economic and Social Development: Debates sobre missão e imperialismo no Brasil," *História, Ciências, Saúde-Maguinhos* Vol. 20 N. 4 (2013): 1698.
[102] Marcio da Silva "Nelson Rockefeller," 1698.

The AIA adopted a method of technical cooperation that used experts to develop projects and to train specialists to implement them. They established their first project in the Bocaina Serra, at the borders of São Paulo, Rio de Janeiro, and Minas Gerais states. They selected Bocaina as a test project to extract timber.[103] Working through the IBEC, they attempted to purchase land to develop smaller farms and construct U.S. style homes, resembling Henry Ford's initiative in the Amazon.[104] The Bocaina project failed shortly after its inception because of land purchasing complications.[105] But central themes emerged from Bocaina that would animate ACAR's approach to development: collaboration through technical and financial investment, agricultural modernization, home economics, and education.

Philanthropy and Productivity: The Origins of ACAR

On December 6, 1948, Minas Gerais state governor Milton Campos and Nelson Rockefeller's AIA formally launched ACAR. They tasked the institution with improving quality of life and increasing agricultural productivity in rural regions of Minas Gerais. To do so, ACAR would offer "supervised credit" to small-scale farmers, which typically included facilitating small financial loans for projects and providing technical advice through ACAR's agents. The underlying ideology held that increasing productivity would generate more income and benefit agricultural families and rural communities. But the goals in 1948 extended well beyond productivity. ACAR's founding charter outlined objectives that included providing access to credit, improving home and farm infrastructure and tools, improving health, sanitation,

[103] American International Association (IAI) *Press Release: Serra da Bocaina, July 15, 1947*. Series 2, Box 17, Folder 182, Rockefeller Family Public Relations Series 1-9, The Rockefeller Archive Center, Sleepy Hollow, New York.
[104] Greg Grandin, *Fordlandia: The Rise and Fall of Henry Ford's Forgotten Jungle City* (New York: Metropolitan Books, 2009), 272-274.
[105] Tota, *O Amigo Americano*, 206.

education, domestic industry, nutrition, literacy, and developing an associative spirit.[106] The core theme can be summarized in ACAR's phrase: "to help the rural population to help themselves."[107] But unlike similar self-help rhetoric of earlier periods, ACAR offered an institutional pathway to building relationships.

In addition to financial investment, the AIA provided agronomists and specialists from the U.S. to train Brazilian ACAR employees. The AIA played a crucial role by providing funding, technical knowledge, and reliable support as a U.S. based institution that framed itself as apolitical, non-profit, and promoting development. ACAR's structure was modeled on the U.S. Farm Security Administration (1935-1937), which was reformed into the Farmers Home Administration (1937-1942), aimed to educate and advise agriculturalists to resolve the root causes of rural poverty.[108] Historian Maria Teresa Lousa da Fonseca notes that "rural extension" in the U.S. did not always include the provision of credit. But when applied to "underdeveloped" countries by U.S. aid organizations, credit played a key role. ACAR merged these approaches into the system of "supervised credit."[109]

The U.S. perspective on ACAR's creation is steeped in a myth propagated by AIA journalist Martha Dalrymple, who published *The AIA Story* in 1968. Dalrymple described a thoughtful Rockefeller at a party in Rio de Janeiro, where he gazed upon the favelas (urban slums) where people lived "without running water, without electricity, and without hope."[110] Rockefeller noted how many of the favela habitants had migrated there from the state of Minas

[106] Minas Gerais State Government, Lei Registro número 12.854. Convênio Celebrado Entre o Governo do Estado de Minas Gerais e a Associação Internacional Americana (Belo Horizonte: December 6, 1948).
[107] Associação de Crédito e Assistência Rural (ACAR), *Relatório 1950/1951* (Belo Horizonte, 1951), 3.
[108] Gabriel N. Rosenberg, *The 4-H Harvest: Sexuality and the State in Rural America* (Philadelphia: The University of Pennsylvania Press, 2015), 177.
[109] Maria Teresa Lousa da Fonseca, *A extensão rural no Brasil, um projeto educativo para o capital* (Edições Loyola: São Paulo, 1985), 82.
[110] Fonseca, *A extensão rural no Brasil,* 66.

Gerais and the northeast of Brazil. This observation, according to the story, planted the seed for a developmental program in Minas Gerais. Historian Claiton Márcio da Silva debunked this "missionary" story despite its repeated reference in the historical literature. Instead, Nelson Rockefeller's correspondence with his father in 1946 explained the gradual emergence of his plan to establish a philanthropic organization to combat poverty, disease and illiteracy, and to raise funds on the grounds of expanding market possibilities and solidifying democracy in Latin America.[111] Moreover, a network of personal relations between Rockefeller, AIA employees, U.S. agronomists based in Minas Gerais, and connections to Minas Gerais governor Milton Soares Campos likely contributed to the decision to create ACAR in Minas Gerais.[112]

The willingness of Governor Campos' administration to establish ACAR stemmed from a long-stated ambition among Brazil's elites for agrarian development and his calls for international investment.[113] Governor Campos and Nelson Rockefeller agreed to split the financing for ACAR evenly between the Minas Gerais government and the AIA. The leadership of ACAR included a five-member administration board, with two appointed by the Minas Gerais government, two by AIA, and a fifth proposed by the AIA and approved by the Minas representatives. The Minas government appointed Brazilians Dr. José Barbosa Mello (lawyer and large-scale farmer) and Dr. Paulo Penna de Salvo (agronomist and large-scale farmer); the AIA placed Americans Dr. John B. Griffing (agronomist and director of the AIA in Brazil) and Dr. William H. Alton (lawyer and IBEC consultant in Brazil). They agreed upon American Walter L. Crawford as the fifth member and director of the institution. Crawford previously

[111] Marcio da Silva "Nelson Rockefeller," 1701.
[112] Claiton Marcio da Silva, *De agricultor a farmer: Nelson Rockefeller e a modernização da agricultura no Brasil* (Curitiba: Editora Unicentro, 2015), 145.
[113] José Paulo Ribeiro, *A saga da extensão rural em Minas Gerais* (São Paulo: Annablume Editora, 2000), 93-94.

worked for the Farmers Home Administration in the U.S.[114] The AIA and its majority American board members wielded considerable influence over the initial activities.

Planners selected the town of Santa Luzia for the first local office in January 1949 and established for more offices by March.[115] The first location was likely chosen for its near proximity to the state capital of Belo Horizonte, providing logistical and administrative access. ACAR's ideal office composition included a male agricultural supervisor, either an agronomist, veterinarian, or technician, along with a female domestic supervisor trained as either a teacher, nurse, or home economist. Their activities divided along gender lines as the female technicians worked on domestic programs while the males dealt with agriculture and livestock. Beyond solicitations at the local office technicians also traveled to meet families on their farms.[116]

In addition to providing general advice, ACAR's technicians also drafted agreements for farmers to access supervised credit. In the early 1950s, loans were designed for projects that aimed to improve the economic and social standing of families.[117] The state bank of Minas Gerais, Caixa Econômica do Estado de Minas Gerais, partnered with ACAR to issue the loans. The bank relied on ACAR technicians to identify the farmers, create the administration plan detailing the activities, and assess progress on the farms. Caixa Econômica played a crucial role since Minas Gerais' agricultural areas generally lacked access to banks.[118] Moreover, loans through ACAR charged relatively low interest rates that ranged from 6 to 8 percent per year, with an established ceiling of 12 percent and a multiple-year repayment period. The interest rates and repayment structure were exceptionally generous compared to those of the general price

[114] Ribeiro, *A saga da extensão,* 27.
[115] Ribeiro, *A saga da extensão,* 95.
[116] Ribeiro, *A saga da extensão,* 94.
[117] Ribeiro, *A saga da extensão,* 95.
[118] Associação Brasileira de Crédito e Assistência Rural (ABCAR), *Reformulação da política de aplicação do crédito rural em articulação com a extensão rural* (Rio de Janeiro: 1960).

index of the credit market. Small-scale farmers often relied on informal lenders whose rates could be considerably higher. One estimate pegged these rates between 10 and 28 interest points higher than ACAR's system, although this number cannot be confirmed.[119]

In 1949, Sebastião Onofre da Silveira signed the first ACAR supervised contract with Caixa Econômica. Silveira purchased dairy cows and later used another loan to plant corn and fruit. In 1979, Silveira wrote a letter to ACAR reflecting on his experience. The letter is of dubious credibility since ACAR's archive contains a number of different edited versions. Ostensibly writing when he was 70 years old, Silveira reflected on his experience in 1949, highlighting ACAR's novelty. He wrote that "a group of Americans and Brazilians, men and women, came to the town" so the townsfolk "went to hear the American proposals." Silveira expressed his surprise at the time, as they were offering money with little interest and technical assistance to "capable people," noting that ACAR did not just offer credit to any poor small-scale farmer. He had "never heard of anything like it," and claimed that the Americans "had to have come from the sky to help us—they were not men from earth."[120]

It is likely that Silveira's story is at least embellished if not manipulated as there were multiple contradictory drafts, but its presence in the archive is telling. The emphasis on relationship building, social change, and U.S. involvement highlight how ACAR envisioned their activities. Moreover, Silveira serves as an example of the type of clients ACAR sought, namely small-scale farmers who possessed enough capital to secure a loan and an ability to follow the administrative plan. Silveira's comment regarding poor small-scale farmers lacking access to credit reveals the selective dimensions of the program. Despite ACAR's promotion of

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[119] José Paulo Ribeiro and Clifton R. Wharton Jr., "The ACAR Program in Minas Gerais, Brazil," in *Subsistence Agriculture & Economic Development* (Chicago: Aldine Publishing Company, 1969), 432.
[120] Sebastião Onofre da Silveira, 1979, "Primeiro projeto de crédito rural supervisionado e depoimento de Sebastião Onofre da Silveira," ACAR, EMATER Centro de Memória, Belo Horizonte, Minas Gerais.

development, those with few resources were presumably bad investments for loans in the view of the bank, highlighting the commercial component that undergirded loans.

The retrospective telling of Sebastião Onofre da Silveira's story elides the practical and systemic issues that ACAR faced in its early years. Despite having the resources to offer credit to farmers, there was uncertainty about who exactly should participate.[121] The idea of replicating the U.S. model to offer financing to "family farms" did not apply equally in the Brazilian context. American Walter Crawford, ACAR's director, identified the challenge of applying a model that proposed to address a wide swath of activities, including sanitation, farm production, improving health and nutrition, among other goals.[122] Most agrarian families in Minas Gerais fit ACAR's criteria. But having a need did not necessarily make them viable program candidates. ACAR's leadership recognized that many applicants lacked collateral to secure bank loans, which left their applications hanging in limbo.[123]

Establishing new local offices also entailed a process of selection that considered environmental, economic, and social considerations. But above all, Marisa Dulce Pereira stressed the priority of finding receptive communities.[124] Historian Leonardo Ribeiro Gomes supported this point by tracing ACAR's underrepresentation in the north of Minas Gerais state, a typically poorer area than the central and south where potential participants likely lacked the resources to access financing.[125] Furthermore, simply establishing an office did not ensure a warm reception by the local inhabitants. Technicians held open meetings to explain their presence and sought to partner with influential people, including priests, mayors, or local politicians who would support

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[121] Marcio da Silva, *De agricultor A farmer*, 153.
[122] ACAR, *Relatório do diretor para membros da junta administrativa: 1949 a 1953* (Belo Horizonte: 1953), 5. Found in Marcio da Silva, *De agricultor a farmer*, 153.
[123] Marcio da Silva, *De agricultor a farmer*, 156.
[124] Pereira, interview.
[125] Leonardo Ribeiro Gomes, "'Progredir sempre' os jovens rurais mineiros nos clubes 4-S: saber, sentir, saúde, servir, 1952-1974" (master's thesis, Universidade Federal de Minas Gerais, 2013), 49.

their work. Pereira explained that these tactics were necessary in Minas Gerais to overcome the common "inconfidência mineira," the proverbial distrust of new people and new programs.[126] ACAR created promotional material to overcome these barriers, including photos and pamphlets, radio broadcasts, and films. As former ACAR director José Ribeiro reflected on the early years, "many agriculturalists reported that it all seemed communist," stressing the challenge of overcoming distrust.[127] Ribeiro describes this perception as a response to the technicians, especially the females, who earned high incomes compared with most inhabitants of rural municipalities. However, taking the agriculturalists' ideological description seriously suggests a political component to the distrust of state-sponsored programs or the arrival of outsiders.

ACAR managed to form agreements in its early years despite the barriers mentioned above. A few example agreements show the types of activities people pursued with financing. In 1951, Luciano and Aureliano, farmers in Três Pontas, diversified from coffee, pigs, and chickens to plant new coffee fields, in addition to sugarcane, corn, rice, beans and a vegetable garden for home consumption. Another farmer, Rui Mesquita, also in Três Pontas, diversified from coffee and cows into corn, manioc, beans and sugarcane. He also financed home improvements and purchased chemical fertilizers for his remaining coffee. In 1952, Leônidas de Brito Mendonça entered an agreement to vaccinate his cattle and expand coffee planting. Some agreements planned to change how crops were planted, especially modifying coffee planting into curves to slow soil erosion and runoff.[128] Even though ACAR prioritized diversification, coffee still played a significant role in the institution's early activities. What these contracts fail to reveal is how ACAR's technicians guided farmers in the new activities. It is unlikely that the technicians

[126] Pereira, interview.
[127] Ribeiro, *A saga da extensão*, 15.
[128] ACAR, *Plano de administração agrícola, 1950-1954* (Belo Horizonte, 1954).

possessed knowledge of each crop or activity. In my conversations with former ACAR employees the capacity of the technician emerged as a crucial component in guiding changes on the farm, suggesting considerable variation across local offices.

ACAR Takes Form in Minas Gerais, 1950-1956

While ACAR established more local offices, national and Minas Gerais state politics drastically shifted. In 1950, Getúlio Vargas won the presidential election. In a contentious political atmosphere, Vargas launched successful campaigns to nationalize key sectors of the economy, typified by the creation of the national petroleum company Petrobras (Petróleo Brasileiro). The federal government amplified intervention in important economic sectors, including a number of agricultural governing boards. In 1951, they founded the National Commission on Agrarian Policy (Comissão Nacional de Política Agrária) to address land disputes. As I will examine in the next chapter, the Vargas administration also created the Brazilian Coffee Institute (Instituto Brasileiro do Café—IBC) in 1952 to manage the coffee sector, which remained the engine of the Brazilian economy.

Juscelino Kubitschek became the governor of Minas Gerais in 1951 on a platform of promoting energy and transportation infrastructure, both of which informed his later federal presidency (1956-1961). Kubitschek did not prioritize agricultural investment.[129] However, he consolidated Minas Gerais state's role in ACAR. The continued commitment of the AIA and its apolitical image likely made ACAR an appealing program for Kubitschek to maintain.[130] Renewed political support spurred an increase in ACAR's partnerships, including a 1951

[129] Juscelino Kubischek, "Governor's Speech 1953." Found in Marshal Eakin, *Tropical Capitalism: The Industrialization of Belo Horizonte, Brazil* (New York: Palgrave, 2001), 115.
[130] Tota, *O amigo americano*, introduction.

agreement to develop research programs with the Rural University of Minas Gerais in Viçosa. The university had recently partnered with the United States Department of Agriculture to establish the Program of Agricultural Extension and Home Economics. This program became a training ground for Brazilian experts, supported by specialists from Purdue University in the U.S.

ACAR also diversified its outreach strategies to include programs for youths in rural areas. In 1952, ACAR's technicians played a role in founding the first 4-S club (Clubes 4-S) in Rio Pomba, in the community of Igrejinha, Minas Gerais.[131] The 4-S clubs were modeled on the American 4-H club, a voluntary association for youths that focused on agriculture and home economics. The 4-S stood for "saber, sentir, servir e saúde" (to know, to feel, to serve, and health), promoting ideas of education and self-improvement. The 4-S youth clubs allowed free membership for males and females aged 10-21. Members developed a project related to agriculture, livestock rearing, or domestic activities, and presented their results at the local fair.[132] Historian Gabriel Rosenberg described the U.S. 4-H clubs as a method to govern and instill in participating children a way of thinking that smoothed the impact of agricultural modernization.[133] The aim was similar in Brazil, albeit packaged as a method to promote new agricultural ideas, and to demonstrate the results to the participants' families and surrounding community. Or as Pereira aptly assessed, the 4-S programs represented a method to "professionalize those living in the rural areas, beginning with the youth."[134]

Documentation on the origins and first years of the 4-S clubs is limited, but the number of clubs and participants increased through the early 1950s. The development of the 4-S clubs

[131] Ribeiro Gomes, "'Progredir sempre,'" 54.
[132] Gabriel N. Rosenberg, *The 4-H Harvest: Sexuality and the State in Rural America* (Philadelphia: The University of Pennsylvania Press, 2015), 2.
[133] Rosenberg, *The 4-H Harvest*, 3-4.
[134] Pereira, interview.

highlighted the continued influence of U.S. approaches to promote agricultural change in Minas Gerais. It also suggested discontent among Brazilian planners about the success of ACAR's programs relative to their goals. Turning to youth offered an alternative to "the rural man" who ACAR described as "reticent and suspicious." Instead, young people were "more receptive to new ideas and adopted them more quickly than adults."[135] Focusing on the youth also signaled a commitment towards generational change to popularize the use of "scientific techniques," including technologies, fertilizers and other inputs, and administering loans.[136]

Providing small loans for youth to pursue a project demonstrated ACAR's arching ideological approach to transform agriculture while avoiding radical social change. In 1952, an internal AIA memo assessed ACAR's credit system as a "major contribution to economic, social and political stability." The idea of stability fit within the AIA's conception of development, whereby "the starting point of progress is production and the first step in economic aid is [to] provide tools of production."[137] The AIA emphasized how agricultural credit would lead to increased production on the farm, and benefit both the borrower and the bank.[138] Yet this developmental model faced skepticism in Minas Gerais.

ACAR's efforts to engage agricultural families in Minas Gerais provoked some internal criticism. Brazilian Geraldo Oscar Domingues Machado, a professor of agronomy at the Rural University of Minas Gerais who also worked with ACAR, doubted the application of the U.S. approach. Machado contextualized the differences between "underdeveloped" poverty in Minas Gerais and "developed" poverty in the United States. Rather than lacking cars or refrigerators,

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[135] ACAR, *Dez anos a serviço do povo rural de Minas Gerais* (Belo Horizonte: 1959), 4.
[136] Pereira, interview.
[137] Internal Memo, AIA, July 22, 1952, Series 13, Box 1, Folder 1, Personal Papers AIA-IBEC, The Rockefeller Archive Center, Sleepy Hollow, New York.
[138] Internal Memo, AIA, July 22, 1952, Personal Papers AIA-IBEC.

Brazilians instead lacked the essentials including food, medicine and clothing.[139] Herein lay the friction of applying the U.S. model to promote rapid agricultural change in Brazil where families lacked basic resources. Specializing in one crop or activity meant less diversification among crops that sustained the family, which increased risk and reliance on market prices. In this vein, Machado encouraged farmers to diversify and plant basic food crops for consumption, explicitly opposing "the trend towards monoculture" in place of an "equilibrium" in farm production.[140]

Machado`s viewpoint helped to explain one perspective in the debate around agricultural change at the time. He outlined a long list of problems facing farmers that he associated with the creation or perpetuation of poverty. Among these, Machado stressed the role of ignorance in reinforcing poverty and self-improvement through education as the solution. Here Machado agreed with ACAR's planners to portray education as the pathway to development. Their conception of education included how people managed their farms, sowed their crops, and reared livestock. For Machado, the lack of education sustained and deepened poverty, spurring migration to the favelas (slums) in urban centers with all the "misery, theft, murder, vagrancy, tuberculosis, prostitution, and more."[141] Instead, he endorsed ACAR's aim to support non-radical change.

ACAR's approach to agrarian transformation while avoiding social conflict informed and was informed by prominent debates around agrarian reform and land redistribution in the 1950s. Land ownership in Brazil remained in the hands of a small group of people, a disparity with long-lasting roots from the colonial period.[142] In the early 1950s, movements to organize workers

[139] Geraldo Oscar Domingues Machado, *A pobreza rural em Minas Gerais* (Belo Horizonte: 1953), 14.
[140] Machado, *A pobreza Rural*, 16.
[141] Machado, *A pobreza Rural*, 16.
[142] Wilder Robles and Henry Veltmeyer, *The Politics of Agrarian Reform in Brazil: The Landless Rural Workers Movement* (New York: Palgrave Macmillan, 2015), 65.

and peasants in rural areas increased, especially in the south of the country, and in the states of São Paulo and Pernambuco.[143] In 1952 and 1953, President Vargas took steps to address rural conditions and rising leftist activism, creating new commissions to review agrarian policy. However, his measures largely avoided provoking the landowning elites who staunchly opposed agrarian reform and the redistribution of land.[144]

These ideological debates in Brazil took place during the increasingly polarized early years of the cold war. Communists had established power in the Soviet Union, China, and Eastern Europe. The U.S. heightened efforts to stem communism by promoting democracy and programs to reduce poverty and spur economic growth internationally. Technical assistance played a key role in this strategy. As outlined in U.S. president Harry Truman's 1949 Point Four Program, "greater production is the key to prosperity and peace. And the key to greater production is a wider and more vigorous application of modern scientific and technical knowledge."[145] ACAR's prescription for rural development fit within this worldview, where increasing capacity through education, technology, and access to credit would generate growth, rather than addressing land distribution.

The emphasis on promoting education as the key to driving agrarian development programs has drawn the attention of academics. Historian Maria Teresa Lousa da Fonseca argues that ACAR's activities were fundamentally educative and designed to expand a model of credit-based agriculture and a narrowly defined idea of development.[146] Institutional rhetoric framed

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[143] Robles and Veltmeyer, *The Politics of Agrarian Reform*, 74; Cliff Welch, *The Seed was Planted: The São Paulo Roots of Brazil's Rural Labor Movement, 1924-1964* (University Park: The Pennsylvania State University Press, 1999), 123-124; Thomas D. Rogers, *The Deepest Wounds: A Labor and Environmental History of Sugar in Northeast Brazil* (Chapel Hill: The University of North Carolina Press, 2010), 131-132.
[144] Welch, *The Seed was Planted*, 169-170.
[145] United States President Harry Truman, "Inaugural Address," (January 20, 1949) in Gilbert Rist, *The History of Development: From Western Origins to Global Faith* (London: Zed Boks, 2002), 259.
[146] Fonseca, *A extensão rural no Brasil*, 95.

low productivity and low incomes as problems of farmer incompetence and ignorance.[147] More broadly, historian Sônia Regina de Mendonça argues that the very notion of "underdevelopment" gained prominence and solidified as a concept through institutions like ACAR and critiques of a lack of education among farmers. The institutional focus on education led directly to promoting productivity and efficiency. In this formulation, planners both defined "backwardness" and established a roadmap to promote a type of change that avoided social conflict.[148]

In 1953, ACAR's planners pivoted towards a more expansive approach to engaging farmers that emphasized education. The Minas Gerais state government and the United States signed the General Agreement for Technical Cooperation (Acordo Geral de Cooperação Técnica) that strengthened courses at the Rural University of Minas Gerais at Viçosa in the areas of home economics and rural extension.[149] ACAR began to conceive of their activities as rural extension, which incorporated supervised credit into a broader platform. While supervised credit relied on conveying knowledge for farm programs, rural extension emphasized education and community engagement as longer-term processes. The transition towards rural extension represented a more ambitious form of outreach rather than a completely new direction for ACAR. Ribeiro notes that the strategy of rural extension in Minas Gerais took form through exchanges between U.S. and Brazilian experts but was also negotiated by technicians in local contexts.[150] Experts played a key role as the drivers of rural extension, acting as a "bridge" between agricultural research and farmers.[151]

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[147] Fonseca, *A extensão rural no Brasil*, 95.
[148] Sônia Regina de Mendonça, "A dupla dicotomia do ensino agrícola no Brasil, 1930-1960," *Estudos Sociedade e Agricultura*, Vol. 14, No.1 (Rio de Janeiro: 2006): 88-113.
[149] Ambassador of the United States, *Renovation of the Accord on American Experts Going to the Rural University of Minas Gerais*, Rio de Janeiro: December 1962. *Opening the Archives: Documenting U.S.-Brazil Relations, 1960s-80s*, Brown Digital Repository, Brown University Library.
https://repository.library.brown.edu/studio/item/bdr:791724/
[150] Ribeiro, *A saga da extensão*, 104.
[151] Ribeiro, *A saga da extensão*, 105.

Despite expanding their methods to reach farmers, ACAR's future depended on the renewal of short-term contracts between the Minas Gerais government and the U.S.-based AIA. In July 1954, João Napoleão de Andrade, the president of ACAR's administrative group, wrote directly to Nelson Rockefeller and the AIA to lobby for a new three-year contract. Not signing the contract, wrote Andrade, would leave "ACAR in a weakened position…that would reduce their operations or kill it outright."[152] Andrade feared uncertain political support with the upcoming Minas Gerais state elections. He assumed that a longer-term commitment from the AIA would incentivize the next government to continue supporting ACAR. Andrade's efforts proved fruitful and Rockefeller authorized a new contract with the AIA in the same year.

Equipped with renewed stability, ACAR's planners sought to convey a more uniform internal message for its employees. In March 1955 the institution launched a newsletter, the first of which framed ACAR's work in Brazil and in the international context. The articles valorized the institution's technicians as "pioneers" and "missionaries," contributing to a "unifying sprit of extension" necessary to change the activities of the "Caboclo or Caipira."[153] In this case used as a derogatory term, Caboclo generally referred to indigenous characteristics by descent or the adoption of indigenous cultural practices. Less racialized, the term Caipira typically depicted a rural inhabitant who was uneducated, irrational, and often impoverished.[154] The newsletter likely identified these politically and economically marginalized groups as a representation of social backwardness that ACAR targeted for change, rather than the participants they preferred for the program.

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[152] João Napoleão de Andrade, "President of the Junta Administrative of ACAR to Nelson Rockefeller," July 22, 1954, Series 13, Box 1, Folder 1, Personal Papers AIA-IBEC, The Rockefeller Archive Center, Sleepy Hollow, New York.
[153] ACAR, *Boletim Informativo* (March, 1955), 1.
[154] Antônio Cândido, *Os parceiros do Rio Bonito: estudo sobre o caipira paulista e a transformação dos seus meios de vida* (São Paulo: Livraria Duas Cidades, 1979), Chapter 1.

The authors of the newsletter also focused on ACAR's international connections. They printed an assessment of ACAR by economist Theodore Schultz from the University of Chicago, who collaborated with the AIA. Funded by the Ford Foundation, Schultz ranked ACAR as one of the four best organizations working in rural development, comparable to the Mexican Corn Program that was also supported by the Rockefeller Foundation.[155] ACAR's brief newsletter presented the two poles of the program: the idealized targets of change, and the international underpinnings that supported their work. These descriptions together demonstrated how ACAR's planners thought about the institution's efforts as part of the larger milieu of 1950s international development programs.

In line with the internal newsletter, ACAR also sought to address the way that technicians interacted with farmers. A 1956 ACAR booklet titled "the human side of our work" (cover image below) clarified the role of technicians to "orient" and not "order." The image presented an idyllic meeting between ACAR's technicians (on the sides) and participants (in the middle), all portrayed as white with no ethnic markers: highly fashionable, likely literate, and engaged in the conversation.[156] This image stood in stark contrast to the aforementioned Caboclo and Caipira, and the common depiction of impoverished rural folk set in their ways. Recognizing "the human side" to their work indicated, at least rhetorically, an internal perception of problematic power structures between ACAR employees and farmers.[157] By the mid-1950s, ACAR solidified the idea of rural extension as the vehicle to reach participants, but also identified that overly structural and paternalistic approaches failed to generate desired results.

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[155] ACAR, *Boletim informativo* (March, 1955), 1; Tore C. Olsson, *Agrarian Crossings: Reformers and the Remaking of the US and Mexican Countryside* (Princeton: Princeton University Press, 2017), chapter 5.
[156] ACAR, *O lado humano de nosso trabalho* (18 January, 1956), 1.
[157] ACAR, *O lado humano*, 7.

Figure 1.1: ACAR: "The Human Side of Our Work," 1956.

Minas Gerais Model Goes National, 1956-1961

After President Vargas committed suicide in 1954, Vice President João Café Filho assumed the presidency until Juscelino Kubitschek won the federal election the following year. Kubitschek's plan for national economic development crystalized in an ambitious Targets Plan that enhanced the role of the state in planning, regulating, and finance, especially as regards industrialization.[158] His prior support for ACAR as Minas Gerais governor continued into his presidency. Once in office Kubitschek proposed the creation of a national "ACAR of Brazil" in partnership with the AIA. After the meeting with Kubitschek, AIA administrator Henry Bagley expressed his skepticism, noting that "ACAR and AIA people know well that he [Kubitschek] never understood what ACAR is, though he has given it full support."[159] Bagley worried that a federal program would be expensive and inefficient, and most significantly "serve regions without need for ACAR type work."[160] Bagley did not detail the types of regions he believed were in need.

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[158] Ioris, *Transforming Brazil*, 4.
[159] Letter from Henry Bagley to Francis A. Jamieson of the International Basic Economy Corporation, February 29, 1956, Series 13, Box 1, Folder 7A, Personal Papers AIA-IBEC, The Rockefeller Archive Center, Sleepy Hollow, New York, 1.
[160] Letter Bagley to Jamieson, 1956, Personal Papers AIA-IBEC, 1.

Nelson Rockefeller traveled to Brazil in April and met with Kubitschek to discuss a national ACAR model. In June 1956, Kubitschek announced the creation of the Brazilian Credit and Rural Assistance Association (Associação Brasileira de Crédito e Assistência Rural—ABCAR).[161] State-based organizations operated as independent initiatives, linked by ABCAR's administration in Rio de Janeiro. The AIA doubled the financial contribution earmarked for ACAR to support the national network, reflecting a clear prioritization of the Minas Gerais system. The states of Minas Gerais, Santa Catarina, Paraná, Rio de Janeiro, Espírito Santo, and joint programs in the northeast supported institutions similar to ACAR by the end of 1956.[162]

Brazilian, U.S., and international experts met throughout 1957 to define internal practices for the national network. Planners concretized the philosophy and principles of rural extension and supervised credit at one gathering. The meeting included representatives from Brazilian institutions, ABCAR and ACAR, Brazilian universities, and the Bank of Brazil. International representation included the AIA and the United Nations Food and Agriculture Organization (FAO). The inclusion of the FAO reflected the significance of the national network and potential multilateral partnerships. At the meeting, planners outlined ABCAR's aim to "elevate the living conditions for rural populations through a program of joint rural extension and supervised credit," and to spur development in the rural areas.[163] They standardized the use of the terms "rural extension" and "rural supervised credit." Rural extension included the process of building relations, establishing programs and educating growers, followed by supervised credit that involved financial borrowing and rural administration.[164] This two-step process, in which supervised credit proceeded after a period of rural extension, became the established method.

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[161] Fonseca, *A extensão rural no Brasil*, 110.
[162] Ribeiro, *A saga da extensão*, 107. The program in the northeast partnered Bahia, Pernambuco, and Ceará states.
[163] ABCAR, *2 Reunião de técnicos em extensão rural e crédito supervisionado* (Belo Horizonte: October 1957), 1.
[164] ABCAR, *2 Reunião de Técnicos*, 1.

ACAR remained the flagship of the national program with the largest network of offices and employees. The need for trained agronomists and technicians surged with the expansion of the national program. ACAR agreed to train technicians for other states in return for additional funding to expand their activities in Minas Gerais.[165] From 1955 to 1957, financing projects facilitated through ACAR tripled.[166] Moreover, the repayment statistics showed remarkable success, reporting a 99 percent repayment rate on the 2932 approved loans issued through Caixa Econômica up to 1955. The criteria used to generate this statistic is unknown but claiming such high rates of repayment suggested rigid selection of low-risk targets (and likely some manipulation).[167] ACAR's director Geraldo Machado did not mention selectivity when concluding that "the small producer is a perfectly legitimate risk."[168]

While ACAR's president Walter Crawford celebrated their work with the "underprivileged rural man," the institution further sharpened its definition of the desired type of participant.[169] They focused on a middle group of farmers who could access financing and technical advice, rather than the undercapitalized farmers who "practice traditional techniques and who are too deficient in all respects" to benefit from the program.[170] Described as more capable, the middling farmers could better respond to educational efforts, including changes in knowledge, in abilities and operations, and in attitudes.[171] Thus, access to credit prioritized the likely success of collaborators in executing a plan and repaying the loan.

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[165] Correspondence from Walter L. Crawford to Louise A. Boyer, Rio de Janeiro, March 9, 1956, Series 13, Box 1, Folder 7B, Personal Papers AIA-IBEC, The Rockefeller Archive Center, Sleepy Hollow, New York.
[166] José Paulo Ribeiro and Clifton R. Wharton Jr., "The ACAR Program in Minas Gerais, Brazil," in *Subsistence Agriculture & Economic Development* (Chicago: Aldine Publishing Company, 1969), 430. The amount of funding through loans jumped from 10 million cruzeiros to over 30 million cruzeiros.
[167] ACAR, *Programa 1956-1957* (Belo Horizonte: 1956), 5.
[168] Geraldo D. Machado, *Alguns aspectos do crédito rural supervisionado em Minas Gerais* (Belo Horizonte: 1957), 4.
[169] ACAR, *Boletim informativo* (Belo Horizonte: March 1957), 1.
[170] Ribeiro and Wharton Jr., "The ACAR Program in Minas Gerais," 430.
[171] José Paulo Ribeiro, *ACAR-programa de extensão* (Belo Horizonte: 1957), 4.

Figure 1.2: ABCAR, Boletim Informativo (Rio de Janeiro: November, 1958)
Caricature of Nelson Rockefeller beside a list of the associations working with rural extension, including Minas Gerais (ACAR), the Northeast (ANCAR), and Santa Catarina (ASCAR).[172]

The continued expansion of ABCAR and ACAR's operations in the late 1950s corresponded with celebrations of rural extension work. In 1959, ACAR published a detailed reflection on its previous ten years in Minas Gerais. They described their "extensionists" (practitioners of rural extension) as "empowered and conscious of their mission to bring the rural families the conquests of modern science, the research from experimentation in agriculture and the home economy."[173] This type of rhetoric differed from the original language of alleviating poverty and helping farmers help themselves. ACAR's priorities can be seen in the financial breakdown of credit contracts. Over 85 percent of approved financing was earmarked for aspects of production, including animals, labor, tools, and fertilizers, while 12 percent corresponded with projects to improve the home and domestic economy.[174] A clear prioritization developed towards farm production over domestic projects, and thus an increasing gender disparity in extension work as male-oriented farm activities heavily outweighed female-oriented home projects.

[172] ABCAR, *Boletim informativo* (Rio de Janeiro: November 1958), 1.
[173] ACAR, *Dez anos a serviço do povo rural de Minas Gerais, 1959* (Belo Horizonte: 1959), 6.
[174] ACAR, *Dez anos*, 28.

One key transformation by the end of the 1950s lay in how ACAR defined their goals. Instead of empowerment, they framed their work as an ongoing interpersonal process, stating: "rural extension…alone is not capable of resolving all the problems of the rural family, it can only be practiced with orientation and technical recommendations, accompanied with the indispensable financial resources." This approach held that "credit is the most effective instrument to increase production and make sense of the value of education."[175] ACAR also mapped out future goals that were more ambitious and stemmed from a steadfast conviction that their model would work.[176] Planners outlined an idyllic vision for the future: "we will have a developed countryside, inhabited by educated people, with a healthy life. An agriculturalist who prospers and is happy, offering food and prime materials for the state and the nation."[177] This ambitious rhetoric, however, did not match the results in Minas Gerais or at the national level.

Walter Crawford's dual role as ACAR president and AIA employee required he send reports to the AIA's New York office. In these reports, Crawford painted a more measured assessment than ACAR's official publications. In 1959, he wrote that "the formula of rural extension tied to supervised credit is generally recognized throughout the country (Brazil) as a practical method of raising the rural standard of living."[178] However, he questioned future stability: "the plant needs continued good nourishment if it is to resist the shocks of inexperience, personal ambitions, political pressures, technical weaknesses, inflation and other threats."[179] The issue of uncertain Brazilian political support surfaced once again, as well as concerns about a lack of resources and trained personnel. Crawford also lamented that most increases in farm

[175] ACAR, *Dez anos*, 6.
[176] ACAR, *Dez anos*, 6.
[177] ACAR, *Dez anos*, 48.
[178] Memorandum from Walter Crawford and Henry Bagley to the Board of Directors of the AIA, Rio de Janeiro, June 8, 1959, Series 13, Box 1, Folder 7A, Personal Papers AIA-IBEC, The Rockefeller Archive Center, Sleepy Hollow, New York, 1.
[179] Memorandum from Crawford and Bagley, June 8, 1959, Personal Papers AIA-IBEC, 1.

output were the products of putting more land under use, rather than increasing worker output and productivity.[180] His concerns with ACAR, the largest network of local and regional offices, likely provided a measure of the national program.

In 1960, ABCAR published a mild critique of the credit programs over the preceding decade. The main issues involved limited farmer access to credit due to administrative delays and hesitant banking institutions to issue loans. Of the claimed 63000 families reached in 1958, only about 1250 received loans, a remarkably small number considering the consistent rhetoric celebrating the benefits of providing credit.[181] ABCAR also recognized that extension agents encouraged technology dispersion without comprehending the problems or determining the economics. Yet, planners remained steadfast in valorizing the model, and in stating the benefits of rural extension to spur rural development.[182]

Perhaps in response to the national assessment, ACAR launched new efforts to increase training and sharpen their outreach through a broadening web of partnerships. For the first time, the Brazilian federal government provided funds to expand ACAR's operations. Moreover, the Rural University of Minas Gerais at Viçosa agreed to cooperate directly with the institution, placing its extension service, which included agronomy and home economics, under ACAR's supervisors to better coordinate teaching, research, and extension. The integration of the university lent better organization to training courses, with structured programs followed by training in the field and potential academic exchange abroad.[183]

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[180] Memorandum from Crawford and Bagley, June 8, 1959, Personal Papers AIA-IBEC, 2.
[181] Memorandum from Crawford and Bagley, June 8, 1959, Personal Papers AIA-IBEC, 6.
[182] ABCAR, *Reformulação da política de aplicação do crédito rural em articulação com a extensão rural*, (Rio de Janeiro: 1960), 46.
[183] José Alfredo Amaral de Paula, *Centro de ensino de extensão* (Viçosa: ABCAR and UREMG, 1960), 3.

New partnerships and investment did little to change ACAR's approach to agrarian transformation. In 1960, José Paulo Ribeiro became the executive director and stressed the priority of "indispensable technological knowledge" that would "solve the problems impeding rising income" and improve the lives of those who participated in the program.[184] However, research focused more specifically on individual crops rather than diverse farming activities. In the south of Minas Gerais, for example, agronomists recognized that coffee and corn were the central crops for many farmers. They designed crop-specific programs that advised how to add nutrients to the soil, prevent erosion, and plant seeds with higher yields. They also advised on farm spacing to maximize land use and incorporate machines. Other crops included rice and beans, staple foodstuffs of the Brazilian diet that were in high demand in the early 1960s during a national food crisis.[185]

During the second half of the 1950s, peasant mobilization in the northeast and São Paulo state brought the issue of land distribution into public discussion. Different perspectives clashed over if and how agrarian reform could be implemented. Those in favor argued that agrarian reform and the redistribution of land could address the structural constraints that exploited workers, caused food crises, and harmed economic growth.[186] In opposition, influential economists from the University of São Paulo did not see land distribution as an obstacle to economic growth.[187] ACAR's approach to development tended to fit with the latter, and worked towards a distinctly non-radical form of agrarian change. Academics have coined the term

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[184] ACAR, *Programa para o ano agrícola, 1960-1961* (Belo Horizonte: 1960), 2.
[185] José Paulo Ribeiro, in ACAR, *Programa para o Ano Agrícola, 1960-1961* (Belo Horizonte: 1960), 4.
[186] Guilherme Costa Delgado, "The Agrarian Question and Agribusiness in Brazil," in *Challenging Social Inequality: The Landless Rural Workers Movement and Agrarian Reform in Brazil* (Durham: Duke University Press, 2015), 44-45. Guilherme Costa Delgado distills three perspectives in favor of agrarian reform, including the Brazilian Communist Party, economists linked to the United Nations' Economic Commission for Latin America, and a sector of the Catholic Church.
[187] Delgado, "The Agrarian Question," 45.

"conservative modernization" to represent an approach to modernizing agriculture without affecting underlying social structures, especially avoiding the redistribution of land.[188] Instead, this position held that economic growth could be accelerated by changing the social, cultural, and technological practices of farmers. Thus, new techniques and technologies combined with the necessary know-how—the base of rural extension ideology—that could improve a family's economic status.

Federal Agrarian Policy Integrates Rural Extension, 1961-1966

In 1961, the Brazilian federal government declared ABCAR a public utility and set to integrate its operations more closely with national efforts to promote rural development. A tumultuous political and economic period saw the election of president Jânio Quadros in 1961, though he resigned in the same year. Afterwards, vice president and leftist-leaning João Goulart assumed the presidency. The AIA made clear their opposition to "leftist" ideology as well as "revolution" and "demagogues."[189] Tethering ABCAR to the federal government coincided with the decline of the AIA's financial support for ACAR, which fell dramatically in 1961 and ended in 1963. Changes in the United States' policy also affected the participation of the AIA. The establishment of President John F. Kennedy's ambitious Alliance for Progress through the United States Agency for International Development (USAID) led to greater centralization and collaboration among U.S. development programs. The AIA had been struggling with its own financing and was reluctant to lose autonomy over its programs.[190] In response, the AIA

[188] Anthony Pereira, *The End of the Peasantry: The Rural Labor Movement in Northeast Brazil, 1961-1988* (Pittsburgh: University of Pittsburgh Press, 1997); Herbert S. Klein and Francisco Vidal Luna, *Feeding the World: Brazil`s Transformation into a Modern Agricultural Economy* (Cambridge: Cambridge University Press, 2019).
[189] Walter L. Crawford, *Agriculture in Brazil: The Mood, the Reality and the Promise* (New York: American International Association, 1961).
[190] Darlene Rivas, *Missionary Capitalist: Nelson Rockefeller in Venezuela* (Chapel Hill: University of North Carolina Press, 2002), 167.

partnered with the Organization of American States to expand rural youth programs throughout Latin America. But they also curtailed participation in other direct programs, including their ACAR partnership.[191]

The Brazilian government's heightened influence over ABCAR shaped the institution's objectives. ABCAR continued to celebrate the values of rural extension, but their goals increasingly framed agrarian development as integral to national economic and industrial growth. Reflecting the priorities of the Goulart administration, ABCAR called for projects that raised income, increased food production, and strengthened the export commodity sectors for foreign trade.[192]

In Minas Gerais, ACAR responded to the shifting political landscape by trumpeting the importance of their activities. In their 1961 annual assessment, ACAR's policy makers stated: "we are living in one of the most dangerous, exciting, and significant periods of the world…development is more important now than ever. The rural people are not equally participating with the larger sectors in the results of economic and social advancement."[193] ACAR's assessment of agricultural change in the state remained staunchly critical of agrarian actors, rather than their own efforts, describing a "static rural population," steeped in older practices. ACAR reiterated their goal to "to promote changes in knowledge, habit and attitudes" of rural people.[194]

The repeated critique by ACAR's policy makers towards farmers' resistance to abandon practices and adopt new ones indicated a disconnect on the ground. It is unlikely that farmers who participated in ACAR's programs were able to reach the institution's lofty expectations. The

[191] Rivas, *Missionary Capitalist*, 168.
[192] ABCAR, *Plano diretor quinquenal* (Rio de Janeiro: 1961), 4.
[193] ACAR, *Programa para o ano agrícola, 1960-1961* (Belo Horizonte: 1960), 4-5.
[194] ACAR, *Programa para o ano agrícola, 1960-1961*, 4-5.

goals of education and development were distinctly vague and often changed. Further, soaring inflation over previous years likely diminished the value of credit contracts and profitability for small farmers. Unfortunately, there is little documentation in ACAR's central archive, nor in regional offices, but the constant internal perception of disconnects was expressed in the interviews I conducted with ACAR's extension workers. One common critique identified the challenges extension agents faced when advising across a swath of agricultural activities, as well as veterinary and livestock breeding programs.[195] It seems, however, that after more than a decade of effort, ACAR recognized the complexity of their endeavor, especially compared to their lofty goals. The institution's 1961-1962 assessment described their work as "agitating in isolation, searching to resolve this or that problem. The reality is that agrarian problems are complex, inter-related, and interdependent."[196] Despite recognizing their limits, planners continued to endorse rural extension as a valued program with the potential to bring about measurable changes.

ACAR's steadfast belief that agrarian transformation required changing "traditional practices" tapped into a broader rhetoric with clear ties to the United States. Walter Crawford of the AIA authored a reflective summary of the state of agriculture in Brazil that included a sharp criticism of what he perceived as traditional practices. Describing "the man with a hoe," Crawford quoted a poem by U.S. poet Edwin Markham, outlining a figure "bowed by the weight of centuries…the emptiness of ages in his face…a brother to the ox."[197] The same publication contained newspaper clippings tracing the rise of Fidel Castro and Mao Tse-tung, correlating traditional agriculture and leftist radicalization, a correlation that took priority in the cold war

[195] Antônio José Ernesto Coelho, interview by author, Varginha, Minas Gerais, July, 2016.
[196] ACAR, *Programa 1961-1962*, 2.
[197] Crawford, *Agriculture in Brazil*, 1-2.

context.[198] To avoid revolution and solve the problem of "the man with a hoe," Crawford emphasized rural extension practices and the potential to modernize through technology and education. As Crawford explained, success was measured by creating an "enlightened rural population capable of applying modern technology to the solutions of problems…as an efficiently conducted agricultural extension service becomes a basic requirement."[199]

As the flagship of the national network, ACAR represented a barometer to measure institutional change. ACAR's annual reports in the early 1960s focused more explicitly on certain crops. In 1959, coffee ranked highest in value in Minas Gerais, but only slightly above corn, rice, and beans. However, coffee overproduction surged in the states of Paraná and São Paulo, combined with global over-production that eroded the crop's trade value. ACAR's 1962 report described both coffee and corn as problematic crops because of persistent low productivity.[200] The critique of corn production likely related to the slow adoption of hybrid varieties that ACAR promoted widely. But coffee posed a different problem beyond declining prices. ACAR`s technicians lamented how coffee farmers were especially slow in adopting new agricultural practices that could increase productivity (measured by yields per hectare).

It is not a coincidence that ACAR's planners scrutinized Minas Gerais' coffee sector in the early 1960s. Surging national coffee production and the creation of the International Coffee Agreement in 1962 brought about the most ambitious effort to date in Brazil to destroy low-yielding coffee trees. Uprooting coffee trees would slow overproduction and open fields for farmers to plant different crops. The federal government created the Executive Groups for the Rationalization of Coffee Growing (Grupo Executivo de Racionalização da Cafeicultura—

[198] Crawford, *Agriculture in Brazil*, 57; See Nick Cullather, *The Hungry World: America's Cold War Battle Against Poverty in Asia* (Massachusetts: Harvard University Press, 2010).
[199] Crawford, *Agriculture in Brazil*, 57-58.
[200] ACAR, *Programa 1961-1962*, 5.

GERCA), whose goal was to eradicate two billion coffee trees, roughly half of the national stock. This program will be examined in the next chapter, but in the context of Minas Gerais, GERCA found effective allies in collaborating with ACAR and its network of rural extension offices. This network played a key role since at the time the Brazilian Coffee Institute possessed little infrastructure on the ground in Minas Gerais. Moreover, ACAR's technicians had already been working with coffee in Minas Gerais. Projects focused on coffee ranked second behind corn.[201] GERCA's planners adopted rural extension methods to incentivize coffee grower participation, including technical assistance, technology, and access to credit. In the case of Minas Gerais most of the coffee grown at the time fit within GERCA's metric for low productivity

The growth of GERCA reoriented ACAR's agricultural programs. ACAR's financing for coffee planting or for improving existing farms in Minas Gerais declined rapidly. In 1962, for every coffee program, ACAR approved more than three times as many corn focused agreements. ACAR cooperated with the coffee eradication program in how they selected activities, and by providing the physical and human apparatus to reach farmers. The institution also shifted its collaboration priorities towards different crops, especially foodstuffs, on the land where farmers uprooted coffee.[202] The rhetoric of ACAR similarly dovetailed with GERCA's national goals. Rather than simply preventing soil erosion to benefit the landowner, reasoning shifted to creating a "conservationist consciousness" to "impede the destruction of our great patrimony, that is the agrarian soil, the base of civilization."[203] The language used by ACAR paralleled GERCA's program, as the choices of farmers as custodians of the nation's soil fused with efforts for national development.

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[201] ACAR, *Programa 1961-1962*, 6.
[202] ACAR, *Programa 1961-1962*, 4.
[203] ACAR, *Programa 1962-1963*, 2.

Closer cooperation between ACAR and the federal government influenced the types of technicians employed in rural extension. Deemphasizing the home economic aspects resulted in fewer female technicians working in extension during the 1960s. The number of agronomists surged, as did programs around single-crop production and technological adoption.[204] This shift also correlated with declining investment in programs focusing on quality of life – an aspect that was central in the documentation during the 1950s. Instead, promoting higher yields for foodstuffs and export crops surged in priority. Rural extension programs continued to promote education, although they focused more narrowly on increasing productivity and disseminating technical knowledge.[205] Yet, these trends made ACAR an attractive option for additional investment both nationally and internationally.

In 1962, the United States Agency for International Development (USAID) invested in Brazilian rural extension programs. The funding aimed to bolster rural extension efforts, youth programs, training, and equipment, with a general focus on food and agriculture.[206] ACAR's newsletter depicted the investment with a caricature of a U.S. figure and Brazilian administrator bringing sacks of U.S. dollars to a farmer working the land with a hoe. ACAR described the funding as essential for the economic and social development of the Brazilian people, through an expansion of the rural extension services. Further, extension would "promote and increase agricultural development of the country, ensuring higher incomes and better living conditions for the rural population."[207] The portrayal of the participant farmer appeared very different from ACAR's image of family outreach in 1956. The earlier image pictured a male and female technician talking at the table with their ideal participants: a seemingly educated couple engaged

[204] Ribeiro, *A saga da extensão*, 16.
[205] ACAR, *Relatório, 1963* (Belo Horizonte: 1963).
[206] ACAR, *Boletim Informativo* (Belo Horizonte: March, 1962), 1.
[207] ACAR, *Boletim Informativo* (March, 1962), 1.

jointly in building a plan of action. The below image moved the setting to a field devoid of crops, where the "man with a hoe" represents the underdeveloped rural figure, eager to receive money from a U.S. financer and Brazilian politician.

Figure 1.3: Pictured a U.S. financer, a Brazilian technocrat, and a farmer (from left to right).
ACAR, *Boletim Informativo* (March, 1962)

In 1963, ACAR signed a 30-month agreement with the Interamerican Development Bank providing 6.3 million USD to Caixa Econômica. Moreira Velloso, the president of Caixa Econômica do Estado de Minas Gerais, stressed that the funding should give preference to commercial or semi-commercial crops or livestock, through a system of rural extension.[208] The following year, ACAR's directors celebrated noticeable statistical transformations. Corn and rice cultivation both increased in Minas Gerais. Coffee eradication programs proved popular as farmers in the state destroyed millions of trees. But ACAR's criticisms continued. Planners claimed that Minas Gerais' farmers were averse to rural associations and cooperatives, resisted

[208] ACAR, *Programa 1963-1964* (Belo Horizonte: 1964), 1.

changing their mentality to become administrators, and were reluctant to further buy in to the technical and practical changes that the programs envisioned.[209]

The ongoing criticism of farmers in Minas Gerais stemmed from two interwoven factors. First, ACAR and the national ABCAR network frequently enhanced their goals as funding and the technical networks expanded. They also critiqued the "rural" as a singular rather than only those who partnered with the institutions—this blanket assessment justified continual expansion. Second, the frequent assessment that agriculturalists failed to fully embrace the model provided evidence that social and cultural change required long-term partnerships, educational in nature and reliant on technological and administrative adoption. This view justified the continued pursuit of development.

The notion that agriculturalists struggled to understand and fully embrace agricultural transformation efforts undergirded agronomist Lingard Miller Paiva's numerous articles published in the Minas Gerais agricultural newspaper *O Ruralista*. Opposed to the agrarian reform programs of president Goulart (1961-1964), Paiva argued that redistributing land would not solve the problems because the landless needed to learn first how to work the land, and how to "improve it."[210] Publishing in the months before the military coup (March 1964), Paiva advocated the implementation of a structure of technical support, a system to supervise, educate, and build associations to capacitate potential land owners.[211] While both patronizing and patriarchal in tone, Paiva sought to fuse the ideology of rural extension and agrarian development with the political climate that seemed likely to actuate long debated agrarian reform programs.

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[209] ACAR, *Programa 1963-1964* (Belo Horizonte: 1964), 1.
[210] Lingard Miller Paiva, "Não confundir problema agrário com o problema fundiário," *O Ruralista*, January, 1964, 1.
[211] Lingard Miller Paiva, "Reforma agrária: um processo em evolução," C*orreio da Manhã*, 12 March, 1964, 31.

The question of land reform was put temporally on hold when the military overthrew the democratic government in 1964. Shortly after the coup, the military regime (1964-1985) signaled their ideological and practical support for the goals of ACAR. In March 1965, the authoritarian government announced that the Secretary of Agriculture and the Secretary of Education would work with ACAR to continue programs and expand the 4-S club system into the official rural education system.[212] In their view, this collaboration would initiate an educational process to utilize credit, enhance personal responsibility, and administer agricultural plans.[213] Focusing on 4-S clubs demonstrated a focus on developing a new generation of farmers familiar with the rural extension service in a way that aligned with the "conservative modernization" idea.

In 1965, a swath of Brazilian governmental ministries, financial institutions, and USAID began to contribute financially to the federal ABCAR system. The Ministry of Agriculture contributed 46 percent of the financial budget for the organization, outspending other ministries and agrarian focused instructions, while USAID contributed 16 percent.[214] The federally-run Brazilian Coffee Institute also began to finance the ABCAR system to further support coffee eradication efforts. In Minas Gerais, ACAR experienced a fantastic boost in funding. The financial institutions met in 1965 to signal their interest to invest in the ACAR model.[215] Loans to farmers through ACAR nearly doubled from 361 million cruzeiros (Cr$, Brazil's currency at the time) in 1964 to CR$ 629 million in 1965, and then leapt to 1.3 billion in 1966. Notably, the number of credit contracts stayed relatively flat at around 2200 across the three years, meaning that the total amount of each loan increased substantially.[216]

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[212] No author, "Mudar a mentalidade do meio rural," *O Ruralista*, March, 1965, 1.
[213] Mylton Moreira Velloso, *I Seminário brasileiro de instituições financeiras, 2-8 Maio* (Belo Horizonte: Caixa Economica do Estado de Minas Gerais, 1965), 7.
[214] ABCAR, *Sistema brasileiro de extensão rural* (Belo Horizonte: 1965), 2.
[215] Velloso, *I Seminário brasileiro de instituições financeiras*, 5.
[216] ACAR, *Movimento de credito rural supervisionado, 1965/66* (Belo Horizonte: 1966), 3.

The number of partnerships between research institutions also increased after the military coup. The Rural University of Minas Gerais formalized an agreement with the United States for technical training, supported by the U.S. Alliance for Progress. In addition to international student exchanges, the agreement aimed to increase advanced agricultural education. The university established new experimental farms to test fertilizers, recognizing that research in tropical soils was different than the North American research and required adaptation to the environments. They also collaborated with ACAR to develop studies on specific crops with financial and technical support from USAID.[217] In the same vein of partnership building, the Brazilian Coffee Institute partnered with the university to increase coffee research in the state, which would expand over the decade.[218] These developments in Minas Gerais also informed the national context, as ABCAR announced that education and rural extension were the centerpieces of their agrarian development policies.[219]

The travels of U.S. academic Harold Clements through Minas Gerais in the mid-1960s offers a perspective on the agricultural conditions at the time. Clements identified the role that ACAR played in modernizing some farms in the state. He noted that farmers in the southern and western zones of the state had adopted technologies to reduce manual labor, which "may be attributed largely to the work of the state extension service of ACAR."[220] Identifying the support for those activities, Clements also recognized the contributions of agricultural universities in Minas Gerais in developing research and technology. His observation suggests that ACAR's efforts produced some visible changes that aligned with his conception of agricultural

[217] Malosinho S. Figueiredo, "Universidade Rural e ACAR estudam adubação," *O Ruralista*, February, 1965, 3.
[218] No author, "Convênio UREMG-IBC," *O Ruralista*, October, 1965, 1.
[219] ABCAR, *Sistema brasileiro de extensão rural*, 5.
[220] Harold M. Clements, *Mechanization of Agriculture in Brazil* (Gainesville: University of Florida Press, 1969), 23.

modernization. However, seen through Clements' U.S.-based perspective, Minas Gerais farmers as a whole remained underdeveloped and early in the stages of modernizing agriculture.

In 1967, the Brazilian Minister of Agriculture, Avo Arzua, met with ABCAR's directors to overhaul the administration and further centralize agricultural planning with the government. At this point, military dictatorship accelerated their direct involvement in agricultural programs. Arzua heralded past successes but stressed that ABCAR's activities should be coordinated by the ministry towards a larger system of common planning. Further integration and expanding rural extension services, the minister claimed, would "renew the agrarian economy."[221] Adopting the underlying ideology of the ABCAR networks, the military regime embraced rural extension as the primary vehicle for state-led programs to transform agriculture. They also adopted the view that fundamental problems in agrarian regions could be addressed with technological and educational solutions, a position that forestalled deeper social reforms. Embracing rural extension aligned with their view that the fundamental problems of the countryside were technological, and amenable to technological solutions.

Conclusion

ACAR was born of a U.S. agrarian development model that took hold in Minas Gerais. The institution expanded in the state before federal politicians nationalized the model as a vehicle for agrarian transformation programs. From 1949 to the mid-1960s the model underwent a series of renovations, both expanding in scope and scale as national and international institutions collaborated or invested. Planners frequently modified ACAR's targets, both in operational aims and outlining the desired participants. Rather than the initial aims of poverty

[221] No author, "Extensão rural é força para progresso agrícola," *O Ruralista*, June, 1967, 1.

alleviation, ACAR came to focus on a middling type of agricultural producer who was considered able to develop economically and possessed the collateral to secure financing to change how they grew crops, reared livestock, or organized their domestic economies. The sharp selectivity of participants highlighted the boundaries of participation in state-led programs. Planners targeted farmers with specific criteria that they envisioned would generate the best results, but the provision of capital alone did not produce desired outcomes.

ACAR's expansion in Minas Gerais brought closer relations between experts and farmers. These relationships arched towards a model of rural extension, which framed agricultural transformation as a continual process, malleable to an array of objectives. Beyond material objectives, both democratic and dictatorial governments embraced rural extension as an educational initiative to change ways of thinking among farmers. In some cases, planners framed their efforts to alleviate poverty, in others to offer a model of non-radical development, and later as a system to promote high-productivity technology-dependent agricultural production. In each phase, the notion of educating and changing ways of thinking undergirded their methods.

The initial focus of the early 1950s on improving living standards in agricultural regions included the farm as well as home economics, infrastructure, and health. These priorities gave way to an emphasis on increasing yields in the fields and educating agriculturalists to adopt administrative and strategic practices that experts deemed "rational." The program gradually transformed into a rural extension project that increasingly prioritized access to technical assistance and credit within an educative and entrepreneurial framework. The activities of ACAR technicians varied by region and by the types of projects they developed but were also influenced by new financial and institutional partnerships during the 1950s.

Despite the institutional growth of ACAR and the solidification of rural extension as the method to improve agriculture, efforts to increase crop yields and change social practices often failed to meet desired targets. To some degree, the rhetorical description of farmers as resistant or slow to adopt the practices promoted by ACAR provided a justification to intensify the agency's efforts. This view, often repeated in planning documents, highlighted the high degree of investment in the goals and methods of rural extension, even though modifications were deemed necessary. Over two decades of continuous efforts, a model of rural extension that evolved in Minas Gerais through ACAR crystalized into an ideology that fused together education, technical assistance, and supervised credit, albeit using different descriptive terms in different periods. These three components were tightly linked by the mid-1960s, when the military regime overthrew the democratic government (1964) and shortly thereafter intensified agricultural development initiatives using rural extension as a key component.

The role of rural extension to drive agrarian transformation especially surged in Minas Gerais in the late 1960s. As will be examined in detail in the following chapters, the military government tasked the Brazilian Coffee Institute to renew the national coffee sector by promoting planting on a mass scale. The IBC's planners identified the environments of southern Minas Gerais as appropriate for what they considered modern coffee fields. The construct of "modern coffee" changed over time, but planners' objectives remained steadily focused on increasing yields of coffee trees and, at least in rhetoric, the income of farmers. The Brazilian Coffee Institute not only collaborated with ACAR and its network of regional offices in Minas Gerais to promote coffee planting, they adopted the practices of rural extension as the central vehicle to educate, instruct, and incentivize coffee growing in the state. The transformation of ACAR over its first two decades contributed to the formation of this model of rural extension,

which was an ideologically and practically appealing method for state planners to actuate programs. In the late 1960s, as the military dictatorship increased investment in agriculture to generate export commodities and foodstuffs to feed the growing cities, rural extension offered the regime a model and method to pursue their preferred form of development.

Chapter Two: Multiple Modes of Modernization Turn Coffee from an Enemy to an Ally, 1961-1969

In the late 1950s, Brazilian and global coffee production surged, outstripping international demand and causing trade prices to tumble. Lower prices reduced export tax income for the Brazilian government and the income of farmers.[222] In Brazil, excess coffee stocks that could not be exported or consumed domestically presented politicians with a dilemma. The state-operated Brazilian Coffee Institute (IBC), which coordinated parts of the coffee industry, faced rising costs associated with managing the national coffee surplus stockpiles. In previous decades, the government had burned or dumped excess coffee into the sea as a short-term solution. But this time many coffee-producing and consuming countries signed international coffee agreements to regulate trade quotas and elevate exchange prices. Brazilian planners also tried to address the persistent problem of over-producing coffee at a structural level in their own fields. In October 1961, the government created the Executive Group for the Rationalization of Coffee Growing (Grupo Executivo de Racionalização da Cafeicultura—GERCA), to change the agricultural landscape of coffee.

This chapter examines three overlapping phases of GERCA's operations: initial efforts to eradicate coffee under a democratic government (1961-1964), a second more forceful eradication program under the military regime (1965-1967), and lastly coffee growing's incorporation into a concerted modernization program (1967-1969). In each phase a variety of factors influenced how planners sought to change the coffee industry, including political ruptures, changing economic contexts, environmental factors, and rapidly changing access to agricultural technology. I argue

[222] Gregory Dicum and Nina Luttinger, *The Coffee Book: Anatomy of an Industry from Crop to the Last Drop* (New York: The New Press, 1999), 82-83.

that GERCA provided a vehicle through which state planners rapidly cycled through several approaches to agricultural modernization. These approaches varied programmatically over a decade and reflected the different ways that planners envisioned the relationship between agricultural change and national development. As a mid-level government institution, GERCA's multi-modal strategies to spur agricultural change exhibited superficial continuity and consistently revealed a developmental ethos. In practice, their myriad programs drove profound changes in coffee growing areas. By the late 1960s, planners firmly embraced a framework for coffee modernization that guided massive planting over the following decade. By the 1970s, then, coffee reemerged as a cornerstone in the Brazilian government's emphasis on agro-industrial, export-focused, agricultural production.

In the 1960s, under guidance farmers ordered millions and millions of coffee trees cut down in the southeastern coffee growing areas of Brazil. Efforts began in late 1961, when GERCA launched an ambitious initiative to dramatically reduce the number of coffee trees in the country. It was a calculated gamble since coffee still formed the backbone of the agricultural economy of Brazil, but not all coffee trees were equal in the view of planners. GERCA's eradication mission specifically targeted coffee trees with relatively low productivity, measured by the number of kilos of coffee cherries yielded per 1000 trees. Measuring yields allowed coffee trees to be categorized into tiers of productivity. The plan aimed to reduce national coffee production by destroying coffee fields deemed underproductive (or anti-economic), while preserving higher-yielding trees that were more economically beneficial.

Defining low-productivity coffee trees and targeting them for eradication led to a second component of GERCA's initial mandate. In the place of these coffee trees, GERCA promoted a process called "diversification." Agriculturalists were to receive financial credit, technical

support, and rural extension to plant alternative crops. Organizations like ACAR, in Minas Gerais, would support farmers in their diversification efforts. Planners cast diversification as "liberating" land from both coffee and perceptions of economic under-use. In the early 1960s, the federal government and GERCA's leaders favored food crops to help alleviate a food-price crisis and concerns about feeding a growing nation.[223] In this formulation, coffee represented the barrier to broader agricultural change.

Rising inflation and faltering political commitment to GERCA's eradication efforts in the early 1960s stalled efforts to clear trees. Moreover, coffee growers expressed skepticism about the economic viability of other crops. Those who ordered their trees cut generally turned the land to pasture for cattle, some waiting for coffee prices to improve to push coffee seedlings into the soil once again. The military coup (1964) resulted in a brief pause in GERCA's operations. Yet by 1965, military planners recognized that the problem of coffee overproduction persisted. The military heavily invested in GERCA to fulfil its initial eradication task but modified the terms of diversification. Rather than food crops, GERCA increasingly incentivized agriculturalists to plant crops in place of coffee that would bolster national economic development. These crops were to be grown using modern techniques at the time: selected seeds, fertilizers and pesticides, and when possible, machines to boost productivity.

By 1967, the perception of state planners towards coffee began to change. Eradication efforts through GERCA surged, prompting state planners to curtail incentives for further destruction. Shortly after, a series of destructive frosts struck the main coffee growing regions in Paraná and São Paulo states. The frosts contributed to eradication in their own way, in some cases destroying a tree's capacity to grow coffee for a year or two or even killing the plant

[223] Instituto Brasileiro do Café (IBC), Grupo Executivo de Racionalização da Cafeicultura (GERCA), *Instruções para financiamentos, 1962* (Rio de Janeiro: 1962), 6.

outright. The combination of GERCA and the destruction caused by frosts produced remarkable numerical changes. Over roughly seven years, the total number of coffee trees in Brazil fell from around four billion to just over two billion, a steep decline for the world's leading coffee producer.

In the late 1960s, government planners faced an unusual scenario of potential coffee shortages. In response, they turned to GERCA once again but not as a vehicle for eradication. Instead, planners tasked GERCA to promote coffee planting. Once again though, not all coffee was equal. In a period of strong national economic growth, combined with belief in the benefits of new agricultural technology, state planners, economists, and agronomists created a pathway for coffee to become "modern." By 1970, planners promoted a new, totalizing approach to coffee cultivation, which included adopting yield-increasing chemical inputs, selected coffee varieties, and machines and technologies designed to reduce costs. This model of modernization corresponded to the national trend in the late 1960s to promote growing export commodities to help balance foreign trade. It also drew coffee into the global Green Revolution ethos.[224]

Adopting fertilizers became a crucial pathway to 'modernize' the coffee fields. Those not using chemical inputs became seen as "anti-economic," – a term that permeated conversations on coffee and agriculture more broadly. The vocabulary describing the antithesis of 'modern' – e.g. "anti-economic", "traditional", and "low-productivity," – became a metonym for an unchanging and degenerative agricultural landscape. State planners, technocrats, and academics heralded how chemical inputs increased yields and served as a bridge between these two descriptive models. But access to fertilizers alone was not sufficient to make the transition to modern

[224] Nick Cullather, *The Hungry World: America's Cold War Battle Against Poverty in Asia* (Massachusetts: Harvard University Press, 2010), Chapter 9.

farming. Farmers needed direction, guidance, and often convincing.[225] Promoting fertilizers thus fit snugly into the toolbox of the agronomists and technicians who met with farmers to demonstrate the benefits of modern coffee on experimental farms, through cooperatives, clubs, and schools. In this transition, coffee itself became the target of modernization through additive processes, and no longer a barrier that had to be eradicated to foment modern agriculture.

Politically, the 1960s in Brazil was arguably one of the most tumultuous decades of the 20th century. The military overthrew the democratically elected government in 1964 and ruled continuously for over two decades.[226] The first half of the 1960s experienced an economic crisis that was followed in the later years of the decade by a so-called "economic miracle" of high GDP growth rates. Intense political transitions saw four different presidents take office between 1961 and 1969. Despite the political ruptures, agricultural science and research were changing at a fantastic rate, including research conducted in Brazil that increasingly focused on boosting the yields of export commodities. There were repeated efforts by different governments to transform agricultural regions, attempting to generate raw materials and export revenue on the one hand, and to free up workers from agrarian regions to work in the growing urban industrial economy, on the other. Planners envisioned that these processes would contribute to the rapid economic development of the nation, especially as military leaders strove for the "order and progress" on which they staked the legitimacy of their rule.[227]

International Coffee Agreements and the Politics of a Commodity

[225] Coutinho Nogueira. "Pais já tem política definida de fertilizantes," *O Estado de S. Paulo*, 26 February, 1967, 33.
[226] Thomas Skidmore, *The Politics of Military Rule in Brazil, 1964-1985* (New York: Oxford University Press, 1988), Introduction.
[227] Herbert S. Klein and Francisco Vidal Luna, *Brazil, 1964-1985* (London: Yale University Press, 2017), 84.

During the summer of 1962, representatives from fifty-eight countries opened a meeting at the United Nations headquarters in New York to discuss declining coffee prices for producer nations. Importers and exporters, government representatives, and international organizations and observers attended the conference. On September 28, they agreed upon the basic structure of the International Coffee Agreement.[228] The agreement aimed to "achieve a reasonable balance between supply and demand" and to assure "equitable prices."[229] The signatories established quotas for the quantity of coffee each producer-nation could export and a minimum price guarantee for its purchase. This structure enabled nations to better predict export totals and smoothed the dramatic price fluctuations in the coffee market. Producer countries also agreed to diversify agriculture and reduce coffee growing to limit over-production and ideally shift dependence away from coffee.[230]

The 1962 agreement represented the culmination of repeated national and international attempts to regulate the trade. Brazil independently experimented with internal governance programs for decades during the early twentieth century. The Second World War motivated a coffee trade agreement between the U.S. and Latin American nations to support allied economies by raising trade quantities and prices.[231] By the mid-1950s, however, the market had no substantial governance, which coincided with a period of coffee overproduction that pushed trade prices to new lows.[232] Coffee producer nations led by Brazil and Colombia formed a treaty through the Organization of American States (OAS) to regulate coffee exports. They signed the 1957 Mexico Agreement along with Mexico, Guatemala, El Salvador, Nicaragua and Costa Rica.

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[228] John M. Talbot, *Grounds for Agreement: The Political Economy of the Coffee Commodity Chain* (New York: Rowman & Littlefield Publishers, Inc, 2004), 12.
[229] Marcelo Raffaelli, *Rise and Demise of Commodity Agreements: An Investigation into the Breakdown of International Commodity Agreements* (Cambridge: Woodhead Publishing, 1995), 45-48.
[230] Talbot, *Grounds for Agreement,* 14.
[231] Luttinger and Dicum, *The Coffee Book,* 78-79.
[232] Luttinger and Dicum, *The Coffee Book,* 82.

The next year, amid persistently worsening prospects for coffee prices, newly independent African coffee growing nations threw their support behind a new agreement. These producer nations signed the first iteration of the International Coffee Agreement in 1959, however it lacked a firm regulatory system and U.S. participation.[233]

As the U.S. government became more concerned about the growing threat of communism in Latin America, politicians identified coffee as a potential area for intervention. In the cases of Brazil, Colombia, El Salvador, and Guatemala, coffee represented the principal export and sometimes, nearly the only commodity to balance foreign trade.[234] In March 1961, U.S. President John F. Kennedy announced the Alliance for Progress, an aid program intended to improve political and economic relations with Latin America. At the program's inauguration speech, Kennedy stated that "frequent violent changes in commodity prices seriously injure the economies of many Latin American countries, draining their resources and stultifying their growth. Together we must find practical methods of bringing an end to this pattern."[235] It was in this context that the United States, and other coffee importing countries, accepted a new coffee agreement. Kennedy's language paralleled the ICA's, as Article 27 stated: "the real income derived from the export of coffee could be progressively increased so as to make it consonant with their needs for foreign exchange to support their programs for social and economic progress."[236] In this view, the ICA was designed to stabilize prices in order to spur economic development, and to strengthen political bonds.[237]

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[233] Talbot, *Grounds for Agreement*, 58.
[234] Robert H. Bates, *Open-Economy Politics: The Political Economy of the World Coffee Trade* (Princeton: Princeton University Press, 1999), 16.
[235] United States President John F. Kennedy, "Address at a White House Reception for Members of Congress and for the Diplomatic Corps of the Latin American Republics," March 13, 1961. Audio file. John F. Kennedy Presidential Library and Museum.
[236] International Coffee Agreement, 1962. New York, September 28-November 30, 1962. Article 27.
[237] The United States' commitment to the Alliance for Progress stemmed from a political and ideological context that emphasized modernization as the central driver for international development. See Michael E. Latham,

The significance of the ICA did not escape U.S. senators, who deliberated at great length before ratifying it in 1963. Their conflicting views reveal a debate over whether the agreement represented political support or a form of development aid, and for whom. Opposition voices broadly asserted that trade was not aid and should not be conducted as such. U.S. Secretary of State Dean Rusk questioned the beneficiaries: "it is not even a program to help the poor peasant, but rather a form of foreign aid, disguised to deceive the unsuspecting public…it is as if we had levied a sales tax on the American housewife."[238] Despite opposition, the ratification passed through the U.S. senate with a majority as the "Cold Warriors" prioritized their geo-political interests.[239] "We all know," Senator Paul Douglas concluded, "We would be accused of breaking faith with the coffee exporting nations of the world, and the followers of Castro, Khrushchev, and Mao Tse-Tung would seek to set all of Latin America against us."[240] Political support for the coffee agreement set off a broader trend of developed countries forging commodity trade agreements under the banner of supporting developing countries.

The Brazilian federal government supported the coffee agreement, hoping it would address a variety of problems and especially slow over-production. The state-run Brazilian Coffee Institute (IBC) purchased coffee from farmers at a minimum guaranteed price. If unable to export or consume domestically, the state bore the cost of stocking it. Having some stockpiles ensured that Brazil possessed some leverage over trade prices and negotiations in the marketplace, but excessive stocks were costly. After a massive Brazilian harvest of 35 million

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Modernization as Ideology: American Social Science and "Nation Building" in the Kennedy Era (Chapel Hill: The University of North Carolina Press, 2000). These views were trumpeted by an academic group from MIT represented by Walt Whitman Rostow, who posited that the concept of modernization needed to be put into practice to contain leftist revolutionary expansion. See Walt Whitman Rostow, *The Stages of Economic Growth: A Non-Communist Manifesto* (Cambridge: Cambridge University Press, 1960).

[238] The United States Senate. Congressional Record, Dean Rusk, 1575, 20 July, 1964.

[239] Bates, *Open-Economy Politics*, 125-126.

[240] The United States Senate, Congressional Record, Paul Douglas, 16834, 29 July, 1964.

sacks (60 kilos per sack) in 1961, stockpile projections trended upwards. In 1961, the IBC estimated that stocks would climb to 43 million sacks by 1965.[241] Without intervention, stockpile projections increased the number to 70 million sacks by 1969—roughly equal to two years of global consumption at the time.[242] Thus, the ICA's guaranteed price level provided an opportunity to address over-production strategically, rather than the previous decades-old strategies of dumping or burning excessive stocks.[243] In this context, the government tasked GERCA with destroying two billion trees, in the process freeing two million hectares of agricultural land from coffee.

GERCA Takes Shape, 1961-1962

Housed under the Brazilian Coffee Institute, GERCA included a consortium of actors including federal ministries and state secretaries. A deliberative council included 18 members: an executive secretary, four IBC directors, three representatives of federal ministries, five from the federally operated Bank of Brazil, a finance commissioner, and one representative each from the coffee-producing states of São Paulo, Paraná, Minas Gerais, and Espírito Santo.[244] The significant representation of the Bank of Brazil reflected the key role that rural credit contracts played in GERCA's approach to incentivizing farmer participation. The daily operations fell to technocrats, typically represented by economists, agronomists and technicians, who engaged farmers to develop plans and provide guidance.

[241] IBC-GERCA, *Programa de racionalização da cafeicultura brasileira* (Rio de Janeiro: 1962), 33.
[242] IBC-GERCA, *Agricultural Diversification of Brazilian Coffee Zones—Guiding Plan* (Rio de Janeiro: October 1962), 8. For annual global consumption statistics see Luttinger and Dicum, *The Coffee Book.*
[243] Mark Pendergrast *Uncommon Grounds: The History of Coffee and How it Transformed Our World* (New York: Basic Books, 2010) 165-171.
[244] Federal Republic of Brazil, Decree 808, March 30, 1962.

Economists and agronomists concluded that GERCA's first measure required targeting "low productivity" trees.[245] They calculated low-productivity as yielding an average of 6 sacks of coffee or fewer per 1000 trees. Destroying 2 billion of these trees would remove 12 million sacks annually and lower national production to around 24 million sacks per year. This strategy would increase average productivity of the remaining coffee trees, representing a modernization by subtraction. The second core aspect of GERCA's agenda called for "diversification," which entailed planting different crops in the former coffee fields and referred to a regional scale rather than variation on individual farms. The program prioritized subsistence crops that would "improve the lives of those in the rural regions, while supplying foodstuffs to the centers of consumption [urban areas]."[246] Doing so would change the economic structure of Brazil's coffee regions, which GERCA described as "profoundly distorted by the force of monoculture," and dependence on a single crop.[247] A third long-term goal aimed to gradually plant 500 million new coffee trees over the decade to slowly raise national production to around 30 million sacs by 1970. GERCA stipulated that these new coffee trees needed to be grown "in accordance with the modern agronomic techniques" at the time to raise yields.[248]

The government commissioned São Paulo agronomist Walter Lazzarini as the Executive Secretary of GERCA to oversee planning, forging agreements between federal and state organs, and building relationships with mixed-economy corporations. Various prominent politicians endorsed the program, especially highlighting the benefits of growing more corn, pasture for cattle, and oil-producing plants, all of which could alleviate a growing food crisis.[249] Even in its

[245] IBC-GERCA, *Programa de racionalização da cafeicultura brasileira* (Rio de Janeiro: 1962), 1.
[246] IBC-GERCA, *Programa de racionalização*, (1962), 38.
[247] IBC-GERCA, *Programa de racionalização*, (1962), 37.
[248] IBC-GERCA, *Agricultural Diversification of Brazilian Coffee Zones* (1962), 27.
[249] No author, "Desenvolvimento da política do café brasileiro," *O Estado de S. Paulo*, 19 December, 1961, 26.

eradication, coffee remained the centerpiece of any transformative agricultural program. The government financed GERCA through a newly-established Coffee Defense Fund (Fundo de Defesa do Café), which drew from a federal tax on coffee exports, popularly called a "confiscation quota." The quota collected 22 USD on each sack of exported coffee, which under the ICA totaled roughly 18 million sacks in 1962.[250] Additional funding was to be siphoned from loans through the Alliance for Progress, although the reporting newspaper offered no specifics.[251]

The Brazilian government habitually taxed coffee exports for nearly a century, but the heavy increase to finance GERCA did not pass unnoticed. Coffee producer associations and interest groups expressed their frustration. The most influential of them, the São Paulo-based Brazilian Rural Society (Sociedade Rural Brasileira—SRB), argued that in addition to the parasitic confiscation quota, coffee farmers were also being abused by high port fees, low minimum purchasing prices, and a classification system that rigidly defined quality based on bean size.[252] Whether true or not, all these factors contributed to the growing friction between coffee farmers and President João Goulart's government (1961-1964).

As GERCA's plans took form some questioned the viability of the program on a large scale. Constantino Carneiro Fraga, an agricultural economist who later became the Secretary of Agriculture in São Paulo state, argued that coffee farmers in São Paulo and Minas Gerais lacked necessary know-how to grow soybeans and could not compete with farmers in the south of the

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[250] IBC-GERCA, *Agricultural Diversification* (1962), 32; U.S. Senate, *Hearings Before the Committee on Finance:* Coffee Situation—Programs and Policies in Producing Countries, 88th Cong., 2nd sess. (Washington, DC: 1964).
[251] IBC-GERCA, *Agricultural Diversification* (1962), 32; No author. "Será intensificada em Minas a luta contra a tuberculose" *O Estado de S. Paulo,* 6 March, 1962, 4. It is not known what specific Alliance for Progress loan that the IBC's document referred to, especially since many of the earmarked loans in 1962 were frozen or curtailed due to friction between the U.S. government and the Goulart government. See Jeffrey Taffet, *Foreign Aid as Foreign Policy: The Alliance for Progress in Latin America* (New York: Routledge, 2007), 104-105.
[252] No author, "Café: definida a posição da SRB," *O Estado de S. Paulo,* 13 April, 1962, 34.

country.[253] His comment highlighted an inherent problem in applying large-scale plans in practice. Some farmers lacked the knowledge to grow different crops or faced insurmountable environmental barriers. Yet, politicians in coffee growing regions encouraged farmers to participate in the program. Ney Braga, the governor of Paraná, addressed the program as a matter of national development, and threw his support behind it since "by dealing with coffee we are dealing with the interests of Brazil."[254]

In September 1962, GERCA announced that it had registered 7288 proposals for the eradication of almost 170 million coffee trees. But cutting coffee trees and replanting alternative crops was no minor task. Coffee farmers generally resisted cutting their trees. Each tree required around four years before its first major harvest, standing in the soil as an investment of time and money. To incentivize farmers, GERCA offered subsidized credit to both eradicate coffee and plant different crops in a context where farmers faced considerable difficulties accessing loans due to high inflation and short term repayment demands.[255] The group highlighted five key instances in which it would offer credit that included eradicating and planting coffee, diversifying to other crops, increasing incomes in general, and acquiring machines and agricultural chemicals.[256] Yet certain areas received greater attention, as was outlined in one finance planning document in May 1962: of nearly Cr$ 20 billion supplied for the program, 8.4 billion were for eradication, 1.4 billion for replanting coffee, and 10 billion for diversification.[257] Farmers seeking loans needed to apply at one of the official rural associations, organs of the

[253] Constantino Carneiro Fraga, "Erradicação de café e diversificação de culturas," *O Estado de S. Paulo*, 16 May, 1962, 38.
[254] No author, "Paraná com o GERCA," *O Estado de S. Paulo*, 10 August, 1962, 20.
[255] The United States also recognized the restricted access to agricultural credit in 1963 when debating foreign aid and development loans. See United States Agency for International Development, "U.S. Foreign Aid in the Alliance for Progress," (1965), 13.
[256] IBC, *O programa do GERCA: instruções para financiamentos* (Rio de Janeiro: 1962), 3.
[257] IBC, *O programa do GERCA* (1962), 6.

state-level secretaries of agriculture, registered farmers' associations, cooperatives, or rural credit offices.[258] Loan structures enabled farmers to access additional credit to purchase Brazilian-made tractors and agricultural machinery.[259]

Goals for diversification ranged widely and included a variety of crops and activities. The most prominent of these included targets to plant 300 000 hectares with corn and pasture respectively, 160 000 for forestry, 100 000 for castor beans, and a large consortium of other mainly foodstuff crops. How state planners described these goals revealed their approach to diversification. Instead of simply corn, planning documents distinctly called for "hybrid corn," a variety introduced to Brazil in the 1950s. Hybrid corn was valued for its potential high yields if cultivated with specific technology and know-how.[260] Theoretically, hybrid corn typified the overarching aims of GERCA's diversification program: it could improve profits on the farm by raising yields, and simultaneously help feed the nation. Other crops appealed because they produced oils and foodstuffs, such as peanuts. Like corn, peanuts could have been used for oils, as a food product, or for animal feed, thus making a peanut surplus more appealing than coffee.[261]

Beyond changing the types of crops grown, destroying coffee fields dramatically affected labor needs. Low-productivity coffee employed a lot of people. GERCA estimated that it required one laborer for every 3000 trees. If two billion trees were eradicated, 600 000 to 700 000 workers would be displaced. In comparison, the labor expectations for modern coffee revealed a stark contrast; the IBC estimated that had 500 million trees been planted, they would have required only 25 000 permanent workers, or one worker for every 20 000 trees. GERCA's

[258] IBC, *O programa do GERCA* (1962), 6.
[259] IBC, *O programa do GERCA* (1962), 3.
[260] Associação de Crédito e Assistência Rural (ACAR), *Programa 1961-1962* (Belo Horizonte: 1962), 5.
[261] IBC-GERCA, *Agricultural Diversification* (1962), 13.

planners noted the structural changes necessary in this scenario, reporting that "there will be a need for extra labor for harvesting, about 150 000 people over three months, who may be recruited either in the rural zone itself, or from other cultures or in the cities, especially women and children who produce very little for industry."[262] These estimates from 1962 demonstrate that planners anticipated how agricultural changes would profoundly transform labor relations, foreshadowing a future scenario for mechanized coffee reliant on migrant labor.

These assessments of the labor landscape lacked nuance when considering the diverse arrangements employed across the many coffee regions. Further, there was no single national survey of coffee labor. One study in 1958 by a joint-research group including the Brazilian Coffee Institute, the United Nations Commission for Latin America and the Caribbean (CEPAL), and the Food and Agriculture Organization, studied São Paulo's coffee farms. Their research estimated that 2.15 million people worked in coffee.[263] In the case of São Paulo state, GERCA estimated that labor accounted for 36 percent of the total productive costs, but considering the diversity of labor agreements, costs likely ranged considerably from farm to farm. Various factors shaped labor costs, which changed annually and often included a composition of agreements, including annual, monthly, and daily employment. Structures varied as well, including wage labor and sharecropping agreements that were individually negotiated with employers.[264] Technology used on the farm, and the different ages of plants also shaped labor

[262] IBC-GERCA, *Programa de racionalização,* (1962), 3.
[263] IBC-GERCA, *Programa de racionalização,* (1962), 8.
[264] Colonos were typically employed as multi-year contract workers, similar to sharecroppers. They often resided on plantation homes with their families and received a set wage based on the number of coffee trees tended, and use of garden plots. See Verena Stolcke, *Coffee Planters, Workers and Wives: Class Conflict and Gender Relations on São Paulo Plantations, 1950-1980* (London: Macmillan Press LTD, 1988). The Colono labor system in Brazil expanded rapidly in the late nineteenth century tied to mass immigration whereby planters agreed to pay travel costs in exchange for guaranteed labor and gradual repayment. See Thomas H. Holloway, *Immigrants on the Land: Coffee and Society in São Paulo, 1886-1934* (Chapel Hill: University of North Carolina Press, 1980); Jeffrey Lesser, *Immigration, Ethnicity, and National Identity in Brazil, 1808 to the Present* (New York: Cambridge University Press, 2013).

demands. Moreover, not all farms only grew coffee, and in these cases, workers also labored with other crops and livestock.[265]

GERCA's planners argued that diversification efforts could absorb some of the unemployed workers. Others could be channeled away from agriculture and into industry, which fit the dominant development rhetoric, though not all industry required urbanization in theory. GERCA promoted establishing industrial factories in agricultural areas to process raw agricultural materials into consumable or exportable goods, for instance building paper pulp-processing facilities in regions where farms diversified into eucalyptus, bamboo, and pine. These new factories would "absorb agricultural raw materials" and offer new industrial jobs in agricultural areas. But GERCA's ambitious rhetoric did not stop at agro-industry and creating new jobs. In 1962, its aspirations seemed limitless: GERCA aimed to improve regional living conditions by investing in infrastructure, home construction and sanitation, water piping, sewage lines, electrification, rural schools, social centers with medical and dental assistance, and nutritional courses.[266]

A Destructive Frost Becomes an Unlikely Ally

Many coffee farmers willingly participated with GERCA in the first year of operations, but economic and ecological factors quickly transformed the appeal of uprooting trees. From the program's launch in June 1962 to September 1963, GERCA financed the eradication of around 640 million coffee trees, supported by over Cr$ 8 billion cruzeiros in loan contracts.[267] In subsequent years, however, farmers' interest in the program lessened due to economic and

[265] IBC-GERCA, *Programa de racionalização* (1962), 11.
[266] IBC-GERCA, *Programa de racionalização* (1962), 19.
[267] IBC-GERCA, *Report on GERCA's Activities* (1963), 2.

climatic factors. Economically, GERCA`s credit loans failed to accompany rising inflation rates. The real value offered to eradicate a coffee tree decreased by 50 percent in 1962, and represented only 8 percent by 1965—a marginal incentive for farmers to uproot their trees.[268] The devaluation was likely caused by higher inflation rates than predicted, and a concurrent need to direct government funds to other areas of the economy. The lack of investment in GERCA reflected how coffee eradication was not a top priority for the democratic government during a worsening economic context.

As inflation increased, farmers became more hesitant to uproot their coffee and switch to unfamiliar crops and instead found ways to manipulate the eradication programs. The IBC and GERCA did not report many cases of fraud in their official documentation during the early 1960s, but interviews I conducted with former IBC agronomists revealed a different trend. In our conversation, Agronomist José Braz Matiello reflected on the early years of GERCA. He explained that as the value of loans declined, farmers sought to manipulate the system. Matiello offered examples of farmers who accessed funding to cut ten hectares of coffee but only eliminated five. Farm inspections by agronomists and technicians prompted reactionary measures, like merging farms to show that coffee reductions fit the contractual agreements. Matiello stressed that GERCA's agronomists and extension agents frequently argued with farmers, "to the point of violence."[269] He did not provide any specific examples, but recognizing the conflict surrounding farm inspections highlighted the presence of fraud and manipulation. It also suggests there was cultural conflict between farmers and many of the newly trained agronomists working with GERCA, tasked to coordinate the program on the ground.[270]

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[268] IBC, *Relatório das atividades, 1967* (Rio de Janeiro: 1967), 10.
[269] José Braz Matiello, interview by author, Rio de Janeiro, September, 2016.
[270] Matiello, interview, September, 2016.

The model of GERCA was further contorted when a strong frost struck the coffee growing regions of Paraná and São Paulo in August 1963. Frosts harm coffee trees and reduce their ability to produce beans. The 1963 frost affected roughly 80 percent of the trees in Paraná state. GERCA President Walter Lazzarini described it as the worst frost in history–a trope frequently evoked after any frost struck coffee regions–and pledged to support the affected farmers. After assessing the damage, the IBC and GERCA still considered many regions of Paraná appropriate for coffee, agreeing that its rich soils and growing conditions were unparalleled. Some farmers struck hardest by the frost disagreed, sourcing seeds for other crops through the local IBC offices and thus contributing to diversification efforts.[271] The frost also outright destroyed many trees, leaving fields full of leafless skeletons. As if that were not enough, many of the trees also caught fire later in the year during a prolonged drought.[272]

Some farmers struck by the frost turned to other crops, contributing to the diversification goals of the IBC. However, the frost and subsequent fires drove coffee prices up in the short term, and farmers who had avoided the effects of these disasters benefited from an immediate increase in prices for their coffee. Logically, higher prices further dampened their willingness to eradicate coffee and plant other cultures. In this way, the frost slowed GERCA's eradication efforts considerably because the modeling depended on coffee price consistency. When prices rose after the frost, even "low-productivity" coffee growing became temporarily more profitable.

[271] Armínio Kaiser, *Paraná in 1963*. 1963, Museum Padre Carlos Weiss, Londrina, Paraná, Brazil. The image shows an IBC distribution center, indicating the variety of crop seeds available to farmers at that outpost.
[272] Lucas Mores, "História ambiental do agroecossistema do café no Norte do Paraná" (master's thesis, Universidade Federal de Santa Catarina, 2017), 211.

Figure 2.1: Coffee worker cutting down a frost-stricken tree. Photograph by Armínio Kaiser.[273]

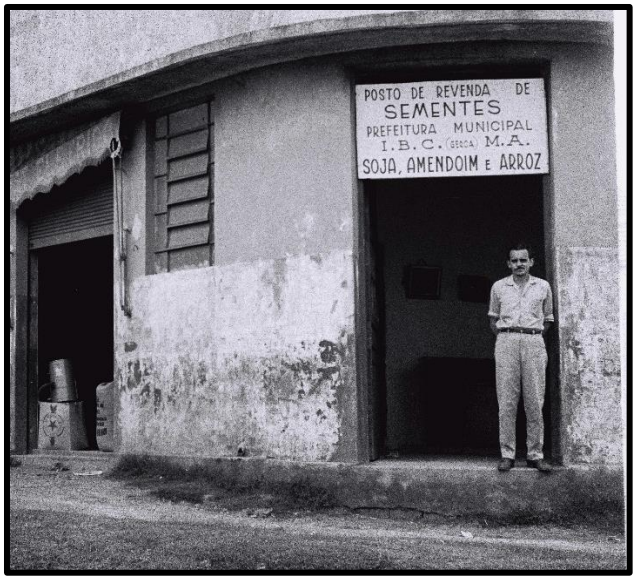

Figure 2.2: IBC outpost supplying subsidized soybean, Peanut, and rice seeds. Photograph by Armínio Kaiser.[274]

While in the aftermath of the frost the state prioritized the situation of coffee farmers, Paraná's Governor, Ney Braga, met with the IBC president and Paranaense politician Nélson Maculan to discuss the 200 000 affected workers. New coffee fields required little labor since the trees needed years before yielding, but sugarcane grew more quickly and could absorb unemployed workers in the region. GERCA formed an agreement with the Sugar and Alcohol Institute (Instituto do Açúcar e do Álcool—IAA) to plant 100 000 hectares of sugarcane in the areas where frost-stricken coffee trees were cut or burned. As a stop-gap measure, the IBC also initiated a study of the state's potential for soybean cultivation.[275] The IBC was hesitant to promote new coffee planting because of uncertainties regarding the impact of the Rural Labor Statute (ETR) in 1963, which extended most labor laws to rural workers.[276] Moreover, planners

[273] Armínio Kaiser, *Erradicação de cafeeiros geados, Fazenda São José, Astorga, Paraná*, 11 October, 1963. Museu Padre Carlos Weiss, Londrina, Paraná, Brazil.
[274] Armínio Kaiser, *Alto Paraná*, 21 November, 1963. Museu Padre Carlos Weiss, Londrina, Paraná, Brazil.
[275] No author, "Nei Braga expõe ao Min. Carvalho Pinto a situação do Paraná," *O Estado de S. Paulo*, 31 August, 1963, 7.
[276] Thomas D. Rogers, *The Deepest Wounds: A Labor and Environmental History of Sugar in Northeast Brazil* (Chapel Hill: University of North Carolina Press, 2010), 138; Stolcke, *Coffee Planters*, 116-117. The law extended

continued to assess the impact of the International Coffee Agreement, which had begun operations the previous year.[277]

Despite some farmer reluctance to eradicate, manipulation of the system, and skeptical participation in the diversification program, a formidable number of coffee trees were uprooted in only three years. Through GERCA contracts, farmers eradicated roughly 206 million trees in 1962, 380 million in 1963, and around 100 million in 1964, bringing the three-year total to roughly 700 million trees. Diversification efforts revealed regional discrepancies and outcomes that veered widely from the initial goals. Activities on the "liberated" land in the three most participatory states of Paraná, São Paulo, and Minas Gerais show divergent regional trends. According to the IBC, Minas Gerais's farmers turned most of the former coffee land to pasture, totaling 64 percent, followed by corn at 34 percent. Paraná followed Minas Gerais's patterns privileging pasture and corn, in addition to cotton. São Paulo, however, planted a wider variety of crops: 27 percent of the former coffee land turned to pasture, 25 percent to corn, 17 percent to rice, and 5 percent for sugarcane and peanuts respectively.[278] The initial aims of the program strived for greater balance, but farmers preferred pasture on a large scale.

A Militant Approach to Agricultural Change, 1964-1966

After the frost chilled coffee growers' willingness to eradicate, political changes eroded the state's commitment to the program. On April 1st, 1964, the military orchestrated a coup that deposed President Goulart from office.[279] Following a period of internal jockeying, the military

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the same urban labor laws of the CLT to permanent rural workers. This included eight-hour work days, a year end salary bonus, indemnification for dismissal, and a minimum wage law.

[277] IBC-GERCA, *Report on GERCA's Activities* (1963), 3.

[278] Banco do Brasil, *Divisão do estatística do Instituto Brasileiro do Café* (Rio de Janeiro: 1965).

[279] Thomas E. Skidmore, "Politics and Economic Policy Making in Authoritarian Brazil, 1937-71," in *Authoritarian Brazil: Origins, Policies, and Future* (London: Yale University Press, 1973), 9. For an overview see Carlos Fico, *O Golpe de 1964: momentos decisivos* (Rio de Janeiro: FGV Editoria, 2014); Marcos Napolitano, *1964, História do*

issued an Institutional Act that overrode the constitution and allowed general Humberto de Alencar Castello Branco to become president. Rhetoric and reality often operated in juxtaposition as the military regime justified its actions as necessary to secure Brazilian democracy, while in reality it suppressed the political opposition and curtailed public participation in the "democratic" process.[280] The coup resulted in a military government that would stay in power for over two decades and govern with varying degrees of authoritarianism.[281] In the immediate aftermath of the coup, the regime embraced economic development and modernization discourses emblematic of previous democratic governments, but toned down the trumpeting of unrealistic developmental goals. Castello Branco's government stabilized rising inflation although national economic growth remained slow during its initial years.[282]

The military coup was not limited to the cities but resonated in the rural areas as well. In part, the military takeover responded to growing unrest among rural workers and peasants. Rural labor unions clamored to change the persistent issues of economic inequality, unequal land distribution, labor laws, and access to political power.[283] Immediately after the coup, the military government shut down many rural labor organizations, accusing them of subversion.[284] Large-scale coffee growers tended to support the proclaimed 'revolution' that swept away the Goulart

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regime militar brasileiro (São Paulo: Editora Pinsky Ltda, 2014); Thomas E. Skidmore, *Politics in Brazil, 1930-1964: An Experiment in Democracy* (New York: Oxford University Press, 1967).

[280] Skidmore, *Politics in Brazil, 1930-1964*, 312-313; Anthony W. Pereira, *Political (In)justice): Authoritarianism and the Rule of Law in Brazil, Chile and Argentina* (Pittsburgh: University of Pittsburgh Press, 2005).

[281] Skidmore, *The Politics of Military Rule*; James N. Green, *We Cannot Remain Silent: Opposition to the Brazilian military Dictatorship in the United States* (Durham: Duke University Press, 2010); Jeffrey Lesser, *A Discontented Diaspora: Japanese Brazilians and the Meanings of Ethnic Militancy, 1960-1980* (Durham: Duke University Press, 2007); Marcelo and Motta, Rodrigo Patto Sá (eds) *A ditadura que mudou o Brasil 50 anos do Golpe de 1964* (Rio de Janeiro: Zahar, 2014); Denise Rollemberg and Samantha Viz Quadrat, *A construção social dos regimes autoritários: legitimidade, consenso e consentimento no século XX* (Rio de Janeiro: Civilização Brasileira, 2010).

[282] Skidmore, "Politics and Economic Policy," 12.

[283] Cliff Welch: *The Seed was Planted: The São Paulo Roots of Brazil's Rural Labor Movement, 1924-1964* (University Park: Pennsylvania State University Press, 1998). 2.

[284] Welch, *The Seed Was Planted*, 343.

government, hoping the new government would ease the tax on exported coffee and modify, if not eliminate, the newly enacted rural labor laws. As anthropologist Verena Stolcke argues, the "landowners regarded the Rural Labor Statute as a genuine threat to their traditional privileges."[285] However, the military regime did not fulfill the hopes of large-scale farmers and instead largely upheld the Rural Labor Statute.[286]

The rule of Castello Branco and the military government as a whole was set to follow a path of its own rather than bend to the will of the producers, challenging the traditional power base of large-scale coffee growers. On April 1st, 1964, the military removed IBC president and large-scale coffee grower Nélson Mulcan. They replaced him with Leônidas Lopes Bório, a staunch critic of the Goulart government, whose work experience involved managing economic development programs and directing funding from the Alliance for Progress.[287] Bório called for a long-term plan for Brazil's coffee sector that more centrally served national economic interests, and offered little to appease coffee grower's complaints.[288]

Large-scale coffee growers repeatedly appealed for reforms to the national coffee plans in the months after the military took power, with little success. The American Ambassador in Rio de Janeiro reported to the U.S. Department of State in July, describing a "sheer breakdown in communications between the farmers and the federal government…(which) has reached the point of cold war."[289] Struck by the oddness of the deteriorating relationship, he questioned why farmers were unable to influence government choices, "except when they have joined

[285] Stolcke, *Coffee Planters*, 112-113. Stolcke further argues that the coffee elites would be dissatisfied by the military government's refusal to revoke the Rural Labor Statute.
[286] Rogers, *Deepest Wounds*, 159; Stolcke, *Coffee Planters*, 112.
[287] Centro de Pesquisa de Documentação de História Contemporânea do Brasil, *Nélson Maculan*, Fundação Getúlio Vargas (accessed August, 2019).
[288] No author, "Bório quer diversificação do café," *Correio da Manhã*, 3 September, 1964, 1.
[289] United States Ambassador Gordon, "Airgram-Department of State," July 9, 1964, *Opening the Archives: Documenting U.S.-Brazil Relations, 1960s-80s*, Brown Digital Repository, Brown University Library.

conspiracies to bring the government down."[290] The ambassador's comments reflected the changing relationship. As a group, large-scale landowners (including coffee growers) supported the military coup hoping to reverse perceived threats to their influence in the early 1960s. After the coup, however, large-scale landowners found themselves dissatisfied with the payoff. Rather, trends of declining political influence among large-scale coffee growers accelerated, much to their dismay. The new military government maintained many of the policies established by the Goulart government and took action to more closely harness coffee production with the objectives of the state.

As coffee farmers clamored for higher prices and more support, GERCA reduced nearly all its activities in the coffee growing areas. The programs that continued focused on supporting alternative crops and infrastructure investment in rural areas—rather than financing coffee farmers to make changes on their farms. In late 1964, for example, of a Cr$ 43 billion transfer to GERCA, Cr$ 33 billion was directed for sugar processing factories in the former coffee zones. The Brazilian Coffee Institute and the Sugar and Alcohol Institute (IAA) jointly agreed to use GERCA to expand sugarcane growing in São Paulo state.[291] Rather than meeting the demands of large-scale coffee growers and raising prices paid for agricultural goods, the state instead chose to continue programs that aimed to change the productive landscape. Reducing commitments to the coffee sector coincided with the military regime's broader efforts to consolidate political power, however, the problem of coffee over-production remained unresolved.

At the International Coffee Organization's meeting in 1965, IBC president Leônidas Lopes Bório warned that rising global production signaled a dangerous economic future. In Brazil, coffee stockpiles continued to climb, and the 1966 harvest predictions forecast a massive

[290] Gordon, "Airgram-Department of State," July 9, 1964, Brown Digital Repository.
[291] No author, "O Brasil que aperfeiçoar o pacto do café," *O Estado de S. Paulo,* 19 December, 1964, 15.

33 million sacks—a similar quantity to the 1962 harvest that prompted the first wave of state-led coffee eradication. In July 1965, the Ministry of Commerce announced that "the moment arrived…with renewed vigor…to reformulate the program to rationalize and diversify the economy, as was sketched out with the creation and activities of GERCA."[292] Doing so, Bório argued, would solve the "internal structure" problems of the coffee sector and allow the ICA to be effective.[293] Looming overproduction combined with a more confident government coffee policy resulted in a return to policies of eradicating coffee in mid-1965.

Influential agronomists, journalists, and economists debated ways to improve GERCA's operations. São Paulo agronomist Jorge Bierrenbach de Castro criticized GERCA's inefficient bureaucracy and underwhelming results. Instead, he pointed to a common trope of highly productive Japanese-descended farmers to argue that landowners should renovate their own fields without state support.[294] In his view, GERCA could provide technical assistance rather than financing, perhaps alluding to ACAR's model of rural extension that fused technical assistance with financing in Minas Gerais state. Others highlighted how farmers avoided committing to alternative crops, skeptical of the economic returns. In this vein, Arnaldo Alencar Lima, a celebrated journalist, noted how "coffee is abandoned for a monoculture of grass…(and) eradication pure and simply does not impede farmers from planting more coffee if prices rise."[295] His observation reveals the discrepancy between the government's statistical measurements of diversification, and how farmers participated. Even if a farmer uprooted coffee trees, their relationship with alternative crops remained contingent on coffee prices. To remedy this, Alencar

[292] No author, "Governo vai racionalizar a cafeicultura," *O Estado de S. Paulo,* 22 July, 1965, 19.
[293] Lleonidas Lopes Borio, in "Brasil sugere fundo de limitação," *O Estado de S. Paulo,* 6 August, 1965, 21.
[294] Jorge Bierrenbach de Castro, "Os Japonêses e seus vafezais no Paraná," *O Estado de S. Paulo,* 8 September, 1965, 34; Jorge Bierrenbach de Castro's description of Japonese-descendents fit one popular trope regarding the cultural trates of Japonese-Brazilians at the time. See Lesser, *A Discontented Diaspora*.
[295] Arnaldo Alencar Lima, "Quotas podem limitar produção de café," *O Estado de S. Paulo,* 24 April, 1966, 34.

Lima recommended a quota system whereby the government set a fixed volume of coffee per farm. This theory stemmed from two influential economists: Eugênio Gudin, the ex-Minister of Finance, and Antônio Delfim Netto, then São Paulo Secretary of Finance. In their view, a quota would motivate farmers to increase coffee yields and use the extra land to plant other crops.[296] Both agreed that GERCA's earlier eradication efforts had failed to prevent overproduction.[297]

Planners never implemented individual farm quotas likely due to the daunting bureaucratic demands to implement such a program. But debating them provided insight into a new approach that aimed at increasing coffee yields on a single farm. This idea was not new and can be seen in almost any period of coffee growing in Brazil that discussed yields. But the specific model discussed in the 1960s embraced new methods that stemmed from a set of ideas about modernizing agriculture, some of which Delfim Netto outlined in his 1959 publication, *O Problema do Café no Brasil* (The Coffee Problem in Brazil):

> "We have accumulated a sum of technical know-how that goes from selection of high-yielding and more resistant varieties to cultivation and fertilizing techniques which make it possible to increase yields of our coffee at least threefold within a relatively short time. Efforts in this sense make it possible to conceive of a highly-mechanized coffee production where labor needs arise only during the harvest.[298]

Delfim Netto's vision did not reflect reality for the vast majority of agriculturalists in 1966. As debates over how to change agriculture in the coffee regions unfolded in newspapers and among politicians, Harold Clements, an American academic, traveled through the agricultural zones of Minas Gerais state. Clements evaluated Brazilian agriculture according to a conceptualized progressive scale that considered indigenous techniques and the use of fire to clear land the most primitive; the plow and draft animals as slightly more advanced; and modern

[296] Alencar Lima, "Quotas podem limitar produção," 34. The proposal of a quota system reconfigured the approach to diversification and focused more directly on the farm rather than regional or state level assessments.
[297] Arnaldo Alencar Lima, "Café necessita das cotas de produção," *O Estado de S. Paulo,* 31 July, 1966, 34.
[298] Antônio Delfim Netto, in Stolcke, *Coffee Planters,* 121.

agriculture as defined by the use of mechanization, yield-raising chemicals, economic farm management, and wage-labor.[299] Clements' search for Brazilian modernity identified pockets of change, but overall found the agricultural sector to be largely "traditional" and "backward."[300]

Clements described a general scene of agricultural stagnation, and prescribed a forceful modernization program to bring about "alterations in attitudes, values, motivations and skills as well as substitutions of equipment and technology."[301] This vision for modernization included similar goals to Delfim Netto's call to increase productivity through technology and inputs, but also social changes deemed necessary to facilitate their adoption—an approach that undergirded rural extension ideology. The circulation of these ideas in Brazil influenced how political planners again mobilized GERCA to destroy low-yielding coffee trees and wean Brazilian agriculture away from coffee growing dependence.

A Second Wave of GERCA: 1966-1967

In June 1966, the IBC announced that GERCA would again carry out widespread coffee eradication efforts. Over the next year, the program generated greater results compared to the early 1960s due to stronger state investment, and manipulation of coffee prices for growers. The IBC committed to the structure of GERCA's program: they continued to offer subsidized credit to uproot coffee and plant other crops, albeit with greater focus on adopting technologies, machines, and equipment.[302] The institution even adopted the same numerical target from 1962

[299] Harold M. Clements, *The Mechanization of Agriculture in Brazil,* (Gainesville: University of Florida Press, 1969), 58, 63, 75.
[300] Clements, *Mechanization of Agriculture*, 8, 10.
[301] Clements, *Mechanization of Agriculture*, 2.
[302] IBC, Departamento de Assistência a Cafeicultura (DAC), *Programma de diversificação da cafeicultura no Estado de São Paulo* (Rio de Janeiro: 1967).

to reduce annual coffee production to around 24 million sacks per year.[303] The National Monetary Council threw financial support behind the "immediate eradication of coffee trees" and planting alternative crops.[304] On August 4, an IBC communique outlined credit rates provided to uproot a tree, which amounted to roughly four times those offered in the 1962 scheme.[305] Further, the new plan offered higher minimum price guarantees for substitute crops and rural industrialization.[306]

The federal government simultaneously used macro-economic tools to make coffee growing less profitable. In almost open hostility to coffee farmers, the Castello Branco government refused to scale up the price they paid to farmers for their coffee with inflation. In July 1966, the government pegged prices at the 1965 level—a reduction of roughly 40 percent in real terms.[307] This amounted to a huge loss of income for coffee growers, and a short-run scheme for the government to capture the difference in trade prices. The United States Agency for International Development's report on GERCA recognized this shrewd maneuver and acknowledged that "the difference between the export value and the domestic value of coffee exports should be treated as general revenue for the Government and not as a resource belonging to the coffee sector."[308] Four months later, the U.S. endorsed the scheme, claiming in a classified memo that the Brazilian government "took the politically courageous decision of refusing to increase the domestic support price for coffee." The memo added that the extra income could be

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[303] IBC, DAC, *Complementação e atualização do cadastro de equipamentos industrias para matérias primas agropecuárias, com vistas a elaboração e avaliação do projetos de diversificação* (June, 1966), 3.
[304] IBC, GERCA, DAC, *Programa de diversificação econômica das regiões cafeeiras* (Rio de Janeiro: 1966), 2.
[305] IBC, *Relatório das atividades* (Rio de Janeiro: 1967), 5.
[306] IBC, GERCA, DAC, *Programa de diversificação* (1966), 4. Beyond calls for agroindustry, crop diversification plans included planting corn, beans, sunflower, soybeans, peanuts, as well as citrus and fruit trees, and forest plantations.
[307] Peter T. Knight, "The Critical Coffee Sector in Brazil: Potential Export Earnings from a Diversification Scheme," (Agency for International Development: September 7, 1966), 28.
[308] Knight, "The Critical Coffee Sector," 9.

transferred to "more productive sectors" to help forestall another recession.[309] In their view, Castello Branco's firm line on manipulating domestic prices was essential to the successful negotiations for loans from the International Monetary Fund and the United States.[310] Most academic studies of the ICA suggest that the agreement benefited farmers with higher prices.[311] This scheme of manipulating prices shows how this was not consistently the case. Rather, the international agreement also provided a tool for state planners to capture revenue, and simultaneously to mediate how farmers accessed resources through GERCA.

Pushing down the real income of coffee growers contributed to GERCA's eradication goals. The government paralleled price manipulation with even stronger financial incentives for coffee farmers who destroyed a greater percentage of their trees before March 1967, the end of Castello Branco's presidential term. For example, a farmer who cut 15-24 percent of his trees would receive CR$ 300 per tree, but for those who uprooted 40 percent or more financing jumped to CR$ 500 per tree.[312] Considering the declining coffee returns on the one hand, and strong financial support to uproot trees, on the other, the carrot and the stick motivated many farmers to seek GERCA's programs.

For farmers to access credit from the Bank of Brazil they required assessment documents signed by GERCA technicians or affiliated agricultural specialists. Technicians would visit a farm to create an "Eradication Verification Report" that established the targets, assessed the activities, and calculated how much land would be "liberated" from coffee. Upon their visit, the technician would also outline diversification activities and include ledgers to track progress over

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[309] Benjamin H. Read, "Inflation in Brazil," 14 January 1967, *Opening the Archives: Documenting U.S.-Brazil Relations, 1960s-80s,* Brown Digital Repository, Brown University Library. http://repository.library.brown.edu/studio/item/bdr:666153/

[310] Read, "Inflation in Brazil," 3.

[311] Bates, *Open-Economy Politics*; Talbot, *Grounds for Agreement*.

[312] IBC, "Têrmo de convênio celebrado entre o Instituto Brasileiro do Café e o Banco do Brasil S.A., para execução do programa de diversificação da cafeicultura," in *Relatório* (August, 1966), 12.

years. Since GERCA lacked the infrastructure to directly govern all the contracts, they partnered with state-level agronomic institutions, the most active being the Brazilian Association of Credit and Rural Assistance (Associação Brasileira de Crédito e Assistência Rural—ABCAR) network discussed in the previous chapter.[313] Through these documents GERCA defined in more detail what eradication and diversification entailed. If farmers did not cut their coffee trees below the level of the soil, or strayed from the sanctioned diversification plan, their funds could be suspended and a legal process to reclaim the subsidy begun. Technicians operated as powerful middlemen between farmers, the banks, and the program's expectations. Yet, in 1966 the actual assessment forms were rather brief, with sections to verify eradication and notate substituted crops. The form was expanded slightly by the end of 1966 to include individualized categories for diversified crops and livestock activities.[314]

Implementing the massive program to reduce coffee trees led almost immediately to a host of problems. On November 24, 1966, the first officially recognized allegation of corruption surfaced in Barra de São Francisco, Espírito Santo, and the IBC responded by suspending around 3500 contracts on suspicion of fraud, without disclosing specific details. The IBC also noted other cases of fraud but supplied scant detail on the extent to which these were thought to exist.[315] The problem stemmed from challenges in monitoring activities across the program during a flurry of activity. GERCA recognized the need to expand and better direct technical assistance to improve control over the program.[316] In December 1966, a new law was passed to regulate the IBC's technical assistance methods, emphasizing scientific approaches in the coffee

[313] IBC, DAC, "Instruções para preenchimento dos laudos iniciais de verificação dos contratos de diversificação," in *Relatório* (June, 1966).
[314] José Alcindo Rittes, DAC, IBC, *Enquadramento geral para quitação ou cobrança da 1ª, 2ª, e 3ª parcelas* (Rio de Janeiro: 31 December, 1966).
[315] IBC, *Relatório das atividades* (Rio de Janeiro: 1967), 5.
[316] IBC, *Comunicação*, N. 25-66 (1966**)**, 2.

growing regions. Planners also called for training new technocrats to instruct and "professionalize" farming.[317]

Rethinking the Role of Coffee Amid Political Change

In April 1967, the government called to slow coffee eradication efforts once again. The shift in policy responded to political reshuffling, concerns over rural unemployment, and environmental challenges. Over the previous year, farmers had chopped down or uprooted around 655 million coffee trees, bringing the 1961-1967 total to around 1.38 billion trees through GERCA contracts. Farmers also destroyed an additional 350 million trees without GERCA`s financing, often due to ecological challenges or to pursue more appealing options.[318] Collectively, the number of destroyed coffee trees nearly reached the goal of 2 billion. In this context, army marshal Artur da Costa e Silva became president of the dictatorship on March 15, 1967. The incoming president echoed Castello Branco's rhetorical calls for rapid economic development. Making the transition, Costa e Silva immediately overhauled government positions and elevated many civilian specialists to influential posts.

President Costa e Silva named Antônio Delfim Netto as the Minister of Finance and president of the National Monetary Council that controlled funding for GERCA. Delfim Netto previously held a chair in economics at the University of São Paulo before taking the post as São Paulo's Secretary of Finance in 1966. As the Minister of Finance, Delfim Netto advocated that it was possible to boost growth, limit inflation, and lift per capita income while expanding employment.[319] The keys to his approach relied on making credit accessible on a wide scale,

[317] IBC, *Regulamento geral dos acordos do departamento de assistência á cafeicultura* (Rio de Janeiro: 1966), 1.
[318] Stahis Panagides, "Erradicação do café e a diversificação da agricultura brasileira," *Revista Brasileira de Economia* V.23 (Rio de Janeiro: Jan-Mar 1969): 42.
[319] Skidmore, *The Politics of Military Rule,* 70.

combined with targeted price controls and greater state influence over wage policy. Delfim Netto typified a new generation of civilian technocrats who populated the institutions of the military government. As historian Thomas Skidmore noted, Delfim Netto espoused a singular commitment to economic development and a lack of self-interest. Technocrats and military leaders often employed this rhetoric that privileged development, which enabled them distance from the "social and moral questions that were inherent in economic policymaking."[320]

Developmental rhetoric in the halls of state institutions did not necessarily correspond with the experiences of those living under an increasingly authoritarian dictatorship. As Costa e Silva took office, an armed rebellion emerged in an area where GERCA worked extensively. One small militant group, "Guerrilha do Caparão," opposed rising authoritarian power, especially after the Second Institutional Act eliminated all but two political parties and expanded presidential powers. The guerrillas, principally composed of ex-military members, established training grounds in a mountainous region of Caparão, straddling the borders of the states of Minas Gerais and Espírito Santo.[321] After the national army and Minas Gerais' military police suppressed the group in April 1967, reports claimed that the local population did not support the guerilla movement. However, José Stacchini, a political author and influential reporter for the newspaper *O Estado de S. Paulo*, tied the events to the agricultural transformations in the area.[322] Stacchini argued that if GERCA's support for diversifying agriculture failed to support farmers, there would be mass unemployment in the region—causing fertile grounds for social unrest, if not widespread opposition.[323] Other examples signaled similar alarms. Also in April 1967,

[320] Skidmore, *The Politics of Military Rule,* 71.
[321] Elio Gaspari, *A ditadura envergonhada.* (São Paulo: Editora Schwarcz ltda, 2002), 202-209.
[322] José Stacchini, *Março 64: mobilização da audácia* (São Paulo: Companhia Editora Nacional, 1965). This book collected the accounts of the "revolution," supported by the owner of newspaper *O Estado de S. Paulo,* Júlio de Mesquita Filho.
[323] José Stacchini, "Brasil já sentiu sabor da guerrilho," *O Estado de S. Paulo,* 23 April, 1967, 7.

changes in São Paulo's sugarcane processing factories left many farmers dismayed and around 5000 workers unemployed, a potential first wave of a larger trend.[324]

For coffee, Horácio Sabino Coimbra, the new IBC president selected by Costa e Silva, sought to end years of hostility with coffee farmers. He recognized that persistently low coffee incomes prompted many farmers to destroy coffee trees that the state considered productive. Moreover, years of eradicating coffee also eliminated many jobs for rural workers. The U.S. Embassy in Rio de Janeiro learned in bewilderment that the Brazilian government would bend from the political pressure from coffee interests and increase domestic prices paid to farmers.[325] Another U.S. government memo bluntly stated that "Brazil's new government…may soon adopt coffee policies that could seriously affect the future of both the ICA and economic relations between Brazil and the U.S."[326] The significance of the problem prompted U.S. politicians to suggest that a substantial price increase or reversal in the diversification program would jeopardize "large-scale U.S. financial and technical assistance to Brazil."[327] U.S. officials took solace in the fact that the Monetary Council largely controlled coffee policy, led by Delfim Netto, with whom they thought negotiations possible.

Attempting to balance internal and external pressure, the Costa e Silva government sought to find a middle ground that quelled rural dissent and continued programs to transform agriculture. Delfim Netto signaled an intensification in programs to improve agricultural incomes, and to recenter the agricultural sector as an "instrument of great importance in the

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[324] No author, "Êxodo do campo pode trazer crise," *O Estado de S. Paulo,* 2 April, 1967, 20.
[325] John W. Tuthill, "Brazilian Coffee Industry," 11 April 1967, *Opening of the Archives: Documenting U.S.-Brazil Relations, 1960s-80s,* Brown Digital Repository. Brown University Library. http://repository.library.brown.edu/studio/item/bdr:814199/
[326] Thomas Hughes, "Coffee Problems Brewing in Brazil," 20 April 1967, *Opening of the Archives: Documenting U.S.-Brazil Relations, 1960s-80s,* Brown Digital Repository, Brown University Library. http://repository.library.brown.edu/studio/item/bdr:667461/
[327] Thomas Hughes, "Coffee Problems Brewing in Brazil."

promotion of stable economic development."[328] These goals, Delfim Netto declared, could be achieved through further modernizing the agricultural regions: "we believe that it is impossible in a country like Brazil for development to be carried out without an agricultural base…" and moreover, "no matter how high productivity is in industry, the industrial sector cannot maintain …if labor is not freed from primary activity."[329] To boost agriculture, the National Monetary Council eliminated taxes on farm and other associated products, e.g. fertilizers, tractors, and other equipment. Further, special interest rates were lowered for agriculture and state-guaranteed minimum price programs expanded.[330] Economic officials, led by Delfim Netto, gambled that investment in agriculture would spur economic growth and subsequently offset negative economic outcomes, especially rising inflation.

While federal planners reshuffled their priorities for agriculture and specifically for coffee growing, another frost hit Paraná on June 9, 1967. Weaker than the 1963 frost, it harmed an estimated 100 million trees. Previous frosts had acted as allies in the effort to destroy coffee trees. In 1967, however, the frost prompted GERCA leaders to declare the end of coffee eradication, fearing that the number of productive coffee trees had fallen too low. The frost struck at a time when political policy towards coffee was changing, and essentially acted as a signal to end widespread coffee destruction. But other factors influenced this decision, especially the underwhelming results of the diversification program.

Of all the land freed from coffee planting, 44 percent was converted to pasture and 19 percent to corn, a considerably narrower result compared to the 1962 goals. Many of the

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[328] Antônio Delfim Netto, in "Govêrno empenha-se em recuperar renda agrícola, *O Estado de S. Paulo*, 1 June, 1967, 19.
[329] Antônio Delfim Netto, "Foundations for the Analysis of Brazilian Coffee Problems" in *Essays on Coffee and Economic Development* (Rio de Janeiro: Instituto Brasileiro do Café, 1973), 136-137. Originally published in 1967.
[330] Skidmore, *The Politics of Military Rule*, 92.

alternative crops failed to capture desired prices on the international commodity markets. While a sack of coffee earned 50 USD in the international market, other products hardly fetched 5 USD.[331] The discrepancy between export prices also revealed a new (old) thread in Brazilian agricultural planning: coffee prices were good because, as GERCA president Walter Lazzarini straightforwardly put it, "rich nations, situated in a cold and temperate climate, cannot produce coffee. If they could, it (coffee prices) would decline as well." Low international commodity prices coincided with a boom in global production of key cereal crops.[332] In response to the changing international marketplace, Brazilian planners emphasized the value of "tropical commodities," which freed Brazil from competing with developed (non-tropical) countries.[333]

The turn towards "tropical commodities" included a valorization of coffee in the view of state planners. No longer seen as an impediment to agricultural development, the IBC argued that coffee could be grown more profitably, especially compared with the alternatives, if it was cultivated in a particular way.[334] Investments shifted to improving economic conditions of how coffee was grown on farms. Corresponding with this new direction in early 1968, IBC president Horácio Sabino Coimbra was replaced with Caio de Alcântara Machado, a lawyer and industrialization promoter with close ties to the United States. Under Alcântara Machado, the IBC more forcefully advocated that yields and profitability could be increased on coffee farms by adopting fertilizers, pesticides, herbicides, mechanization, and making credit and finance more available. These measures, Alcântara Machado pithily explained, would help to turn each coffee farm into a true agricultural business.[335] Further, supporting coffee farmers would prevent

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[331] No author, "Brasil não erradicará mais café," *O Estado de S. Paulo*, 8 Oct, 1967, 8.
[332] The United Nations Food and Agriculture Organization, *The State of Food and Agriculture, 1969* (Rome: FAO, 1969), 8-10.
[333] In the late 1960s, military planners still aimed to increase foodstuffs cultivation, but export goods and especially tropical commodities increased in priority.
[334] Panagides, "Erradicação do café," 46.
[335] Caio Alcantara Machado, in "IBC defenderá o café brasileiro," *O Estado de S. Paulo*, 1 May, 1968, 26.

an economic crisis similar to what had happened with cacao, cotton and rubber, three commodities that previously experienced booms and busts in Brazil. He described the challenge in nationalist and militaristic terms, calling the coffee growers "an elite battalion of an army whose historical obligation is to win the battle to emancipate national coffee growing."[336] The description of what coffee represented for the government in 1968 bore little resemblance to that of the early 1960s, as coffee now became a target of modernization, reincorporated in national economic goals.

Technocrats on the March with a New Agricultural Package

To spearhead the new effort to support coffee growers, the IBC emphasized training and deploying agricultural experts in coffee regions.[337] The IBC opened national competitions to hire 30 new agronomists in July 1968 as part of the institution's "Program to Renovate Coffee Fields."[338] Some of these agronomists staffed the regional service centers to assist coffee growers, while others moved to the IBC's planning headquarters in Rio de Janeiro. Through their field work, they promoted the "rationalization" of coffee growing, aiming to solve problems affecting coffee production and increasing both quality and yield of coffee harvests.[339] A training manual published in 1968 outlines the instructions for agronomists to engage socially to build local contacts, informally visit farms, and promote agricultural instruction. The IBC's training also instructed technicians to coordinate with other extension agencies—be they from the state secretaries, the ministry of agriculture, or ABCAR to build a network of technical outreach.[340]

[336] Alcantara Machado, "IBC defenderá," 26.
[337] IBC-GERCA, *O novo IBC* (Rio de Janeiro, 1968), 5.
[338] IBC, *Boletim no. 68-3* (1968).
[339] IBC-GERCA, *Atribuições do agrônomo do IBC-GERCA-DAC* (Rio de Janeiro, 1968).
[340] IBC, *Atividades que poderão ser desenvolvidas pelos agrónomos das SAGs, independentemente de autorização ou determinação superior* (17 September, 1968), 2.

In 1968, GERCA hired agronomist Antonio José Ernesto Coelho, who left his position as an ACAR rural extension agent in Minas Gerais. In an interview with Ernesto Coelho, he explained that despite being part of the IBC, GERCA operated more independently and had a specific mandate to change coffee growing, and that "the whole project was really about development."[341] In his view, the new wave of experts received better training to engage farmers and were more capable of promoting measures to renovate coffee, thus better equipped to drive "development" forward.[342] In their interactions with farmers, technicians were directed to collect detailed files on farmers, their property, assets, and the conditions of the coffee trees. Agronomists also planted their own experimental coffee farms in rural areas, ideally collaborating with locals to demonstrate the potential of "rational" coffee. On these farms, agronomists demonstrated how to control erosion, use equipment and machines, apply insecticides and fertilizers, as well as more fundamental tasks, such as building drying terraces, and harvesting, preparing, and storing the coffee.[343] These factors emphasized raising yields, as well as increasing productivity per farm, per hectare, and per worker.

In the late 1960s farmers increasingly adopted chemical-based fertilizers to boost yields. Fertilizers harmoniously fit into the goals of modernizing agriculture, and as another measure to categorize modern and traditional styles of farming. But incorporating fertilizers into farming had been an uneven process over the previous decades. In 1956, coffee farms in Brazil consumed roughly 14,000 tons of chemical fertilizers, which climbed to 45,000 in 1960, remaining around that level until 1965.[344] Nationally, in 1960, only five percent of agricultural land in Brazil used

[341] Antonio José Ernesto Coelho, interview by author, Varginha, Minas Gerais, July, 2016.
[342] José Braz Matiello, interview by author, Rio de Janeiro, September, 2016.
[343] IBC, *Atividades que poderão*, 8.
[344] IBC-GERCA, *Programa de diversificação da cafeicultura no Estado de São Paulo* (1967), 15.

chemical fertilizers, and roughly 70 percent of that was used in São Paulo state.[345] In the early 1960s, GERCA offered subsidized credit to purchase nitrogen, potassium and phosphorus as the basic fertilizer "package," but adoption on the ground was slow due to irregular access and the high cost of the chemicals.[346] A 1965 study on fertilizer use concluded that Brazilian agriculture was only slowly adopting technological changes.[347]

In the late 1960s, a series of state-led efforts contributed to a take-off in fertilizer consumption in Brazilian agriculture. On March 28, 1966, President Castello Branco announced the creation of a new Financial Fund to Stimulate Mineral Fertilizer and Supplements Fund (Fundo de Estímulo Financeiro ao uso de Fertilizantes e Suplementos Minerais—FUNFERTIL). FUNFERTIL framed fertilizers as a modern way of increasing productivity and correcting perceived nutritional imbalances in soil. FUNFERTIL's funding came directly from GERCA's diversification budget and from the U.S. Agency for International Development (USAID).[348]

International investment played a major role in making fertilizers available in Brazil. USAID provided 67.9 million USD in loans and guarantees for the construction of new factories and to support programs designed to raise fertilizer consumption, especially for food crops.[349] These investments helped construct Ultrafertil in 1967. Located in Cubatão, São Paulo, this "industrial fertilizer complex" was the largest industrial installation in Latin America. Funding from USAID helps explain why fertilizer promotion often embraced a rhetoric of food scarcity that was directly tied to concerns over a growing population. Ultrafertil represented a decisive

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[345] Jubert Sanches Cibantos, "Demanda de fertilizantes no Estado de São Paulo" (PhD diss., Universidade de São Paulo, Piracicaba, 1972), 18.
[346] IBC-GERCA, Banco do Brasil, *Program for the Rationalization of the Coffee Growing, Bank of Brazil Finance Assessment* (1963), 5.
[347] Cibantos, *Demanda de fertilizantes*, 3.
[348] No author, "Fundo estimulará uso de adubos," *O Estado de S. Paulo*, 29 March, 1966, 21.
[349] William Charles Nelson, "An Economic Analysis of Fertilizer Utilization in Brazil" (PhD diss., Ohio State University, 1971), 3-4.

investment in domestic fertilizer production necessary for the state's ambitious agricultural aspirations.

While the federal government financed factories and networks to distribute fertilizers, academics and technocrats embraced a discourse that foregrounded the input's benefits for farmers and the nation. Variations notwithstanding, there was a general consensus over the use of chemical inputs because, as agronomist Euripides Malavolta declared: "[Brazil has] been, for many years, in the first phase of agriculture, which is the extraction of soil fertility…re-fertilization of the soil is the remedy."[350] Not only did Malavolta praise re-fertilization of the soil, but he also openly accused those who continued with "traditional" agriculture of individualism, arguing they failed to contribute to the nationalist goals of development.[351]

Fears of Underproduction Spur Efforts to Plant Modern Coffee, 1969-1970

After incorporating coffee into the agricultural modernization agenda in the late 1960s, the IBC paused to strategize their next steps. In 1969, GERCA heralded their success in reducing the national harvest to around 23 million sacks per year. However, the specific aim of destroying low-productivity coffee remained elusive and diversification efforts struggled to generate desired results. The IBC circulated an expansive questionnaire to assess the conditions on farms and the willingness of farmers to participate in a modernization program. This document provides a snapshot of the institution's concerns in 1969 and details a rare case of soliciting farmer opinions amid a decade of frequent policy changes. Circulated through the network of technicians, the survey reached farmers who had relationships with rural extension agents in the states of Paraná,

[350] Eurípedes Malavolta, in "O subdesenvolvimento da agricultura," *O Estado de S. Paulo*, 25 June, 1969, 5.
[351] Eurípedes Malavolta, in "Adubação e os seus obstáculos," *O Estado de S. Paulo*, 17 September, 1969, 13.

São Paulo, Minas Gerais and Espírito Santo, with little indication of who exactly partook in it beyond "coffee growers."[352]

Over 1000 farmers responded to the survey. The questionnaire inquired primarily about farming practices: the ages and total number of coffee trees on the farm, the types of fertilization farmers used, and yield of coffee beans per hectare. The survey also focused on profitability and willingness to uproot and replant coffee trees, and asked what farmers considered a reasonable price per sack of coffee to gain sufficient profits.[353] All coffee farmers signaled their hope for a substantial rise in prices for the next harvest, many claiming that they had received no profits from the previous year.[354] When asked if they were willing to uproot their coffee to plant other crops, the vast majority of farmers responded negatively. Their willingness to continue growing coffee spoke to the failure of diversification efforts over the previous eight years.

The survey also asked farmers if they possessed knowledge of "modern agronomic techniques" and if they would be receptive to technical orientation. This question delved into the heart of the survey; that is, testing the farmers' willingness to destroy current coffee plants and plant "modern" coffee trees with the state's support. The questionnaire asked: if the IBC financed all farming operations for four years, would farmers be willing to either eradicate four plants and replant one, or follow the alternative option of eradicating two trees and replant one? This approach fused together two previously independent objectives into one: eradicating low-productivity coffee fields and installing modern coffee in their place.

Farmer responses varied considerably, especially between those in Paraná state where coffee remained the most dominant crop, and the marginal producing state of Minas Gerais. In

[352] IBC, GERCA, DAC, *Pesquisa de renovação da cafeicultura* (February, 1969), 12.
[353] IBC, GERCA, DAC, *Pesquisa de renovação,* 12.
[354] IBC, GERCA, DAC, *Pesquisa de renovação,* 13.

Paraná, only 7 signaled support for the 4 for 1 system, and 21 percent responded positively to the 2 for 1 option. Farmers in Minas Gerais indicated greater willingness: 24 percent reported that they would accept the 4 for 1 system, and 49 percent would participate in the 2 for 1 program, a considerable divergence between the two states. The IBC's planners considered most coffee grown overall as either poor or adequate, and hardly any as highly productive.[355] Agronomist Durval Rocha Fernandes, who worked for GERCA in northeast Paraná, retrospectively shed light on the conditions, claiming that "people liked to grow coffee, but the coffee was often poorly taken care of."[356] That planners and agronomists began to employ negative qualifiers as they described coffee growing practices reveals how experts' views on what coffee *should* look like gradually began to change.

Another set of questions in the survey aimed to measure why farmers would participate in a new program. Paraná's farmers were divided almost equally among the four options provided: profits, guaranteed commercialization, best alternative, and farming tradition. In Minas Gerais, however, responses were more skewed: only 18 percent selected profitability, 26 percent chose commercialization, 34 of the respondents identified coffee as the best alternative, and 22 percent identified tradition as their reason to participate in the program. Offering four categories certainly limited the breadth of farming experiences, and many farmers likely associated with more than one option.

This survey highlighted the many different motivations among coffee farmers to participate in modernization initiatives. The lack of alternatives cited in Minas Gerais, for example, showed a willingness to take on the risks of coffee growing despite skepticism of the

[355] IBC, GERCA, DAC, *Pesquisa de renovação,* 13.
[356] Durval Rocha Fernandes, interview by author, Poços de Caldas, Minas Gerais, October, 2015.

crop's profitability, while farmers in Paraná may have had more risk-averse opportunities.[357] Unfortunately, the questionnaire did not investigate why Minas Gerais farmers lacked alternatives; perhaps due to a lack of know-how for other crops, capacity of the land and climate, prices, market access, and transportation, to name a few.

For the IBC, the survey provided statistical evidence to inform policy for both eradication and new coffee planting efforts. Soon after compiling the survey's results, IBC president Caio de Alcântara Machado announced a new "recuperation" plan that included many previously outlined goals: to expand technical assistance, promote inputs, fertilizers and machines. The plan also called for improving the quality of coffee by expanding research centers for soil analysis, which would help technical assistance adapt advice to local conditions.[358] Moreover, planners highlighted the potential of southern Minas Gerais to produce quality coffee, and the receptiveness of farmers to grow the crop. Regions of northwestern São Paulo were also included, as coffee remained the "dorsal fin that sustains agricultural production in the state."[359]

In the middle of devising a program to improve coffee planting along modern lines, yet another frost struck Paraná on July 10, 1969. Agronomists Orlando Sá Leite and Jorge de Almeida Gouvêa described it–rather unsurprisingly–as the "worst to date," and estimated that Paraná's 1970 harvest would fall from 18 million sacks to roughly three.[360] Immediately after the frost, 32 agronomists traveled through 173 municipalities over seven days, a break-neck trip through Paraná's principal coffee growing areas. The taskforce concluded that 96.8 percent of the roughly 850 million trees in the state had been affected by the frost, with varying degrees of

[357] IBC, GERCA, DAC, *Pesquisa de renovação*, 14.
[358] Ministério da Indústria e do Comércio (MIC), IBC Junta Consultiva, *Renovação da cafeicultura nacional* (Rio de Janeiro: 18 April, 1969), 10.
[359] MIC, IBC *Renovação da cafeicultura*, 9
[360] Orlando Sá Leite and Jorge de Almeida Gouvêa, *Levantamento dos danos causados pela geada de 10 de Julho de 1969 no Estado do Paraná* (Instituto Brasileiro do Café, 1969), 1.

intensity.[361] The voice of coffee agronomists as experts emerged prominently as they assessed the damage and offered their opinion for recovery. Marking a new evaluation of coffee growing in the state, these experts argued that "Paraná is no land for coffee."[362]

The devastation in the coffee fields caused by frost turned out to be below initial estimates, but nevertheless a game changer for the IBC`s coffee plans. Whether the trees had been considered as low-productivity, poor, or adequate was of no significance to the frost, whose impact single-handedly reduced the year`s national harvest by 40 percent. The damage startled the IBC`s planners, who realized that the next year`s coffee harvest might not fulfill the export quotas under the International Coffee Agreement. Perhaps somewhat panicked, the IBC immediately halted their plans to rid coffee fields of low-productivity trees and decided, instead, to temporarily conserve these trees. GERCA followed suit and announced plans to plant 100 million new coffee trees specifically to *increase* national production. The plan seems to have been formed hastily to garner broad political support, as it allocated broadly: 15 million trees to São Paulo, Paraná, Minas Gerais, and Espírito Santo, and another 40 million divided among marginal coffee growing areas of the country.[363]

These humble planting numbers betray the significance of this policy shift, whereby the state began to invest in expanding coffee plantations once again. But calls for replanting coffee revealed future challenges. Declining national production was exacerbated by the frost and prompted speculation that Brazil would not meet its export allocation under the International Coffee Agreement. Repeated frosts, intermittent droughts and troublesome laborers cast doubts on the potential for some regions to grow coffee. In a scathing report claiming that Brazil would

[361] Leite and Gouvêa, *Levantamento dos danos*, 12.
[362] No author, "Paraná não é terra para café, afirmam os técnicos," *O Estado de S. Paulo*, 19, July, 1969, 5.
[363] IBC-GERCA, *Relatório* (Rio de Janeiro: 1970), 18.

face a coffee shortage, a series of unauthored articles in the agricultural section of *O Estado de S. Paulo* newspaper described the problem and their prescription of a solution. "We lack new lands. The coffee planting is immense. The lands are old, riddled with pests. At the same time, workers are leaving the farms." But exactly in consort with the state's and its coffee institutions' earlier rhetoric, the solution was articulated in terms of already standard modernization discourse: "mechanize the coffee harvest, it is the only way…everything can be done with machines, and at much lower prices."[364] These earlier discourses on technification and mechanization of coffee growing had revolved around general understandings of what coffee cultivation meant for Brazil. Now, however, they had acquired a more targeted tone: modernization was not only about the challenges of labor, environment, and coffee quality, but also – and pressingly so – about recovering land previously considered exhausted.

Conclusion

In January 1970, the government of São Paulo, supported by the IBC, launched a plan to plant 200 million new coffee trees. It was the first ambitious project to plant coffee fields on a large scale using the most modern techniques and technologies.[365] This project fit into a larger plan by the government of Emílio Médici, who had assumed the presidency of the dictatorship on October 30, 1969. "Since the 1950s," President Médici said, "the force of development has been predominantly industrial and in disequilibrium with the agriculture sector…the aim is a substantial rise in agricultural production and the rise of exports, that certainly motivate the internal market and the industrial sector."[366] Médici labeled 1970 as the "year of agriculture." As

[364] No author, "Beba mais café: faltará em 72," *O Folha de S. Paulo,* 23 October, 1969, 84.
[365] IBC-GERCA, *Relatório* (Rio de Janeiro: 1971).
[366] No author, "Os projetos prioritários do Governo," *O Estado de S. Paulo,* 3 October, 1970, 6.

one of the protagonists of the "year of agriculture," coffee returned to center stage as the target of an additive modernization program to plant new coffee fields.

Médici's pronouncement marked the final transition from an agricultural modernization plan for coffee based on subtraction and diversification to a process of addition and intensification. This chapter traces how GERCA operated as an elastic body for different developmental initiatives. The institution's years of continued operations present a superficial continuity that belies the radical changes in how government policies affected coffee growing regions. The multiple reformulations of GERCA's program demonstrate how different planners applied variegated approaches, seeking to address first overproduction and then underproduction, all under an overarching ethos of agricultural modernization. GERCA provided a vehicle for coffee focused programs, carried out by the agronomists and technicians to reach coffee farmers and to build individual relationships. Despite the profound changes in operational goals, as an intermediary government institution GERCA demonstrated its utility to state planners because of its flexibility.

The activities of GERCA consisted of three overlapping phases, each of which varied in their intensity and in their access to state resources. The goals of planners to reshape the role of coffee in the national economy and promote agricultural modernization undergirded each phase. The first two phases entailed uprooting coffee for food crops, and later for export commodities. Both approaches specifically targeted low-productivity coffee for destruction, seen as a hindrance for agricultural development overall. Clearing coffee from the land provided fields for other crops that could be grown using the best technologies and methods to increase yields and profitability. Diversification, however, consistently failed to generate the results planners envisioned. Policy changed again when planners realized that excessive eradication posed new

risks of a national coffee shortage. Planners launched a third phase that focused on planting new fields and on discovering ways, scientific and technological, to increase yields and profitability.

This chapter demonstrates how the operations of GERCA were shaped by planners responding to a variety of factors. Changes in the national economy affected the financing and objectives of the programs. Changing calculations of the value of coffee in the national economy directly impacted how coffee fit within the modernizing agenda. Fraud and manipulation informed GERCA's response to increase the number of agronomists and better train them. Moreover, environmental events frequently played a role in shaping the institutional efforts to harness the coffee industry, often in unforeseeable ways. Frosts operated as protagonists and antagonists to the aims of GERCA in different periods. Unlike the 1963 frost, which numerically helped the eradication efforts, the frost in 1967 and 1969 destroyed coffee trees in excess and motivated government planners to promote planting. Through a disorganized and unpredictable process, Brazilian planners managed to oversee the destruction of just under two billion coffee trees by 1968. Measurements of national productivity per thousand trees had steadily increased as well, albeit at a slow pace. But by the end of the decade, planners had a clear vision for what modern coffee represented and an agenda to promote its planting, thus solidifying coffee in the modernizing agenda of national development goals.

Chapter Three: An Epidemic Foretold: Responding to the Arrival of Coffee Leaf Rust in Brazil, 1970-1972

"In South America, nature does everything she can for coffee and man does as little as possible." Edwin Lester Arnold (1886)[367]

On January 18, 1970, Dr. Arnaldo Gomes Madeiros made a startling discovery while walking through a coffee plantation in the municipality of Aurelino Leal, Bahia, a state in northeastern Brazil. The agronomist noticed small rust-colored blotches on the tops of the coffee trees' leaves. Upon closer inspection, he saw a yellow-orange powder-like substance on the underside of the leaves. Although Madeiros worked principally with cacao at the Bahian Cacao Institute (Instituto de Cacau da Bahia), he immediately realized that the odd discoloration on the coffee leaves did not bode well, and collected samples for testing. His initial suspicions about the origin of the discoloration proved correct. One of the greatest threats to coffee production —the *Hemileia vastatrix* fungus commonly known as "coffee leaf rust" — had reached Brazil.[368]

Only a year before the rust arrived, in 1969, the federal government empowered the Brazilian Coffee Institute (Instituto Brasileiro do Café—IBC) to implement the Plan to Renovate and Reinvigorate Coffee Fields (Plano de Renovação e Revigoramento dos Cafezais—PRRC).[369] This plan promoted planting new "modern" coffee fields, marking a turning point in the state's vision of coffee in the national economy. During most of the 1960s, planners sought to slow coffee overproduction by incentivizing the eradication of low-yielding coffee trees. However,

[367] Edwin Lester Arnold, *Coffee: its Cultivation and Profit* (London: W.B. Whittingham & Co., 1886).
[368] Correspondence from Alcides Carvalho to António Branquinho d'Oliveira, 22 January, 1970, Instituto Agronômico de Campinas (IAC), Centro de Café, Campinas, São Paulo.
[369] Instituto Brasileiro do Café (IBC), Grupo Executivo de Racionalização da Cafeicultura (GERCA), *Projeto Café: Relatório Anual, 1969* (Rio de Janeiro: Instituto Brasileiro do Café, 1969) 4.

after nearly two billion coffee trees were destroyed by the late 1960s, planners worried that eradication efforts had exceeded their goals.

The timing of the coffee leaf rust's arrival in January of 1970 could hardly have been worse. The potential proliferation of the fungus would exacerbate concerns of coffee shortages. The rust attacks the leaves of the coffee tree, slowing photosynthesis or defoliating the tree, decreasing the amount of coffee berries produced for the annual harvest. The coffee rust imperiled the entire Brazilian coffee industry, including the livelihoods of millions of farmers, middlemen, and laborers. Harvest shortfalls would reduce coffee exports and the government's revenue through taxation.

The decision to expand coffee planting through the PPRC corresponded with a broader move by state planners to embrace export agriculture as a driver of economic development. Emílio Garrastazu Médici became president of the military regime in October 1969, and maintained the hardline politics firmly established by Artur da Costa e Silva.[370] Yet, even more so than Costa e Silva, Médici empowered technocrats as "non-political" representatives who rhetorically worked foremost for the country rather than in service to the military regime (1964-1985). In this context, technocrats were civilian specialists or experts who received formal institutional training and worked in government posts or institutions.[371] As Minister of Finance, economist Antônio Delfim Netto emerged as one of the most influential experts. He outlined his goal to "aggressively amplify Brazilian exports" to guarantee strong national growth in 1969. This strategy depended heavily on raising agricultural productivity per hectare of cultivated land by applying machines and soil correctives, and simultaneously increasing labor productivity per

[370] Thomas E Skidmore, *The Politics of Military Rule in Brazil: 1964-85* (New York: Oxford University Press, 1988), chapter five.
[371] Eve E. Buckley, *Technocrats and the Politics of Drought and Development in Twentieth-Century Brazil* (Chapel Hill: The University of North Carolina Press, 2017), Introduction.

worker (typically measured by the number of workers needed per hectare of land or quantity of yields cultivated).[372]

The Brazilian economy experienced rapid growth from 1968-1974, a period later termed the "economic miracle." The country's rapid industrialization and surging exports drove its Gross Domestic Product (GDP) upward at 11 percent annually.[373] Yet amid the profound economic changes in Brazil, coffee remained the country's primary export crop in 1970 and principal source of foreign exchange receipts used to balance trade. To a great extent, revenue from coffee contributed funds for the state's national development agenda upon which the military regime staked its legitimacy.[374]

This chapter examines how state planners responded to the arrival and spread of *Hemileia vastatrix* with varied and evolving strategies over the first two years. Initial shock and administrative disorganization gave way to an expansive effort to understand and combat the fungus. Planners started with efforts to eradicate the rust by burning an area radius around any identified outbreak. They also sought to geographically contain the fungus by building an ecological barrier to prevent the rust from reaching the principal coffee growing regions. Over the course of a year, these initiatives failed, and the coffee leaf rust continued to spread.

Gradually, agronomists, economists, and rural extension specialists developed technologies and strategies to manage the impact of the fungus. Through trial and error, they refashioned an existing model of modern coffee and fused it with new technologies and inputs. Climatologists identified environmental criteria that could limit the fungus's effect on a coffee

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[372] Antônio Delfim Netto, in "Exportação garante crescimento," *O Estado de S. Paulo,* 15 November, 1969, 22.
[373] Luiz Bresser Pereira, *Development and Crisis in Brazil, 1930-1983* (London: Westview Press, 1984), 140-141; Werner Baer, *The Brazilian Economy: Growth and Development, 7th edition* (London: Lynne Rienner Publishers, 2014); Jerry Dávila, *Hotel Trópico: Brazil and the Challenge of African Decolonization: 1950-1980* (Durham: Duke University Press, 2010), 145; Skidmore, *The Politics of Military Rule*, 91-92.
[374] Anthony W. Pereira, *End of the Peasantry: The Rural Labor Movement in Northeast Brazil, 1961-1988* (Pittsburgh: University of Pittsburgh Press, 1997); Skidmore, *The Politics of Military Rule*.

tree's productivity. This research included identifying more favorable regions with specific rain patterns and land elevation to plant new coffee fields. The new methods to lessen the impact of the rust gradually provoked changes to the state's definition of "modern" coffee. By 1972, this evolving definition, and the measures it composed, included the adoption of fungicide spraying, varietal research for rust-resistant plants, and calculated spatial organization of coffee trees on farms to facilitate greater mechanization. Arriving at this point was contentious, and contingent upon state investment. The rust ultimately represented one significant factor among many that demanded constant adaptation in the effort to maintain control over agricultural environments.

I argue that the state and its cohort of experts responded to the arrival and proliferation of the coffee rust over two years in a manner that ultimately accelerated their pre-existing aspirations for agricultural modernization, albeit through a contingent and uneven process. I examine how the rust posed a significant threat that catalyzed the investment of national institutions in scientific research and rural extension to fight the fungus and provide know-how to farmers. Brazilian government planners chose to increase their investment in coffee growing at a decisive moment, rather than abandon the crop.

The case of the coffee fungus in Brazil stands in stark contrast to the history of rubber cultivation. As historian Warren Dean argues, Brazilian efforts to intensify rubber plantations over much of the twentieth century failed to overcome ecological challenges. Specifically, the inability of politicians and scientists to appropriately address a different fungus, *Fusicladium macrosporum*, that mostly rendered rubber production uneconomic in Brazil.[375] The responses to the coffee leaf rust show how in a different temporal and geographical context, a concerted state effort more successfully battled the harmful impact of a major crop disease.

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[375] Warren Dean, *Brazil and the Struggle for Rubber: A Study in Environmental History* (Cambridge: Cambridge University Press, 1987), 55, and chapter 4.

In the following sections, I will first trace the rust's global trajectories prior to its arrival in the Americas, and the ensuing international efforts to understand and combat it. The chapter will then examine the conditions of Brazilian coffee agriculture that the fungus encountered. Finally, I outline how massive federal investments sustained a crusade against the fungus. The national program to defend coffee proved successful in so far as the national industry withstood the imminent threat of the fungus, albeit through adaptation and accommodation. I examine how programs to combat the rust impacted the geography and methods of coffee cultivation in Brazil.

Once the state recognized that the rust had become a permanent menace in the coffee sector, the methods to combat it shifted to focusing principally on "technifying" coffee growing. Coffee technification typically referred to a combination of measures, including the adoption of high-yielding varieties (a measurement of the amount of coffee grown per tree or per hectare), the use of fertilizers and pesticides, and spatial organization to maximize plant and farm productivity.[376] Strategies to technify coffee thus prioritized measures to manage the debilitating effects of the fungus, while simultaneously adopting technologies and techniques to increase plant yields and overall farm productivity.[377] One proponent of technified coffee agriculture, Saulo Roque, worked as an IBC agronomist in the 1970s and fought the fungus directly. In an interview, he argued that "modern coffee was created through the institutions… the war against rust brought a great benefit for Brazilian coffee. Only after was there a great technification, and it

[376] Technification is most commonly used in Spanish speaking coffee growing countries. The term typically refers to a variety of practices and inputs used on a coffee farm, including pruning, shading, the use of inputs, machines, and selected varieties. The term was adopted by USAID in Central American and Panama reports in 1981, see Robert Rice, "A Place Unbecoming: The Coffee Farm of Northern Latin America," *Geographical Review* Vol. 89, No. 4 (Oct., 1999). Rice describes the process of "technification" as the transformation from traditional to modern cultivation.

[377] In my formulation, as discussed in chapter one, technification includes technical changes that compose a subsidiary part of modernization, but they do not include the larger processes of ecology and labor embedded in agricultural transformation. See: John Talbot, *Grounds for Agreement: The Political Economy of the Coffee Commodity Chain* (London: Rowman & Littlefield Publishers, 2004).

caused a violent transformation."[378] The rust historically represented one of the greatest threats to coffee growing, but in the case of Brazil its arrival spurred the construction of the most "modern" coffee sector in the world.

Scholars of environmental history and commodity studies recognize the fundamental friction in the relationship between agriculture and nature. Farmers typically seek to control their agricultural space to cultivate specific plants while managing threats to their farm's productivity, including pests, diseases, erosion, drought, floods, and frosts, to name a few.[379] Linking these studies thematically, historians emphasize actions to combat, mitigate, or flee from certain environmental challenges or threats. Scholars have noted the destruction brought by pests and diseases, especially over the last few centuries, which coincided with the intensification of agriculture and the global circulation of biological material—both crops and their respective diseases and pests.[380] Despite the challenges that agricultural systems face, measuring the impact of diseases and pests remains subjective. In the case of coffee, the impact of the rust can be measured in productive losses. While the coffee leaf rust posed no direct threat to human lives, it posed a potential catastrophe for the coffee economy, harming thousands of farmers and affecting the economic development aims of the nation, were it not addressed.

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[378] Saulo Roque de Almeida, interview by author, Varginha, Minas Gerais, October, 2015.

[379] On coffee specifically see Warren Dean, "The Green Wave of Coffee: Beginnings of Tropical Agricultural Research in Brazil (1885-1900)," *The Hispanic American Historical Review* Vol.69, No. 1 (Feb 1989); Warren Dean, *With Broadax and Firebrand: The Destruction of the Brazilian Atlantic Forest* (Berkeley: University of California Press, 1995), chapters 8-10; Stuart McCook, "Global Rust Belt: *Hemileia vastatrix* and the Ecological Integration of the World Coffee Production since 1850," *Journal of Global History* 1. No. 02 (2006): 177-195; For other crops see Dean, *Brazil and the Struggle for Rubber*; John Reader, *Potato: A History of the Propitious Esculent* (New Haven: Yale University Press, 2009); John Soluri, *Banana Cultures: Agriculture, Consumption and Environmental Change in Honduras and the United States* (Austin: University of Texas Press, 2005); James Giesen, *Boll Weevil Blues: Cotton, Myth, and Power in the American South* (Chicago: The University of Chicago Press, 2011).

[380] Alfred Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900-1900.* (Cambridge: Cambridge University Press, 1986); Alfred Crosby, *The Columbian Exchange: Biological and Cultural Consequences of 1492* (Connecticut: Greenwood Publishing, 1972); Dean, *Brazil and the Struggle for Rubber*; Frank Uekotter, eds. C*omparing Apples, Oranges and Cotton: Environmental Histories of the Global Plantation* (Chicago: University of Chicago Press, 2014).

Spores of Havoc: Coffee Rust Attacks Plantation Agriculture, 1869-1930

The Arabica coffee plant is the most widely cultivated coffee variety in the world and it is plagued by a number of pests and pathogens. An agronomic manual published by the Brazilian Coffee Institute in 1972 lists six different insect pests, and six major diseases, along with a host of minor maladies that may threaten the plant.[381] The coffee-leaf rust (*Hemileia vastatrix*) ranks among the most destructive of this list. The rust is a fungus that attacks the leaves of the *Coffea arabica* plant, causing defoliation and limiting the tree's ability to generate energy and thus produce coffee berries. The disease begins its lifecycle as a tiny spore that only germinates in liquid water on the underside of a coffee leaf, requiring temperatures between 15 and 28 Celsius. The spores penetrate the leaf tissue with shoots that produce spore buds. These spore buds in turn produce visible pale yellow and orange spots, or lesions, on the dark-green leaf and disrupt the plant's ability to photosynthesize. Each lesion can contain hundreds of thousands of spores that can be transported easily by wind and rain, or piggyback on insects or other creatures that pass through the ecosystem.[382] Outbreaks can occur annually, weakening the tree's production of coffee berries over multiple years. Coffee rust most likely evolved alongside a variety of coffee species in Africa, the ecological origin of all coffee plants. The variety *Coffea arabica* is particularly susceptible to the fungus, while other coffee varieties developed partial to high genetic resistance (Liberian and Robusta coffee respectively).[383]

Hemileia vastatrix first attacked large commercial scale coffee plantations in Ceylon (present day Sri Lanka) in 1869. For centuries beforehand, coffee growers outside of Africa had no need to concern themselves with the pathogen, which initially lagged behind the globalization

[381] IBC, *Cultura de café no Brasil: Manuel de recomendações* (Rio de Janeiro: 1977), 156-207.
[382] McCook, "Global Rust Belt," 179.
[383] McCook, "Global Rust Belt," 176.

of coffee growing. After 1869, the fungus emerged as the first major coffee epidemic disease, as it moved through major productive regions of the Indian Ocean's basin and elsewhere in Asia.[384] By the mid-1880s, plantations across South Asia rapidly declined in production, prompting changes in the global geography of coffee cultivation.[385]

The virulence of the rust on farms in the Indian Ocean's basin at least partially stemmed from the local methods used for growing coffee. European colonial officials encouraged monoculture planting to increase productivity and earn higher profits from a given cultivatable space. Officials rejected mixed-crop cultivation systems typical of native people in the region, largely considering them to be backwards and unproductive.[386] Dominant single-crop (monoculture) landscapes became commonplace in coffee cultivation, corresponding with agricultural trends in many areas around the world. Monoculture coffee fields possessed only the natural defense of the plant when the rust arrived, and the fungus moved with little impediment among the closely planted coffee trees.[387] As historian Stuart McCook notes: "the intensity of coffee rust infections in the wild was kept in check by a combination of factors, including the biological diversity of the forest, the genetic resistance of the coffee plant, the climate, and parasites that attack the rust fungus."[388] The coffee leaf rust's dispersal through the Indian Ocean basin found welcoming landscapes for procreation in the neatly organized monoculture farms—a feast for the fungus.

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[384] McCook, "Global Rust Belt," 181-183; William Gervase Clarence-Smith, "Coffee Crisis in Asia, Africa, and the Pacific," in *The Global Coffee Economy in Africa, Asia, and Latin America 1500-1989*, eds. William Gervase Clarence-Smith and Steven Topik (Cambridge: Cambridge University Press, 2003), 102.
[385] Clarence-Smith and Topik eds, *The Global Coffee Economy*; Nina Luttinger and Gregory Dicum, *The Coffee Book: Anatomy of an Industry from Crop to the Last Drop* (New York: The New Press, 2006); Mark Pendergrast, *Uncommon Grounds: The History of Coffee and How it Transformed our World* (New York: Basic Books, 2010).
[386] McCook, "Global Rust Belt," 183.
[387] Clarence Smith, "Coffee Crisis in Asia," 105.
[388] McCook, "Global Rust Belt," 179.

The coffee rust did not infect all places it reached on South Asian plantations equally. The intensity of the disease varied in accordance with local, contingent environmental factors (especially rainfall), and the life cycle of the fungus. European colonial officials contracted scientists to investigate the rust. The most prominent of these scientists, botanist Henry Marshall Ward, traveled to Ceylon in 1880. He concluded that the rust bore responsibility for declining production and even noted that the cultivation of single-plant coffee fields provided fertile conditions for the fungus.[389] Research from this era gradually revealed the disease's traits and identified a few initial strategies for controlling it.[390] Scientists developed copper-based sprays to prevent the fungus from attacking the leaves, with limited results. Some farmers experimented with planting Robusta coffee, which had evolved natural resistance to the fungus. But Robusta's different and undervalued taste made it a poor market substitute for Arabica coffee. For many growers, falling productivity and rising costs to combat the disease eroded the Arabica coffee's profitability.[391]

The decline of coffee growing in the Indian Ocean basin coincided with planting in other regions and countries. Brazil firmly established itself as the global leader in coffee production in the second half of the nineteenth century. This development was partly possible because the Americas remained free of the rust, while the fungus continued to move in the Old World, striking East African Arabica coffee plants in the early twentieth century.[392] While the impact of the rust in Africa varied regionally, it followed a trend similar to the Asian and Indian Ocean basin experiences: Arabica coffee planted as monoculture generally declined in productivity.[393]

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[389] McCook, "Global Rust Belt," 182.
[390] J.B. Matiello and S.R. Almeida. *A ferrugem do cafeeiro no Brasil e seu controle* (Varginha, Minas Gerais: 2006), 61-70.
[391] Clarence-Smith, "Coffee Crisis in Asia, Africa, and the Pacific," 102.
[392] F. H. Sprott, *Coffee Planting in Kenya Colony* (Nairobi: East African Standard, 1930).
[393] Luttinger and Dicum, *The Coffee Book*, 29-30.

Hemileia vastatrix contributed to the closing of some coffee frontiers, as farmers migrated elsewhere or turned to other crops deemed more economically beneficial or culturally preferable. Just as coffee transformed the ecological and environmental conditions where it was cultivated, the arrival of *Hemileia vastatrix* forced a recalculation of those conditions.

Agricultural Research in the Brazilian Context, 1886-1945

Despite *Hemileia vastatrix's* ability to travel great distances on winds, the Atlantic Ocean apparently proved too vast for the spores to reach the Americas. The geographic barrier nearly failed in 1903 when infected coffee plants reached Puerto Rico traveling with coffee seedlings sent from Java. An observant U.S. scientist noticed the signs of the fungus and destroyed all the plants in port before it could spread.[394] While many European colonial governments financed diverse scientific botanical investigations, Brazil engaged with these efforts only later, and hesitantly.[395]

With the end of slavery in Brazil looming near the close of the nineteenth century (it was eventually abolished in 1888), agricultural elites grew concerned about coffee labor, credit, and productivity. Imitating European examples, a group of forward-looking planters led by Antônio da Silva Prado, the Minister of Agriculture, requested funding from the Imperial government for an agricultural research station in 1886. Emperor Don Pedro II approved the request and founded the Campinas Imperial Station (Estação Imperial de Campinas) on 27 June, 1887, which later became the Campinas Agronomic Institute (Instituto Agronômico de Campinas—IAC).[396]

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[394] McCook, "Global Rust Belt," 184.
[395] Dean, "Green Wave," 95.
[396] Rogério Naques Faleiros, *Fronteiras do café: fazendeiros e "colonos" no interior paulista, 1917-1937* (São Paulo: Universidade do Sagrado Coração, 2010); Vitu Carmo and Zulika Alvim, *Chão fecundo: 100 Anos de história do Instituto Agronômico de Campinas* (São Paulo: Agroceres, 1989).

Politicians chose to establish the research center in Campinas, in the province of São Paulo, because it was the largest regional coffee growing municipality in the province and operated as a central transport hub.[397] The IAC hired Franz Dafert as its first director, a young and ambitious Austrian agricultural chemist who had earned a doctorate from the University of Giessen. The other initial staff of the Institute consisted of two chemists and a civil engineer, and shortly thereafter a phytopathologist (plant pathologist).[398] In 1891, Dafert began his scientific research to raise the productivity of coffee trees. In this vein, he began to experiment with fertilizers and soil nutrition in 1894.[399] As an active member of the international scientific community, Dafert knew of the dangers posed by *Hemileila vastatrix.*

Despite the absence of coffee leaf rust in Brazil at the time, its global menace produced a divisive debate captured in the short career of Dr. Franz Benecke. Trained as a phytopathologist, Benecke worked on the coffee leaf fungus in South Asia before taking a position at Campinas one year after Dafert's hiring. Benecke arrived in Brazil eager to continue research on the rust. In 1894 he published an article advising large-scale farmers of the destruction in Ceylon. Benecke offered a troubling opinion about São Paulo's coffee trees: "happily, the plantations in the state of S. Paulo do not suffer from this disease… although saying this it is not impossible that the disease exists in one or another place, and until today has remained unknown because it has not malignantly propagated itself and not caused great losses."[400] Benecke encouraged planters to

[397] Ulysses Cidade Semeghini, *Do café à indústria: uma cidade e seu tempo* (Campinas, São Paulo: Editoria da Unicamp, 1991), 40. São Paulo became a state in 1889 when the Empire of Brazil became a Republic.
[398] Dean, "Green Wave"; Instituto Agronômico de Campinas, *Relatório 1888*, annexo, (Campinas: 1888) 3-6.
[399] J.A. Jorge, E.B. Germek, A.P. Camargo O.J. Book, A. Conagin. *Memória do Instituto Agronômico* (Campinas: Instituto Agronômico de Campinas, 1993), 8.
[400] Franz Benecke, "Aviso aos lavradores sobre o aparecimento de moléstias em plantas de cultura," in *Relatório anual do Instituto Agronômico do Estado de São Paulo em Campinas* (1894), 167.

send leaves to Campinas for testing, and described the symptoms in detail: "on the top of the leaves appear circular yellow stains, and the underside is covered by an orange colored dust."[401]

Benecke's call to action fell on deaf ears and likely overstepped the IAC's research agenda and objectives. The contentious nature of Benecke's research on the rust became evident in December 1894, when Dafert criticized all "the malevolent and exaggerated propaganda by speculative journalism that the rust that ended coffee culture in Ceylon had arrived in the state." In defense of the research, Dafert attempted to clarify that studying diseases did not *produce* them, stating that "any insomniac constipation is not yellow fever, and for… most… plant diseases yet discovered, maybe none of them have the grave importance of *Hemileia vastatrix*."[402] Within what seems to have been a public debate, Dafert dismissed Dr. Benecke from the position of phytopathologist in October 1896, a move that was approved by São Paulo's Secretary of Agriculture. Seeking out the rust in Brazil was not a priority.[403] Benecke's position was soon taken by Dr. Fritz Noack. Less of a maverick in the field of agricultural pathogen research than his predecessor, Noack studied diseases already identified in Brazil, publishing work on sugarcane and wheat fungi.[404]

Agricultural research in Brazil at the time was politically contentious. Large-scale planters wielded considerable influence and had little interest in radical change. Even before Dafert returned to Europe in 1897, his research pivoted towards improving existing practices and methods rather than promoting unfamiliar or new theoretical ones.[405] Coffee elites met scientific research with skepticism; identifying a new pathogen or pest could threaten one's career, as

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[401] Benecke, "Aviso aos lavradores," 168.
[402] Franz Wilhelm Dafert, *Relatório do diretor do Instituto Agronômico de Estado de S. Paulo* (December 26, 1894).
[403] Franz Wilhelm Dafert, "Moléstias de plantas observadas no Estado em 1894 e 1895," in *Relatório annual do Instituto Agronômico do Estado de São Paulo em Campinas* (1896), 14.
[404] Dafert, "Moléstias de plantas," 14.
[405] Dean, "Green Wave," 113.

happened to French agronomist J.J. Arthaud-Berthet. Having served as director of the IAC since 1909, Arthaud-Berthet was dismissed in 1924, accused of being responsible for the arrival of a coffee pest, the broca do café.[406] This small beetle drills holes in the coffee bean to deposit its eggs, killing the bean in the process.[407] It is most likely that the broca do café arrived in São Paulo along with imported seeds from Uganda and Java in 1913.[408]

Only after the major coffee crisis associated with the global financial collapse of 1929 did the IAC create the Genetics Division (Seção de Genética) to improve agricultural research. Working as a research assistant, agronomist Carlos Arnaldo Krug traveled to Cornell University to study corn genetics before returning to Brazil the next year to direct IAC's genetics division. His research agenda prioritized "improving" corn and coffee by learning the genetics of inheritance and resistance to diseases and pests. The genetics division and Krug's leadership marked the re-entry of Brazilian scientific research in coffee domestically and internationally. This re-entry occurred at the same time coffee revenues were rapidly declining amid contracting global trade, prompting new measures. Dr. Krug published research on the genetic varieties of Arabica coffee in Brazil in 1939, assessing productivity and drinking quality.[409] Recognized for his pioneering research in plant genetics, Krug assumed the directorship of the IAC in 1949.

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[406] Carmo and Alvim, *Chão fecundo*, 70; Rui Henrique de Albuquerque, Antônio César Ortega, and Baastian Philip Reydon, "O sector público de pesquisa agrícola no Estado de São Paulo, parte I," *Cad. Dif. Tecnol.*, Brasília, 3(1) (Jan/Apr, 1986): 87-88.

[407] Carmo and Alvim, *Chão fecundo*, 70.

[408] Eliane Laurentino and Jose Nilton Medeiros Costa, *Descrição e caracterização biológica de broca-do-café no Estado de Rondônia* (Rondônia: Embrapa, 2004), 8; Some researchers suggest that the beetle came from the Democratic Republic of the Congo, as Bethet claimed in 1913. See Franciso Infante, Jeanneth Perez, and Fernando E Vega, "The Coffee Berry Borer: The Centenary of a Biological Invasion in Brazil," *Brazilian Journal of Biology* Vol.74, No.3 (2014). Not until 1924 was the beetle recognized as the same from Africa, the *Hypothenemus hampei*, when it caused widespread damage to coffee trees.

[409] IAC, *Boletim técnico n. 62* (1939), 1.

Coffee Rust on the March After WWII, 1945-1969

After World War II, a revival of the global coffee economy coincided with a new wave of coffee rust epidemics through previously uninfected Arabica growing regions of central and western Africa. Outbreaks spread through British Cameroon, Ivory Coast, and Liberia in the 1950s, in Guinea and Nigeria in the early 1960s, and in Angola in 1966.[410] Compared to other regions, the fungus caused a less dramatic decline in coffee production in Africa since some growers cultivated rust-resistant Robusta rather than the vulnerable Arabica.[411] However, the issue of coffee rust garnered international interest and collaboration amid post-war global development initiatives. The recently founded Food and Agriculture Organization of the United Nations (FAO) and the Inter-American Association (IAA) participated in building multi-national partnerships to prevent the spread and limit the impact of the disease. Their efforts were an early and imperfect example of international collaboration to protect the global coffee industry.

In 1952, Frederick L. Wellman, a plant pathologist and chief agriculturalist who specialized in coffee at the Costa Rican Inter-American Institute of Agricultural Science, traveled the world to study the rust. Accompanied by Dr. William H. Cowgill, a horticulturalist at the National Agricultural Institute of Guatemala, they sought "to work out ways to spare the coffee industry of the Americas of possibly great losses to this fungus."[412] The mission was organized by the U.S. Department of Agriculture's Office of Foreign Agricultural Relations and financed by the Institute of Inter-American Affairs, an American non-government organization that promoted economic development, discussed in Chapter One.[413] After the two agronomists

[410] McCook, "Global Rust-Belt," 187.
[411] McCook, "Global Rust-Belt," 187.
[412] No author, "Fredrick L. Wellman Takes Up New Position," in *Coffee and Cacao Technical Services* Vol. 4, No. 15 (Turrialba, Costa Rica: October-December, 1962): 63.
[413] Frederick L. Wellman, "Some Important Diseases of Coffee" in *Yearbook of Agriculture: Plant Diseases* (United States Department of Agriculture, 1953) 891; Antônio Pedro Tota, *O amigo Americano: Nelson Rockefeller e o Brasil* (Rio de Janeiro: Campanhia das Letras: 2014).

traveled 36,000 miles through the world's coffee zones, Wellman published an article in 1953 in *Foreign Agriculture,* the U.S. Department of Agriculture's journal. Explaining why the U.S. willingly financed research on the fungus in an increasingly polarized geopolitical context, Wellman argued that if the rust arrived in the Americas, "a two billion (dollar) industry would be undermined and the whole economy of a dozen Latin American countries would be shaken."[414]

Wellman urged greater attention to the fungus and explained the likelihood of it reaching the Americas. He argued: "luck and the accidents of circumstance must explain a good deal of the freedom from rust that we have enjoyed thus far… but luck cannot be depended upon forever. And conditions are changing. Airplane traffic is general and increasing. In the next 20 years", Wellman continued, "the danger of introducing coffee rust into the Americas will be multiplied many times. No matter what we do, the disease will probably come to us at last."[415] In his travels Wellman collected over 100 different coffee varieties, noting the different environmental characteristics of where they grew. These samples were transported back to botanic stations in the United States with the intention of distributing them to cooperating experimental stations in Latin America.[416]

Brazil's participation in this international initiative took shape through the IAC. In 1953, under Krug's leadership, the institute received the first coffee plants resistant to the fungus, which needed to be quarantined for more than a year. Their arrival signaled the beginning of Brazilian research on the rust and greater international engagement in the political and botanical spheres of coffee.[417] In 1955, Krug set off on his own trip through the world's coffee producing

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[414] Fredrick L. Wellman, "The Americas Face up to Threat of Coffee Rust," *Foreign Agriculture,* Vol XVII no. 3 (March 1953).
[415] Wellman, "The Americas Face up."
[416] Wellman, "The Americas Face up."
[417] IAC, *Boletim Anual* (1954), 1.

zones to research the rust and coffee genetics.[418] An even broader consortium of agricultural institutions supported his travels, including the FAO, the French Institute of Coffee and Cacao (IFCC), as well as the Inter-American Institute for Agricultural Science (IICA) in Costa Rica. In this case, the material collected was sent to the recently founded Center for Coffee Rust Investigations (CIFC) in Portugal.[419]

Although these initiatives contributed to the construction of an international network of scientific knowledge, they did little to halt the spread of the disease. In 1960, *World Crops,* an academic journal specialized in international agriculture assessments, called the rust the "most well-known and notorious of all the diseases of tropical plants."[420] Scientists in rust-stricken areas experimented with methods to control the debilitating effects of the fungus. In Kenya, for instance, researchers developed more effective sprayers and demonstrated the benefit of chemical control, especially from spraying with Bordeaux (a copper-based liquid) mixture.[421] Applied to the leaves of coffee trees, the spray diminished the ability of spores to attack and procreate. Researchers also noted variations in the rust's intensity based on temperatures and humidity.[422] Experimental research suggested it was possible to breed resistance into plants that possessed partial or no resistance. But as agronomist R.W. Rayner explained, "not enough is known about the genetics of resistance to be sure at the present stage that this will be possible."[423] Beyond the few scientists and research institutions, Brazilian planters likely had few worries about the fungus. They had their own issues, as all farmers do, especially between the

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[418] Jorge, *Memória do Instituto Agronômico*, 37.
[419] Jorge, *Memória do Instituto Agronômico*, 37.
[420] R.W. Rayner, "Rust Disease of Coffee: I—Nature of the Disease," in *World Crops* (May, 1960), 136.
[421] The use of copper-based spray to control the rust dates back to 1890, but the results were limited by technology and effectiveness. In the early 1960s in Kenya, researchers used motorized backpack spraying machines to increase the efficiency of spraying. Ajamada C Kushalappa and Albertus B. Eskes. *Coffee Rust: Epidemiology, Resistance, and Management* (Boca Raton, Florida: CRC Press, 1989), 145.
[422] Rayner, "Rust Disease of Coffee: I—Nature of the Disease," 138.
[423] R.W. Rayner, "Rust Disease of Coffee: I—Resistance," in *World Crops* (July 1960), 261.

late 1950s and the first years of the 1960s, when trade prices for coffee were discouragingly low.[424]

In the late 1950s, sustained low market prices for coffee prompted producer and consumer nations to address the international coffee trade. As discussed in the previous chapter, nearly all coffee producing nations and most coffee importing nations signed the International Coffee Agreement (ICA) in 1962. Regulating the trade, producer countries gained secure markets and fixed export quotas, as well as higher coffee prices. Consumer nations sought influence and political stability, especially in Latin America amid the polarized geo-political landscape of the Cold War.[425] As U.S. President John F. Kennedy stated: "a drop of one cent a pound for green coffee costs Latin American producers $50 million in export proceeds, enough seriously to undermine what we are seeking to accomplish by the Alliance for Progress."[426]

Anticipating the coffee agreement, the Brazilian federal government created the Executive Group for Coffee Rationalization (Grupo Executivo de Racionalização da Cafeicultura—GERCA) in 1961. As discussed in the previous chapter, GERCA spearheaded a wide-ranging agricultural transformation program to eradicate coffee and promote other crops and activities.[427] From 1962-1969, the total national coffee stock declined from roughly four billion producing trees to around two billion.[428] Changes in the dictatorship's leadership and economic planning elevated the role of agriculture, and specifically export commodities, in

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[424] Mario Samper and Radin Fernanco, "Appendix: Historical Statistics of Coffee Production and Trade from 1700 to 1960," in *The Global Coffee Economy*.
[425] Robert H. Bates, *Open-Economy Politics: The Political Economy of the World Coffee Trade* (Princeton: Princeton University Press, 1997), 121-127.
[426] Talbot, *Grounds for Agreement*, 58. John F. Kennedy established The Alliance for Progress in 1961 to strengthen political relations and promote economic development. See Jeffrey Taffet, *Foreign Aid as Foreign Policy: The Alliance for Progress in Latin America* (New York: Routledge, 2007), Introduction and chapter 1.
[427] IBC-GERCA, *Plano inicial para a aplicação dos recursos do convênio, Banco do Brasil S.A, Instituto Brasileiro de Café* (1962), 4.
[428] Hélio Duque, *A luta pela modernização da economia cafeeira* (São Paulo: Alfa-Ômega, 1976), 1-3; José Braz Matiello, *O café: do cultivo ao consumo* (São Paulo: 1981), 15-16.

national development objectives. By the end of the 1960s, fears of national coffee shortages prompted the government to overhaul GERCA's eradication mandate and reverse course. On the eve of the rust's arrival, federal planners had tasked GERCA to replant coffee on a major scale along "rational" lines. Rational planting emphasized adopting technologies and techniques to raise the yields of plants and the overall productivity of farms—a concerted program to modernize coffee agriculture. At the time, GERCA's formulation of "modern" coffee prioritized planting high-yielding coffee varieties, using chemical-based fertilizers and pesticides, and to some extent labor-saving machines.[429]

The pivot to plant and modernize coffee largely ignored the threat of the rust. Throughout the 1960s Brazil's agricultural press accorded little attention to the threat of the fungus.[430] Although few in number, studies on the rust in Brazil identified the potentially disastrous consequences the disease could cause. In 1968, Alcides Carvalho, Brazil's leading coffee geneticist, and agronomist A.J. Bettencourt, published their views in the IAC's research journal, *Bragantia*. They concluded that Brazil's coffee trees were "totally susceptible to most types of the fungus."[431] Moreover, they noted the high risks associated with the increasing number of flights between Brazil and African countries where rust was rampant, which "extraordinarily increased the danger of introducing *Hemileia vastatrix* to the coffee zones of Latin America."[432] Brazil's scientific institutions had finally acknowledged the problem, but their research still remained largely exploratory.

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[429] Inputs refers to a broad category that principally included fertilizers, pesticides, and pest control.
[430] The "Agrícola" insert of the newspaper *O Estado de S. Paulo* published 18 articles that included reference to coffee leaf rust in the 1960s.
[431] A.J. Bettencourt and Alcides Carvalho, "Melhoramento visando à resistência do cafeeiro à ferrugem," *Bragantia* 27 (February, 1968): 34-36.
[432] Bettencourt and Carvalho, "Melhoramento visando," 34-36.

Forming Plans After the Fungus Arrives in Brazil, 1970

It is unlikely that on January 18, 1970, Dr. Arnaldo Gomes Madeiros could have foreseen how his discovery of the fungus would transform the Brazilian coffee industry. Madeiros simply brought samples of infected leaves to The Executive Commission for Rural Economic Recuperation of Cacao Farming (Comissão Executiva do Plano de Recuperação Econômico-Rural da Lavoura Cacueira—CEPLAC). A sample of the fungus was flown to the Center of Coffee Rust Investigation (Centro de Investigações das Ferrugens do Cafeeiro—CIFC) in Oeiras, Portugal. The Brazilian Coffee Institute, along with GERCA, invited the Brazilian phytopathologists Agespilau Bettancourt and Adolfo Carlos Vianna from the Campinas Agronomic Institute to visit the coffee field in Bahia and see *in situ* what the coffee leaves looked like. Concurrently, Madeiros' sample reached Dr. Antônio Branquinho d'Oliveira, the world leading specialist on coffee pathogen diagnosis at the CIFC. d'Oliveira confirmed that ominous blotches found on coffee trees in Bahia were, indeed, *Hemeileia vastatrix*.[433] Bettancourt and Vianna, along with GERCA general secretary Dr. José Maria Jorge Sebastião, performed their own test in Brazil, only to confirm d'Oliveira's assessment.[434]

After identifying *Hemileia vastatrix*, the initial responses by politicians and agricultural experts ranged from paralysis and perplexity to calls for extreme measures. In an interview only a few years later, the president of the Brazilian Coffee Institute, José de Paula Motta, reflected on the arrival of the rust, stating that "the rust…was a disease unknown to us. There was a college professor who wanted to eliminate all coffee planting in Brazil for, in his opinion, there was no way to fight the rust. Another… propose(d) that we burn every coffee tree—with army

[433] Correspondence from António Branquinho d'Oliveira to Alcides Carvalho, 26 January, 1970, IAC, Centro de Café, Campinas, São Paulo.
[434] IBC, GERCA, *Ferrugem do cafeeiro: características da doença e providências para seu controle* (Rio de Janeiro: May 1970), 4.

flamethrowers."[435] Others claimed that the program to "rationalize" and replant coffee was finished before it began. These calls proved sensationalist. Rather than destroying the Brazilian coffee industry, the threat of the rust in fact prompted a massive campaign driven through the IBC and GERCA to support and remodel coffee growing. As it turned out, this state-orchestrated campaign succeeded in maintaining Brazil as the leading coffee producer in the world. Amid the crisis in 1970, however, this result had seemed far from certain.

Archived communications between Alcides Carvalho at the IAC and Antônio Branquinho d'Oliveira at the CIFC in Portugal reveal the immediate concerns of leading coffee scientists. On January 22, 1970, Carvalho wrote to d'Oliveira claiming that Brazilian experts had "considerable doubt how to treat this molestation."[436] d'Oliveira replied on January 26, urging colleagues to "inspect, plant by plant, all the coffee plants… in the area where the *Hemileia vastatrix* was located." He stressed the urgency of dealing with the outbreak before it spread: "the problem is so very important for the economy, even affecting the social stability of Brazil, that I think you should mobilize all of the resources, if it is still possible to eliminate this outbreak."[437] d'Oliveira urged that a vast and expensive program be mobilized for the defense of Brazilian coffee, and that of the entire American continent.[438] In another letter on February 3, 1970, d'Oliveira encouraged Carvalho to eradicate, if possible, all of the outbreaks by burning.[439] The next day, *O Estado de S. Paulo*, a leading national newspaper based in São Paulo, reported the arrival of the rust in Brazil. The newspaper published a statement by IBC president Jaime

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[435] José Barbosa do Rosário, Clementina Silva and José de Paula Motta, "Paula Motta Comments on the Misfortunes and the Future of Brazilian Coffee Growing," in *Revista do Comércio de Café* (1975): 30.
[436] Correspondence from Alcides Carvalho to António Branquinho d'Oliveira, 22 January, 1970, IAC, Centro de Café, Campinas, São Paulo.
[437] Correspondence from António Branquinho d'Oliveira to Alcides Carvalho, 26 January, 1970, IAC, Centro de Café, Campinas, São Paulo.
[438] Correspondence from Branquinho d'Oliveira to Carvalho, 26 January, 1970.
[439] Correspondence from Carvalho to Branquinho d'Oliveira, 22 January, 1970.

Miranda, who confirmed the existence of the rust in a limited area of Bahia, but claimed that the IBC would keep the disease under control.[440] The newspaper's editors offered their view of the danger: "In the case of diffusion of the rust, all of our crops would be irreparably lost… the outbreaks need to be immediately eradicated, the only truly effective method to defend our principal crop."[441]

The newspaper supported the IBC's position to eradicate the fungus from Brazil. However, some experts who worked with coffee institutions were more skeptical. Julio Cesar, who was working as an IBC agronomist when the rust arrived, retrospectively reflected that "everyone thought it was over. Coffee in Brazil was going to end."[442] A consortium of federal ministries, agricultural institutions and state level organizations disagreed with this assessment at the time and began to develop a concerted response to the arrival of the fungus. The Ministry of Agriculture and the IBC assembled a taskforce to survey the coffee fields near the initial outbreak. On February 18th, surveyors discovered the fungus in two different locations in the municipality of Conceição da Barra in Espírito Santo state, near the border with Bahia. The identification of a second and third outbreak provided evidence that the rust was spreading.[443]

Eradicating the rust seemed the most viable and immediate option for Brazilian planners. d'Oliveira argued that successful rust eradication in Papua New Guinea in 1965 showed that eradication could work in Brazil as well.[444] FAO Agricultural Officer George H. Berg inquired in February 1970 about the state of the rust and if an eradication program had been developed.[445] Other voices expressed skepticism that farmers would participate. Journalist Carlos Henrique,

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[440] No author, Jamie Miranda in "Ferrugem do cafeeiro," *O Estado de S. Paulo*, 4 February, 1970, 3.
[441] Miranda in "Ferrugem do cafeeiro," 3.
[442] Julio Cesar, interview by author, Lavras, Minas Gerais, July, 2015.
[443] Carlos Henrique, "Praga no café baiano preocupa," *O Estado de S. Paulo*, 24 February, 1970, 5.
[444] Correspondence from Branquinho d'Oliveira to Carvalho, 26 January, 1970.
[445] Correspondence from George H. Berg to Carlos Krug, 12 February, 1970, IAC, Centro de Café, Campinas, São Paulo.

writing for *O Estado de S. Paulo* argued for "the incomprehension" of the "homem do campo" (the rural man), claiming that "not all of them, truthfully, understand the necessity to destroy the crops."[446] He also cast rural workers as potential dispersal agents, describing specifically female migrant laborers in Bahia as "threats to spreading the disease."[447] Success, argued Carlos Henrique, demanded experts to lead the fight against rust, whereby the Ministry of Agriculture would identify properties for eradication, and a military regiment would guarantee the eradication action if farmers did not comply. Authority was necessary to lead the fight against the fungus, in his view.[448] Coffee was too important to rely heavily on distrustful rural collaborators, since "[the] spreading [of rust] to the plantations in the south of the country is a problem of national security."[449]

"Plan of Action" from the Institutions to the Fields

Brazilian officials invited coffee rust experts d'Oliveira from the CIFC, and Dr. Aníbal Jardim Bettencourt from the Angolan Coffee Institute (Instituto do Café de Angola) to meet with Brazilian planners and agronomists. These meetings resulted in the creation of the Plan of Action (Programa de Ação), which the federal government authorized on April 8, 1970.[450] Developed over the course of a month, the plan encompassed nineteen different strategies, with the central

[446] On the construction of degenerative terminology for the rural population, see Jerry Davila, *Diploma of Whiteness: Race and Social Policy in Brazil, 1917-1945* (Durham: Duke University Press, 2003), 29.
[447] Henrique, "Praga no café baiano," 5.
[448] This view was not unusual in the larger context of outbreaks, particularly in the areas of public health. See Buckley, *Technocrats and the Politics of Drought*; Teresa Meade, *"Civilizing" Rio: Reform and Resistance in a Brazilian City, 1989-1930* (University Park, Pennsylvania: Pennsylvania State University Press, 1997).
[449] Henrique, "Praga no café baiano," 5.
[450] IBC, *Ferrugem do Cafeeiro: Conclusões da reunião* (25 March, 1970). The meeting included the IBC, the IAC, and the technicians from CIFC and the Coffee Institute of Angola, the Brazilian Minister of Agriculture, and GERCA.

goal of eradicating the fungus from Brazil and subsidiary goals to develop methods to contain its spread.[451] Their strategy focused on short, medium, and long-term priorities.

Short-term goals focused on surveying coffee fields to assess the extent of infection and eradicate any outbreaks. Further dispersion seemed likely given that the fungus had already spread from Bahia into Espírito Santo. A consortium of leaders of agriculturally focused institutions called for an immediate assessment of infection, including the hitherto seemingly uncontaminated states of Paraná and São Paulo – the geographic heart of coffee growing in Brazil. Eradication methods included cutting the tree to the stump and spraying herbicides, then burning the plants, ideally with flamethrowers.[452] Furthermore, as part of the Plan of Action, the IBC aimed to create a "security zone" (faixa da segurança) under the advice of d'Oliveira and Jardim Bettencourt.[453] This entailed demarcating a geographic zone that would divide the national coffee sector in two and isolate the fungus in the northeastern region, which produced only 10 percent of the national stock. The security zone would act as a biological barrier to prevent the fungus from jumping from tree to tree and moving southwestward. Planners called for the zone to be "totally devoid of coffee plantations."[454]

The plan's medium-term objectives complimented the goals to eliminate the fungus by increasing and improving training for agronomists and technicians in the rural areas. In April 1970, the IBC and GERCA held major conferences for agronomists, agricultural technicians and phytopathologists to teach the participants the fungus' characteristics, how to identify it, and the

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[451] IBC, *Atas da diretoria: uma reunião da comissão de planejamento administrativo do Instituto Brasileiro do Cafe, 351ª* (Rio de Janeiro: IBC, 28 April, 1970), 1-12.
[452] IBC, *Summary of a Consulting Commission Meeting, March 31-April 1, 1970* (Rio de Janeiro: 1970), 1.
[453] IBC, *Ferrugem do cafeeiro: conclusões da reunião* (25 May, 1970), 1. The idea of dividing the coffee areas into zones was suggested by Anibal Jardim Bettencourt in a letter to Alcides Carvalho. See Correspondence from António Branquinho d'Oliveira to Alcides Carvalho, 7 February, 1970, IAC, Centro de Café, Campinas, SP.
[454] IBC, *Ferrugem do cafeeiro: conclusões da reunião* (25 March, 1970), 3.

best eradication practices.[455] These professionals were to be posted in rural areas to monitor the spread of the fungus, reach out to farmers, and eliminate any infected plants.[456]

The plan's long-term goals strategized how to manage the fungus if it could not be eradicated from Brazil. The IBC established programs to send agronomists to the CIFC and research centers in Africa and Asia to better understand methods to combat the fungus. This knowledge would ideally contribute to a national program to experiment with breeding resistance into the Arabica coffee varieties. The agricultural universities of Lavras and Viçosa, in Minas Gerais, and the IAC in São Paulo earmarked resources for research, while the IBC also founded experimental farms.[457] However, considering that coffee trees require three to four years to fully produce, experimentation naturally required patience.

The full-scale battle against the rust began to unfold in early May 1970. The Plan of Action linked the IBC, the Ministry of Agriculture, and the Ministry of Industry and Commerce. Activities on the ground integrated a wider variety of agricultural specialists. IBC planners created a document to standardize the surveying process across regions and institutions.[458] To survey the coffee fields in Minas Gerais, the IBC collaborated with workers from the Association of Credit and Rural Assistance (Associação de Crédito e Asistência Rural—ACAR), a state-level rural development institution with a large rural extension infrastructure, discussed in Chapter One.[459]

Cooperation among agricultural institutions helped facilitate coffee farm surveys. Inspections started far from the initial outbreak zones, in southern Minas Gerais (Sul de Minas),

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[455] IBC, *Ferrugem do cafeeiro: características da doença e providencias para seu controle* (Rio de Janeiro: May 1970), 12.
[456] Matiello and Almeida. *A ferrugem do cafeeiro*, 12.
[457] IBC, *Ferrugem do cafeeiro: características*, 4.
[458] IBC, *Summary of a Consulting Commission*, 2.
[459] Associação de Crédito e Assistência Rural (ACAR), *Plano de Trabalho, 1970* (Belo Horizonte: 1970).

where the taskforces reported visiting 3613 coffee growing properties without identifying the rust. The taskforces then moved east, into the demarcated security zones in Minas Gerais and northern Rio de Janeiro states. José Edgar Pinto Paiva, an IBC agronomist, participated in this survey by visiting coffee farms registered by the IBC, as well as regional cooperatives and unions. Traveling by jeep, car, boat and mule, he and surveyors sought out the rust, "procurando do lá de cá" (searching all over).[460] Inspectors reported visiting 2451 coffee growing properties in this region and identified 53 cases of the rust in eastern Minas Gerais.

The surveys demonstrated that the fungus had continued to spread but remained contained to the northeastern coffee growing zones. In São Paulo and Paraná, a different set of surveys conducted on roughly 5000 farms failed to locate a single case of the rust.[461] These surveys justified efforts to construct the security zone and divide the national coffee sector into two regions. Work on the rust then began in earnest with the mobilization of agricultural specialists in the security zone, while experts from other coffee growing areas traveled to the affected region. Saulo Roque de Almeida, an IBC agronomist at the time, participated in "cutting swaths of land in an effort to contain it (the rust)." In a 2015 interview, he emphatically stressed that everyone who worked for the IBC in the region sought to contain the rust there, in the eastern side of the security zone.[462]

[460] José Edgar Pinto Paiva, interview by author, Varginha, Minas Gerais, October, 2016.
[461] IBC, *Ferrugem do Cafeeiro: Características* (May, 1970), 18.
[462] Saulo Roque de Almeida, interview by author, Poços de Caldas, Minas Gerais, October, 2015.

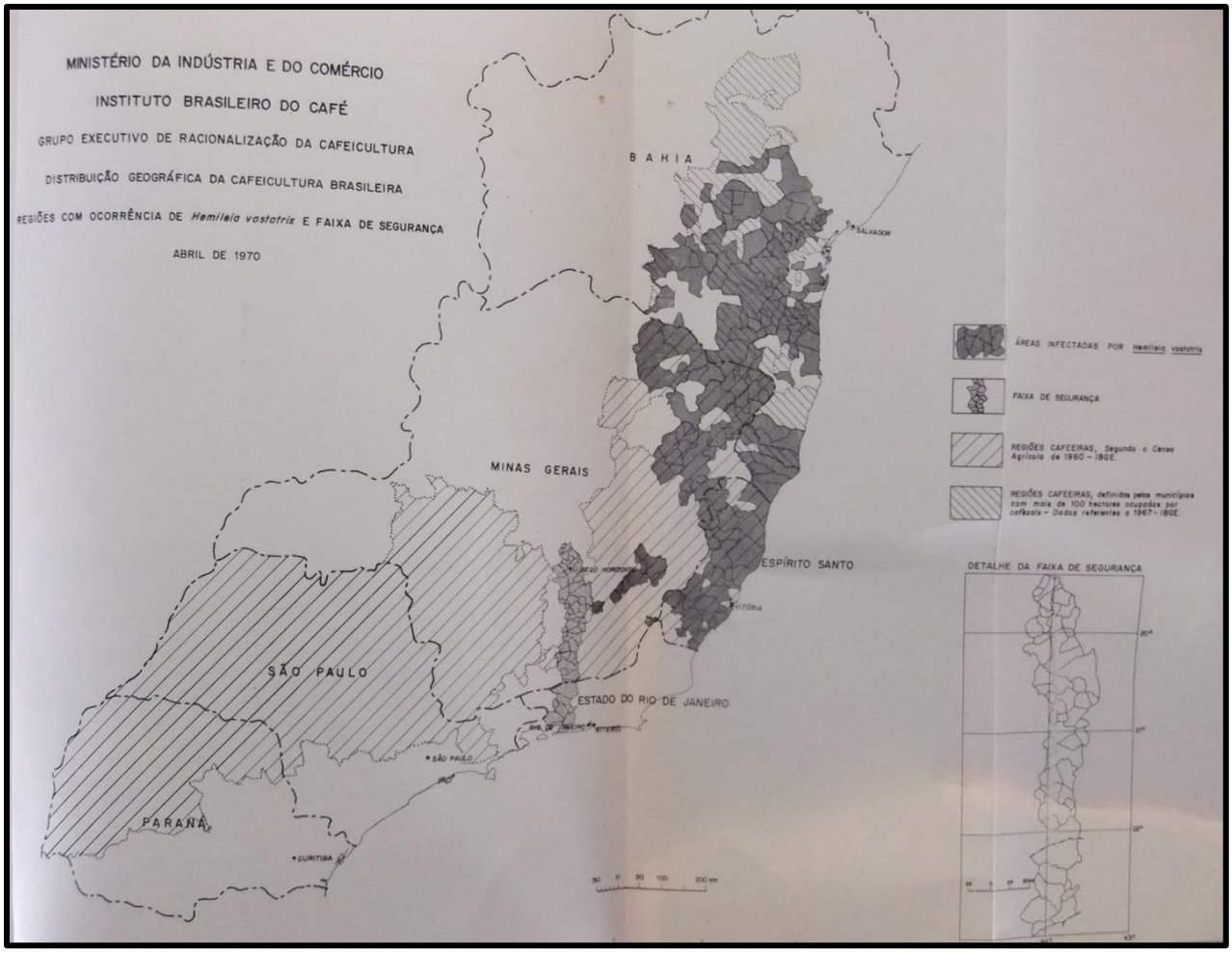

Figure 3.1: Geographic Distribution of Brazilian Coffee: Regions with the presence of Hemileia vastatrix and the Security Zone, April 1970. Ministry of Industry and Commerce, the Brazilian Coffee Institute, GERCA.

<u>Ledger on the right:</u>
1. Areas infected by Hemileia vastatrix (Áreas infectadas por Hemileia vastatrix)
2. Security zone (Faixa de Segurança)
3. Coffee regions according to the agricultural census of 1960 (Regiões cafeeiras, segunda o censo agrícola de 1960)
4. Coffee growing municipalities with more than 100 hectares of coffee plantations (Regiões cafeeiras definidos pelos municípios com mais de 100 hectares ocupado por cafezais)[463]

The initial contours of the security zone encompassed an area roughly 50 kilometers wide and 350 kilometers long, running north to south from Belo Horizonte, the capital of Minas Gerais, to Rio de Janeiro state. The zone totaled 20,170 km², encompassing roughly 500 000

[463] Minestério da Indústria e do Comêrco, IBC, GERCA, (April 1970), *Procafé archive*, Varginha, Minas Gerais.

coffee trees on over 1200 properties—a relatively small amount compared to the roughly 2 billion trees in the country. On the western side of the zone, the IBC charged their technicians in the regional headquarters in Varginha, Minas Gerais, with creating an area of "permanent vigilance" in the Sul de Minas region. With training in aerial map analysis from U.S. specialists, agronomists at Varginha analyzed aerial photos taken of the security zone to monitor if any new seedlings were being illegally cultivated.[464] To support these efforts, regional news organizations began to publish educational and instructive materials targeting farmers. Coinciding with action on the ground, *O Ruralista,* a leading Minas Gerais agricultural newspaper, first reported on the fungus in May. The rust featured thereafter in every edition throughout 1970 and 1971, including articles describing how to identify the disease, as well as warnings of its destructive potential. These newspaper articles encouraged farmers to contact experts in their municipalities, or at the agricultural universities of Viçosa and Lavras.[465]

Carlos Nogueira, an IBC agronomist and engineer specialized in radio communication, led the national program for outreach and education. The IBC and Nogueira held a series of meetings with communication specialists from the Organization of American States (OAS), the FAO, the Ministry of Agriculture, ACAR in Minas Gerais, and São Paulo's Secretary of Agriculture.[466] The involvement of such a wide range of institutions indicated the seriousness with which planners approached rural communication. The central message of the communication program contained three components: the positive activities of the state, encouragement to participate in the program, and the threat of collapse in the coffee industry. *O Ruralista* fused this message with a positive tone of progress and partnership, publishing the

[464] IBC, *Ferrugem do cafeeiro: características* (May, 1970), 22.
[465] No author, "A ferrugem do cafeeiro" *O Ruralista,* May, 1970, 1.
[466] IBC, *Ferrugem do cafeeiro: características* (May, 1970), 32.

following notice: "thanks to the diverse Brazilian institutions, we are beginning to control the coffee rust. We count on you as well! ... if you identify the disease on your property, immediately call an agronomist in your region, he will give all the orientation to control the disease." The notice included a grim reminder that farmers "need to control the rust to prevent the end of coffee!"[467]

Experimentation and Containment to Protect the "National Wealth"

Researchers from the Brazilian Coffee Institute and the Campinas Agronomic Institute began tests in the infected regions as the two coffee growing zones became more delineated. Based on communications with international experts on rust-stricken coffee areas, Brazilian agronomists adopted copper-based fungicides for testing.[468] Similar chemical mixtures had been used to control the fungus in Ceylon and the Indian Ocean basin seventy years earlier and in Kenya in the 1950s. Moreover, farmers in the Central American banana industry had been using copper-based mixtures on a mass scale since the 1940s.[469] Brazilian researchers recognized that spraying methods developed in Kenya would not directly correlate to Brazilian environments, and called for patience to test these methods on farms with different elevations and rain patterns.[470]

In May 1970, the IBC selected the municipality of Caratinga, Minas Gerais, for experimental research with fungicides. Located in the rust infected zone, researchers focused on the fungus's dispersion patterns and how it proliferated from an outbreak.[471] The tests were led

[467] No author, "A ferrugem do cafeeiro," *O Ruralista,* June, 1970, 1.
[468] IBC, *Ferrugem do cafeeiro: conclusões da reunião* (25 March, 1970), 1**.**
[469] Steve Marquardt, "Pesticides, Parakeets, and Unions in the Costa Rican Banana Industry, 1938-1962" *Latin American Research Review* Vol. 37, No. 2 (2002): 4.
[470] IBC, *Ferrugem do cafeeiro: características* (May, 1970), 38.
[471] IBC, *Relatório da situação da ferrugem do cafeeiro* (July, 1970), 4.

by Geraldo M. Chavez, a phytopathologist at the newly renamed Federal University of Viçosa, Minas Gerais, and Marcos Vilela M. Monteiro, an agronomist from the State University of São Paulo, Jaboticabal. After coffee farmer Feliciano Abdala reported the fungus on his farm, Fazenda Caetana, the professors and their team of IBC technicians and agronomists tested the copper-based mixture. They used a variety of spraying machines, determining success based on covering the highest number of coffee trees in the shortest amount of time—initially prioritizing effectiveness over costs. The tests noted the adverse role of rain, which washed away the chemicals. While the scientists studied the rust with one eye on ecological factors, they also considered the capacity of labor to apply the fungicide and were skeptical of locating skilled workers capable of operating the machines.[472] Initial research prioritized fungicide effectiveness, but also considered the mechanical, environmental, and labor components.

Additional rust outbreaks provided opportunities to test fungicides and study the nuances of the disease. On Alfredo Amert's farm in the state of Espírito Santo, researchers sprayed infected coffee trees with different chemical mixtures. In this case, rain removed the fungicide from the leaves and the technicians re-sprayed the trees twice, recording the practical and economic costs associated with rain patterns. On José Volka's farm, agronomists tested dispersion, cutting infected trees and spraying herbicides to defoliate a radial area from the outbreak. They then sprayed a wider circumference with fungicide, and left a third, broader circumference of coffee trees untouched. This experiment tested which methods (burning, stumping, defoliating, fungicides, or no action at all) proved most effective at destroying the fungus at different distances from an outbreak. On the farm of Manoel Rêgo, the IBC's

[472] IBC, *Ferrugem do cafeeiro: características* (May, 1970), 22.

researchers applied another composition of chemicals to the coffee plants, gradually building a comparative base for further study.[473]

The accumulated research informed the development of a new Campaign to Eradicate Coffee Rust (Campanha de Erradicação de Ferrugem do Cafeeiro), launched by the IBC and GERCA on June 17, 1970. GERCA took the leading role for inspection and destruction, as well as engaging the public in a bid to control the disease.[474] The boundaries of the security zone were extended further along the 44th meridian, 50 kilometers wide. The southern tip reached the municipality of Itaguaí e Mangaratiba in the state of Rio de Janeiro, while the northern tip ended in Montes Claros, Minas Gerais. The zone now stretched over 800 kilometers north to south.[475] The June campaign also called for tighter restrictions on transport, prohibiting east to west movement of any part of the coffee tree or biological coffee material including processed berries. Coffee cultivated east of the security strip had to be exported eastwards through the ports of Vitória in Espírito Santo, Ilhéus and Salvador in Bahia, and Niterói in Rio de Janeiro.[476]

The São Paulo Secretary of Agriculture issued a directive to prevent automobile travel between the western coffee growing regions and the infected areas. The bulletin stated its key message in capital letters, signifying the depth of concern: "Motorist: Brazil has a big problem of rust on our coffee trees. Coffee rust is a new disease to our country. It spreads rapidly destroying the coffee agriculture, our principal wealth."[477] The message revealed the concern with preventing human agents from carrying the rust between regions. Planners knew that rust spores could travel by wind, but they envisioned that geographical features would support the security

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[473] IBC, *Ferrugem do cafeeiro: características* (May, 1970), 22.
[474] IBC, Ministério da Agricultura, *Campanha de erradicação da ferrugem do cafeeiro* (1970), 7.
[475] IBC, *Campanha de erradicação* (1970), 8.
[476] IBC, "Normas e instruções para levantamento e eliminação de focos de ferrugem e erradicação dos cafezais de "faixa de segurança," in *Controle de ferrugem: programma de racionalização da cafeicultura* (July 1970), 2.
[477] Paulo Rebelles Reis and Rodrigo Luz da Cunha, Eds. *Café Arábica: de plantio à colheita* (Lavras, Minas Gerais: Empresa de Pesquisa Agropecuária de Minas Gerais, 2010), 69.

zone and prevent further spread. In July, another IBC directive described the security zone: "one of its ends lies at the Atlantic Ocean, and the other extends to the cerrado region, free of coffee."[478] Similarly, there were hopes that the "counter-force" winds of the Serra de Mantiqueira would prevent spores traveling westward towards São Paulo. These statements demonstrated an incomplete knowledge of the rust's mobility, but also the increasing recognition of the ecological factors that contributed to the spread and intensity of rust outbreaks, a theme that would take center stage in later years.

Continuing its efforts to isolate the fungus, the IBC created "vigilance zones" on the eastern and western sides of the security zone to monitor and destroy any outbreaks. Strategy and governance of the daily operations fell to GERCA and the IBC's Coffee Assistance Department (Departamento de Assistência à Cafeicultura—DAC), which specialized in farm assistance and agricultural instruction. Agronomists populated the regional offices established in the vigilance zones in Minas Gerais and Espírito Santo. Minas Gerais received the most financial and logistical attention since the southeastern region represented the bulwark against further dispersion. In one administrative reshuffling, 96 of 200 agronomists, technicians, and support personnel were installed in Minas Gerais.[479] The maintenance of "vigilance zones" also relied on support from state governments, who were responsible for monitoring and coordinating with the IBC, under the directive of containment and eradication.

The vigilance zones were much larger than the security zone and contained considerably more coffee farms and transport arteries, posing great challenges for surveillance. With lofty bureaucratic goals, the IBC expressed its objective: "in order to organize a perfect registry, it will

[478] IBC, "Normas e instruções," (July 1970), 2.
[479] IBC, *Campanha de erradicação* (1970), 15.

be necessary to account for all of the agricultural properties that exist in the sub-regions."[480] The IBC worked with the National Institute for Colonization and Agrarian Reform (Instituto Nacional de Colonização e Reforma Agrária—INCRA) to identify a list of 93,862 coffee properties in the vigilance zones.[481] Farmers were obligated to destroy identified outbreaks on their farms, but unlike inside the security zone, producers could also choose to "stump" their trees (cutting it between 20-40 centimeters above the soil) allowing them to regrow. However, the IBC only offered compensatory funds for stumping if the farm's productivity exceeded 10 processed sacks of coffee per thousand trees, and if the rust reappeared the trees had to be burned. Eradication was the only option for farms with lower productivity, highlighting the government's support for high-productivity farms that likely adopted modernization practices. Furthermore, the IBC's guidelines revealed the authoritarian tone of the program, which indicated that: "if the landowner does not accept eradication, the sub-regional office will contract people necessary to execute the eradication work."[482]

An IBC map from 1970 provided a snapshot of the institutional network constructed to fight the fungus. Centered on Minas Gerais state and the security zone, the key includes a list of participating institutions that the IBC map-maker deemed important: cooperatives, IBC offices, Bank of Brazil locations that issued the loans, and the vast network of ACAR offices. Collaborating with ACAR did not slow the expansion of the IBC's own infrastructure. The IBC had already established a regional office in Varginha in 1969 as part of a replanting initiative. In 1970, the IBC expanded to seven agronomic stations, and established additional mobile teams in the state. ACAR's infrastructure in the region totaled 31 offices with agronomists and 37 offices

[480] IBC, "Normas e instruções," (July, 1970), 8.
[481] IBC, "Normas e instruções," (July, 1970), 6. INCRA formed an extensive rural land registry in 1966 but it did not contain all coffee farms. Presidência da Republica, Brasil. Lei N. 4.947 de 6 de Abril de 1966.
[482] IBC, "Normas e instruções," (July, 1970), 6.

with agricultural technicians, supported by four regional offices. These experts populated the institutions and formed the network of "extensionists" who could reach out to farmers.[483]

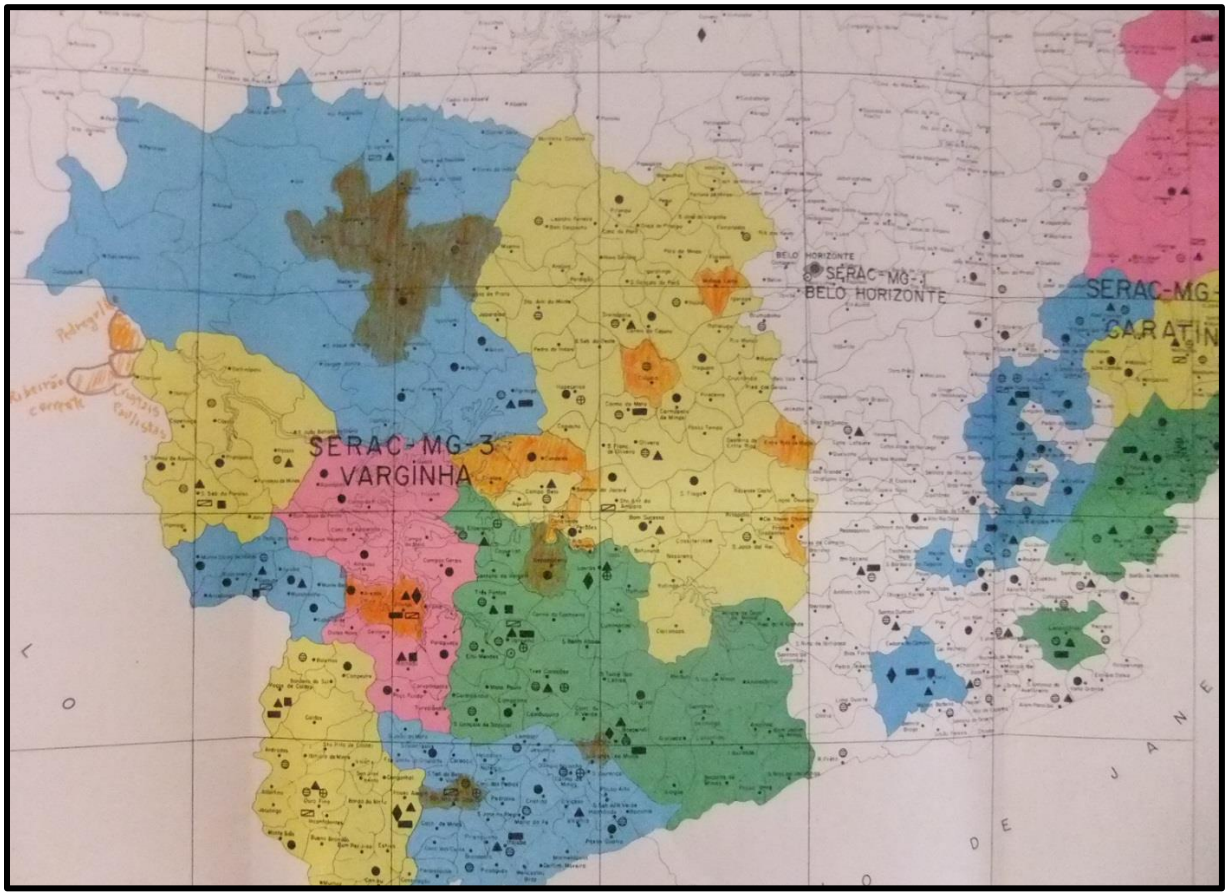

Figure 3.2: IBC zoning map of Minas Gerais state approximately June 1970, including the three IBC-SERAC regional headquarters located in Varginha, Belo Horizonte, and Caratinga. The security zone is not represented on the map but correlates with the white area dividing the east and west of the state, that contained SERAC Belo Horizonte and runs south to Rio de Janeiro state (only partially marked). Orange and brown markings were drawn overtop of the original publication.[484]

The IBC increasingly claimed authority over farmer outreach activities since the institution specialized in coffee. A political struggle unfolded between the Minas Gerais Secretary of Agriculture, Alysson Paulinelli, who operated ACAR, and GERCA president José Maria Jorge Sebastião, revealing the institutional friction in the middle of 1970. Described as a

[483] IBC, Unnamed map, *Procafé archive*, Varginha, Minas Gerais.
[484] IBC, Unnamed map, *Procafé archive*, Varginha, Minas Gerais. The map offers a snapshot of the coffee zones divided by the IBC. Centered on Minas Gerais state, the white zone between the two colorful portions represented the security zone. Map creation date approximate June 1970.

"confusion" the political dispute ended with a clear winner when "O IBC passou fazer todos projetos" (the IBC took charge of all the projects).[485] José Edgar Pinto Paiva, an IBC agronomist posted in Minas Gerais, explained in an interview that he supported the IBC taking leadership over the program because of institutional ideological differences. ACAR, he aptly assessed, employed a U.S. originated philosophy that included projects in agriculture, livestock, and home economics. This fragmentation, argued Pavia, meant that ACAR "não tem conhecimento, não sabia bem nada" (they lack knowledge and didn't know anything well).[486] Officially, ACAR remained a partner with the IBC and active in the fight against the rust but the IBC and specifically GERCA emerged as the clear institutional leader, embracing a more specialized approach to agricultural development for coffee.

Even as GERCA consolidated operational leadership over the fight against the rust, the institution's secretary general, José Maria Jorge Sebastião, expressed concerns. On July 21, 1970, Jorge Sebastião lowered expectations, stating that "victory is not immediate in the war against the rust," and that "only by divine miracle will we be able to soon finish with the rust."[487] He still promoted trust in the "official organs" that were working "continuously and carefully," yet signs were ominous. Sebastião confirmed that the fungus had been identified in three regions in the Sul de Minas vigilance zone: Soledade de Minas, Nepomuceno and Santanda do Jacaré. IBC task forces burned these outbreaks beyond the security barrier, but their existence signaled concerns of further spread. Containing the rust seemed to strain available resources, evident in Sebastião's optimistic claim that the July and August harvest would draw a million "volantes" (migrant workers) into the coffee fields, who "will collaborate in the campaign against the

[485] José Edgar Pinto Paiva, interview by author, Varginha, Minas Gerais, October, 2016.
[486] Paiva, interview by author, October, 2016.
[487] José Maria Jorge Sebastião, in "Vitória não é imediata na guerra à ferrugem," *O Estado de S. Paulo*, 21 July, 1970, 5.

rust."[488] Not only were farmers cast as valued allies needed to identify and report outbreaks, but workers could be framed as such as well.

A New Planting Imperative and Redefining Modern Coffee

When politicians and IBC planners spoke of the fungus as a potentially catastrophic threat, they almost always did so based on the economics of coffee exports. In 1970 coffee exports alone accounted for almost half a billion U.S. dollars in trade receipts, and Brazil needed to ensure enough quality coffee was grown to fulfil their export quota established through the International Coffee Agreement. As well as destroying infected coffee, the state increased its annual planting goals for 1970, from 50,000 new trees to 200,000.[489] Yet the replanting could not simply target any area, but needed to replant in regions untouched by the rust.

Combating the fungus in one region and incentivizing planting in others brought state representatives into closer contact with coffee growers.[490] By visiting farms to survey for rust or providing advice, experts assessed farm productivity. Planners recognized soon after fungicide tests began that spraying would increase expenses on coffee farms. Using the same metrics of GERCA's coffee eradication program of the previous decade, "low productivity" farms could not afford to control the fungus. Even though researchers were still determining exact cost estimates associated with controlling the rust, it was clear that expenses would increase. The IBC concluded that to offset higher costs of controlling the rust required higher incomes only

[488] Sebastião, "Vitória não é imediata," 5.
[489] IBC-GERCA, *Relatório Anual* (Rio de Janeiro: 1971), 3.
[490] Increasing interaction between technocrats and rural populations has drawn the attention of scholars in various disciplines, including state-led economic and educational development, and international development programs. For a critique on how programs went awry see James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition have Failed* (New Haven: Yale University Press, 1998). On agrarian education in Brazil see Sonia Regina de Mendonça, "Ensino Agrícola e Influência Norte-Americana no Brasil (1945-1961)," *Tempo* Vol. 15, n. 29 (2010): 139-165.

achievable by increasing productivity.[491] The rust both threatened productivity and provided the imperative to pursue it further.

In the view of the IBC, not all coffee was equal. Financing for eradication varied by region, the technology in use, and the productivity of a farm. For example, in the security zone, a farmer would be compensated Cr$ 5 to eliminate a "technified" tree, and 1.20 for a non-technified tree. The IBC justified the discrepancy: "the technified crops with high productive potential (higher yields) inside the security zone, merit higher compensation in relation to the indemnity for other crops."[492] The state decided that coffee growers who adopted modern technologies and followed IBC-recommended practices deserved better compensation. In the act of delineating financial compensation for only two categories of coffee farms (technified and traditional), the IBC maintained the same categorical binary that GERCA had used in the 1960s. However, unlike the 1960s, the criteria for technified coffee fragmented into more specific categories. It also relied less on measuring coffee yields per 1000 trees as the standard barometer of low and high-productivity coffee fields. In the process, the definition of what modern coffee entailed expanded and became more clearly detailed.

Agronomists or technicians would visit a farm to assess and classify the local conditions. These technocrats carried with them a list of 15 requirements worthy of attention in a farm assessment. If a producer practiced 12 of them, the farm was classified as "technified." The categories easily broke down along the themes of spatial organization, plant variety, use of inputs (fertilizer, pesticide and pest control), and overall productivity (now measuring whether the farm produced over 15 sacks of coffee per 1000 plants).[493] The same surveyor departed the farm with

[491] IBC, *Ferrugem do cafeeiro: características* (May, 1970), 12.
[492] IBC, "Normas e instruções," (July 1970), 14.
[493] IBC-GERCA, "Ficha cadastral," Procafé, Varginha, Minas Gerais, (1970).

a new document, an assessment report (Laudo de Qualificação da Lavoura de Café), detailing the topography and slope of the land, and the total number of coffee trees, including their variety and age. The "Laudo" was not a new document created in response to the rust. It had been used in GERCA's programs in the 1960s, but the categories had changed over time, and markedly so after the rust arrived. New categories were added to assess the degree of fungus infestation, the spacing of the trees, the number of shaded coffee trees, and the machines and equipment present on the farm.[494]

Tracking the new categories demonstrates the state's changing qualifications and expectations of what modern coffee entailed. These categories established a roadmap for farmers to follow if they sought access to state resources. Adapting coffee farming to fit the categories trended towards an ever more intensified form of cultivation. In subsequent years, changes in the methods to manage the rust would continue to modify coffee growing practices, showing how "modernization" continued to operate as a moving target, and how its definition was in part driven by diseases. Each adaptation on a farm impacted the use of resources and labor practices required to grow coffee. Moreover, assessing farms in response to the rust solidified the practice of categorizing agroecological spaces, privileging a particular way that experts (and possibly farmers) *saw* and described farms as a composition of certain quantifiable elements.

The End of Barriers and the Turn to Management, 1971

Brazilian representatives committed to maintaining coffee export levels at the 1970 International Coffee Organization meeting just as the efforts to contain the rust broke down. The IBC map above, outlining the institutional geography and frontiers of the security zone,

[494] IBC-GERCA, "Ficha cadastral."

contained more information than the initial publication intended. Twelve municipalities in the Sul de Minas were shaded in by hand using a similar stylistic pattern as the rust infected areas. I presume that the map's markings visualize the breakdown of the security zone as a barrier. The fungus' spread was confirmed by the end of 1970, when IBC agronomist Dorval Rocha Fernandes identified infected trees in the municipality of Ouro Fino, Minas Gerais, only 30 kilometers from the São Paulo border.[495] Cooperatives in the area had reported being rust free only a few months earlier.[496] Upon Fernandes's notification, a mobile team arrived to destroy the coffee trees on the farm, but the fungus was clearly on the move. On January 19, 1971, two agronomy students identified infected coffee trees on the Fazenda São Joaquím farm, in the municipality of Pedregulho, São Paulo. The fungus had been identified in São Paulo state for the first time.

In early 1971, the IBC devised a new method to test the spread of the rust. Collaborating with the São Paulo Biological Institute (Instituto Biológico de São Paulo), and the Superior Agricultural School of Lavras (Escola Superior de Agricultura de Lavras), the IBC launched a small aircraft to perform "trapping" tests. Panels on the plane were covered with a viscous material to catch the fungal spores. The airplane made flights at 50, 100, 250, 500, 1000, and 1500 meters with slides covered in silicone spray. The tests revealed the presence of *Hemileia vastatrix* spores up to 1000 meters, and trapped spores 150 kilometers from the outbreak site in Jabotical, São Paulo.[497] The test confirmed a correlation between the number of spores in the air and the distance from infected sites, making the dispersion patterns more comprehensible. More

[495] Dorval Rocha Fernendes, interview by author, Poços de Caldas, Minas Gerais, October, 2015.
[496] Fernandes, interview.
[497] Eugenio Schieber, "Economic Impact of Coffee Rust in Latin America," *Annual Review of Phytopathology* Vol. 10 (September, 1972): 492; José Braz Matiello, interview by author, Rio de Janeiro, September, 2016.

importantly, the flights confirmed the ease with which the spores moved on the winds.[498] The tests in 1971 provided evidence that the rust would neither be eradicated nor contained in Brazil. Planners turned their attention and resources towards control.[499]

In late February 1971, agronomists met with producers to explain that the rust traveled as spores and could be transported by "men, equipment, and along the wind, and by flood." The agronomists indicated that any sightings needed to be reported to agricultural experts immediately.[500] Identifying outbreaks remained important to slow dispersion, but research increasingly centered on the battle against the fungus on the farms. The IBC created the Campaign to Control Coffee Rust (Campanha de Controle da Ferrugem do Cafeeiro) in 1971, to educate farmers in the proper use of fungicides and sprayers to prevent the fungus's impact. State planners increased investment into research on chemicals to control the fungus, and the IBC offered subsidized loans for farmers to purchase fungicides. Farmers still required an affiliated agronomist or technician to visit and "verify the conditions and technical viability of particular aspects of the property" before accessing the state's resources.[501] Credit contracts demanded farmers execute the agronomic plan, adopt the technical norms, and request technical assistance from local agronomists three months after planting and annually thereafter.[502]

On October 5, 1971, farmer Lourenço Morandi reported the first identified outbreak in Paraná state. The rust had now officially reached all the major coffee growing regions.[503] The next month, the IBC issued a concise manual titled "How to Control Coffee Rust." Based on

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[498] Fernandes, interview.
[499] Fernandes, interview.
[500] No author, "Métodos para salvar o café," *O Estado de S. Paulo*, 23 February, 1971, 10.
[501] MIC, IBC, GERCA, *Programa de racionalização da cafeicultura: instruções e normas de execução dos financiamentos para formação de cafezais* (Rio de Janeiro: 1971), 5.
[502] MIC, IBC, GERCA, *Programa de racionalização*, 5. The documents necessary to apply for credit included a proposition, the technical agronomic evaluation, a technical information form, rural credit form, technical assessment, and program assessment.
[503] IBC, MIC, GERCA-DAC, *Relatório de Atividades 1972* (Londrina: 1972), 3.

nearly two years of research, the manual detailed the characteristics of the rust, and the IBC's diagnosis: "coffee rust is a disease that can be very well controlled by applying chemical products called 'fungicides.'"[504] The IBC encouraged farmers to purchase both fungicides and fertilizers to fight the fungus and increase yields. The institution also reduced interest rates for the fungicides and fertilizers to 7 and 6 percent per year, respectively.[505]

Recognizing the wide-reaching spread of the fungus, the IBC launched a new plan to "Renovate and Reinvigorate Coffee Growing" in late 1971. The institution tasked GERCA to lead efforts to plant 300 million new trees, and increased the number of trees a farmer could plant on their property with financial support from 20,000 to 50,000. Incentives to replant were not made available in the states of Espírito Santo, Rio de Janeiro, and the eastern Zona da Mata of Minas Gerais — the areas most afflicted by the fungus.[506] Even in approved regions access was restricted. GERCA directed the funding only to high-productivity coffee farms or newly planted seedlings.[507] Their financing criteria offered no option for low-productivity coffee.[508] By measuring fertilizer use on a per hectare basis rather than per tree, the structure of credit assumed monoculture to be the only option for growers. It also assumed that farmers would spray a similar chemical mix uniformly across their fields, suggesting that the coffee trees themselves would also be uniform and require the same chemical dosages. The model of growing coffee required fungicides to fight the fungus, and fertilizers to increase productivity.[509]

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[504] IBC-GERCA, *Como controlar a ferrugem do cafeeiro* (November, 1972), 3.
[505] MIC, IBC, GERCA, *Programa de racionalização*, 5; IBC-GERCA, *Plano de renovação e revigoramento de cafezais* (1972), 3.
[506] IBC-GERCA, *Plano de renovação e revigoramento de cafezais* (1972), 3.
[507] One could borrow Cr$ 300 per hectare for high yielding coffee (above 20 sacks of unprocessed coffee per 1000 trees) and Cr$ 100-150 for plants between 2-3 years.
[508] IBC-GERCA, *Plano de renovação e revigoramento de cafezais* (1972), 3.
[509] IBC-GERCA, *Plano de renovação e revigoramento de cafezais* (1972), 47.

Planting Coffee and Growing a Nation

The military regime's coffee policy conformed to the national political objectives. The state claimed that under their guidance, technocrats were cultivating the long heralded economic development of Brazil. The surging GDP between 1968-1974 relied on rapid industrialization and expanding exports.[510] The period of economic prosperity simultaneously brought the harshest repression by the military regime. Rule was centralized and institutionalized by governmental decrees, rewritten constitutions and legislation. These actions manifested on the ground through disappearances, detainment, torture, and to a lesser extent, killings.[511] Forms of popular culture were targeted for censorship as the military regime became more conscious of managing its image in the public sphere.[512]

The issue of coffee continued to feature prominently in the national economy and in the highest levels of politics. In December 1971, on the eve of assuming the presidency of the IBC, Carlos Alberto de Andrade Pinto met with the Minister of Industry, Commerce, and Tourism, Marcus Vinícius Pratini de Moraes to discuss the national coffee sector. They agreed on two priorities for the coffee industry. First, a continued commitment to support the fight against the rust. Second, to adequately incentivize a planting program to maintain a productive coffee sector.

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[510] Baer, *The Brazilian Economy*, chapter 5.
[511] James Green, *We Cannot Remain Silent: Opposition to the Brazilian Military Dictatorship in the United States* (Durham: Duke University Press, 2010); Jerry Dávila, *Dictatorship in South America* (West Sussex: Wiley-Blackwell, 2013); Jeffrey Lesser, *A Discontented Diaspora: Japanese Brazilians and the Meanings of Ethnic Militancy, 1960-1980* (Durham: Duke University Press, 2007); Victoria Langland, *Speaking of Flowers: Student Movements and the Making and Remembering of 1968 in Military Brazil* (Durham: Duke University Press, 2013); Anthony W. Pereira, *Political (In)justice: Authoritarianism and the Rule of Law in Brazil, Chile, and Argentina* (Pittsburgh: University of Pittsburgh Press, 2005); Carlos Fico, *Como eles agiam: os subterrâneos da ditadura militar: espionagem e polícia politica* (Rio de Janeiro: Editora Record, 2001).
[512] Kenneth Serbin, *Secret Dialogues: Church-State Relations, Torture, and Social Justice in Authoritarian Brazil* (Pittsburgh: University of Pittsburgh Press, 2000); Anne-Marie Smith, *A Forced Agreement: Press Acquiescence to Censorship in Brazil* (Pittsburgh: University of Pittsburgh Press, 1997).

They deemed new planting as essential to fulfil Brazil's leadership role in the International Coffee Agreement, to strengthen the national export sector, and to satisfy domestic consumption.

The appointment of Andrade Pinto as IBC president revealed the lines of patronage connecting the institution with Antônio Delfim Netto. As the federal Finance Minister and head of the National Monetary Council, Delfim Netto held considerable influence over coffee sector finance. He appointed Andrade Pinto, a fellow technocrat, who was also an academic and former research partner on the economic history of coffee in Brazil. Clearly patronage played a role in Andrade Pinto's rise to the IBC presidency, but his vision also aligned with "suggestions" Delfim Netto had articulated for the coffee sector in 1959:

> We have accumulated a sum of technical know-how that goes from selection of high-yielding and more resistant varieties to cultivation and fertilizing techniques which make it possible to increase yields of our coffee at least threefold within a relatively short time. Efforts in this sense make it possible to *conceive* of a highly-mechanized coffee production where labor needs arise only during the harvest.[513] (my italics).

This vison was hardly unique by the early 1970s, as many other nations embraced "Green Revolution" technology and approaches to raise agricultural yields. But in the case of Brazilian coffee, political and professional relationships revealed important linkages that undergirded adopting this model.

In February 1972, Andrade Pinto announced that the IBC would raise both total production and average productivity by using the best modern technology. Speaking at the Seminar on Coffee Commerce (Seminário do Comércio de Café de Santos), Andrade Pinto aligned his message with the rhetoric of the military government: "I call on agriculture and trade to engage in the realistic process of reformulating coffee policy, an important goal for the

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[513] Antônio Delfim Netto, in Verena Stolcke, *Coffee Planters, Workers and Wives: Social Conflict and Gender Relations on São Paulo Plantations, 1850-1980* (London: MacMillan Press, 1988), 121.

Revolutionary Government." He continued: "The IBC did not come to negotiate, nor to give in or cede"[514] Andrade Pinto called for new planting and subsidies for fertilizers and machines.[515] The speech forcefully proclaimed that all actors in the coffee industry must collaborate to achieve the national development goals.[516] In rhetoric and practice, coffee was a crucial area of government interest, especially considering that in 1972, Brazil exported 19 million sacks of coffee, valued at over 1 billion USD.

In this political atmosphere, the Ministry of Industry and Commerce, along with the National Monetary Council and the IBC-GERCA raised planting goals to 600 000 new trees for 1972. The state earmarked Cr$4.2 billion (equivalent to US$ 740 million at the time, and three quarters of annual coffee export value) to finance five areas: raising seedlings, planting, fertilizers, pesticides and fungicides, and to cut old coffee trees. The plan aimed to "expand and technify coffee growing" in the country.[517] The program continued to prioritize coffee rust, including a concession for purchasing preventative chemicals and spray machines, on which interest rates were abolished to support the fight against the diseases.[518] GERCA also added an important note: to "localize coffee production in ecologically favorable regions," which were determined partially in response to the rust.[519]

GERCA's eradication and planting efforts never lost sight of the goal of increasing agricultural profitability. Planners encouraged a model of high-yielding and input dependent coffee based on the notion that low-productivity coffee "does not remunerate satisfactorily the factors of production, causing a progressive decapitalization of the properties and creates social

[514] IBC, *Politíca national de café* (Rio de Janeiro: 1972), 7.
[515] IBC, *Politíca national de café* (1972), 7.
[516] IBC, *Politíca national de café* (1972), 8.
[517] IBC-GERCA, *Plano de renovação e revigoramento de cafezais* (1972), 5.
[518] No author, "Brasil vai plantar 600 mil pês de café," *O Ruralista*, February, 1972, 1.
[519] IBC-GERCA, *Plano de renovação e revigoramento de cafezais* (1972), 7.

problems arising from the liberation of labor."[520] In this view, if farmers maintained low-productivity coffee farms, they would stagnate or decline into poverty and potentially abandon their farms. GERCA posited that low-productivity farmers were economically vulnerable, and would suffer from "occasional occurrences of adverse climatic phenomenon" and poor economic returns.[521] The state's anxiety towards rural unrest harkened back to the preceding decade when eradication programs intensified rural unemployment. GERCA argued that modern coffee could provide solid jobs and prevent urban migration. In comparison with other crops, GERCA cast modern coffee as a stabilizing force. As will be discussed in the next chapter, as planners targeted areas to incentivize coffee growing, labor was just one concern among many. The IBC increasingly recognized how the rust and other environmental and climatic elements played a role in crises of production. These factors together signaled how the state mounted a program that was increasingly sensitive to ecological and human environments, while still seeking greater influence over the productive processes on farms.

Science in the Fields: Selecting Climates and Coffee Varieties

Experiments to eradicate and control the fungus over two years provided insights into how climate and environment shaped the appearance, intensity, and dispersion of the fungus. Initially, "preferred ecologies" were areas free from the rust, but research modified this idea by identifying how certain climatic factors diminished the intensity of outbreaks. For example, the rust proliferated at a higher rate in more humid and rainy areas. Sustained dry seasons and higher altitude lessened fungal outbreaks and avoided unexpected rains that stripped fungicides from the

[520] IBC-GERCA, *Plano de renovação e revigoramento de cafezais* (1972), 8.
[521] IBC-GERCA, *Plano de renovação e revigoramento de cafezais* (1972), 8.

tree's leaves, forcing costly reapplication.[522] Avoiding certain ecological conditions could minimize the impact of the disease.[523]

Climatic conditions increasingly influenced how state planners envisioned the geography of coffee planting across the country, but no factor was more important than the 1972 climate report by agronomist Ângelo Paes de Camargo. Working at the IAC, Paes de Camargo published the first analysis of the climatological zones for coffee in the southeast of Brazil. Trained at the Luis de Queiros College of Agriculture (Escola Superior de Agricultura Luis de Queiroz, São Paulo), he began working at the IAC in 1954 researching agricultural climatology. After earning a doctorate in agronomy in 1961, Paes de Camargo studied for a year at Rutgers University in the United States, in the Laboratory of Climatology with Dr. Charles Thorthwaite, who devised the climate classification system.[524] His work on coffee climatology responded to the arrival of the rust in Brazil, analyzing the relationships between regional environments and the potential to cultivate coffee. The findings influenced the decisions of the IBC's planting programs, which determined where government incentives would be offered based on suitability of regional environments

The work of Paes de Camargo contributed to forming a more focused definition of what the IBC deemed "appropriate ecologies" for coffee growing. His assessment influenced the IBC to restrict planting in certain frost-prone areas of Paraná. Based on his work, regions could be analyzed by macro and micro indicators. Macro level indicators included regional environmental criteria: altitude, frost probability, wind and rain patterns. Micro-level environmental indicators depended on the agronomists who visited and assessed farms. The IBC expanded its agronomic

[522] José Edgard Pinto Paiva, interview by author, Varginha, Minas Gerais, October, 2016.
[523] Paiva, interview, October, 2016.
[524] Inter-American Institute of Agricultural Sciences of the Organization of American States Planning Office, *Latin Americans Holding Advanced Degrees in Agricultural Sciences* (Costa Rica: 1965).

assessment form to include more detailed ecological information. An agronomist visiting a potential farm did not travel lightly. They arrived with a tool-kit to assess the entire farm as a potentially productive space. Their toolkit included tape measures to precisely record the distance between plants and rows; tools to measure the declivity of hills on the farm; a compass to assess the direction of the coffee rows; altimeters; and kits to preserve samples of soil, foliage, and seeds.

Greater emphasis on regional environments coincided with research programs to develop rust resistant and highly productive coffee varieties. Varietal research was not new to Brazil; coffee varieties had been bred and selected for specific agricultural goals, most commonly for higher yields. Scientists at IAC began coffee cross-breeding in the 1930s, but farmers had done so for much longer by selecting their most productive trees for replanting. IAC researchers created Mundo Novo in 1942 by crossing Typica and Bourbon, varieties that were popularly grown in Brazil. Valued for its productivity and quality of taste, Mundo Novo was then crossed with Cattura to create Catuaí, a productive and stocky shrub that flourished when densely planted.[525] These were the varietal options available in Brazil when Luiz Carlos Fazuoli joined the Campinas Agronomic Institute in 1969.

Fazuoli's career paralleled the rise of coffee varietal research in Brazil. He began his research on corn genetics, but the rust's arrival shifted the institution's focus almost entirely to coffee. Lead coffee geneticist, Alcides Carvalho, invited Fazuoli to work on coffee with him. Fazuoli described this shift in his career as entering coffee research "through the rust."[526] In 1970, the IAC published an assessment of the varietal coffee stock in the country in their

[525] Paulo Rebelles Reis and Rodrigo Luz da Cunha, Eds. *Café Arábica: de plantio à colheita* (Lavras: Empresa de Pesquisa Agropecuária de Minas Gerais, 2010), 24.
[526] Luiz Carlos Fazuoli, interview by author, Campinas, São Paulo, August, 2016.

research journal, *Agronômico*. Research focused on developing resistance in the highly productive Mundo Novo and Catuaí varieties by crossing them with rust-resistant Robusta and Hybrid Timor.[527]

In 1972, the São Paulo state and federal governments expanded financing for coffee-based research. Catuaí took center stage for its high yields, environmental adaptability, and valued taste qualities. [528] Yet inherent varietal resistance alone had limitations, especially in the short term. Fazuoli recognized that varietal research needed to coincide with adopting fungicides, declaring that "there is no way without spraying." The need to control the fungus sooner rather than later shaped research directions, as Fazuoli explained: "it is easier to change (factors like) machines and inputs than the genetics of the plant, which are more challenging and require more time."[529] Nevertheless, varietal research worked in concert with chemical spraying, forming a two-pronged model to control diseases and pests and raise plant productivity.

The significance of the rust for the development of coffee research was clearly displayed in July 1972, when the major agricultural institutions in Brazil held the First National Congress on Coffee Diseases and Pests. With the image of a rust-infected coffee leaf on the congress' program, the fungus featured prominently in the scientific research-focused event. IBC director José de Paula Motta Filho clarified the objectives: to give a technological base to the coffee renovation because enormous advances had been made that offered security and profitability to coffee farming.[530] A staggering 57 of the 71 research projects focused directly on controlling the coffee rust, developing fungicides, and spraying methods and technologies.[531]

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[527] IAC, *O agronômico: boletim informativo do instituto agronômico,* Vol. 22. No. Único (Campinas, São Paulo: January-December, 1970), 2.
[528] IAC, *O agronômico: Boletim Informativo*, 3.
[529] Fazuoli, interview.
[530] José de Paula Motta Filho, in IBC, *1 Congresso brasileiro sobre pragas e doenças do cafeeiro* (Rio de Janeiro: 1972), 3.
[531] IBC, *1 Congresso brasileiro*, 3.

Conclusion

The Brazilian government and its technocrats worked within a set of parameters associated with their agricultural modernization ideology to prevent a rust-caused epidemic. They posited that environmental threats could be managed with new technologies, and that agriculture held an economic potential that could be unlocked to serve the nation. Efforts to combat the fungus only intensified concerns to eliminate low productivity (low-yielding) coffee farms. The rust both threatened productivity and justified pursuing it. Over the course of two years, state-employed planners and experts formed a new package of techniques and technologies for coffee growing that fundamentally changed both the physical and human geographies of cultivation in Brazil.

In August 1972, José Maria Jorge Sebastião announced that the IBC`s research program had collected sufficient data to effectively orient coffee growers to control the disease. Brazilian researchers presented their findings at the 64th annual meeting of the American Phytopathological Society, held in Mexico City. The coffee rust was not solely a Brazilian problem since its spread to other coffee growing countries seemed probable. In Mexico, Brazil`s representatives laid out research on the effectiveness of different copper-based fungicide mixtures to control the fungus. This research previewed the costs of each treatment and the productivity of subjected coffee trees.[532] Other coffee-growing nations foresaw the spread of the rust to their fields and the potential for disastrous consequences. While each coffee producing nation would develop its own approach to manage the rust, Brazil's emphasis on science and technology to control the disease provided one potential model for others to follow.[533]

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[532] IBC-GERCA, *Novos resultados de controle químico da ferrugem do cafeeiro no Brasil* (Rio de Janeiro: August 1972).

[533] Fredrick L.Wellman and E. Echandi, "The Coffee Rust Situation in Latin America in 1980," *Phytopathology* Vol. 71(9) (September 1981): 968-971.

In Brazil, the approaches of planners and researchers to accommodate the fungus on the farm corresponded with a broader vision to modernize coffee agriculture. Yet coffee was not alone as a target of modernization amid the shifting priorities of national politics. President Médici, along with Minister of Agriculture and Commerce, Cirne Lima and Minister of Finance Delfim Netto, launched the new harvest plan for 1972-1973 in Uberlândia, Minas Gerais. Heralding the "economic emancipation of the country," Cirne Lima argued that agricultural growth was an imperative in national economic development.[534] He identified the role of the state moving forward: "the government does not plant nor harvest, but creates the conditions to incentivize private production, offering stimulus and orienting those who plant."[535] The national objectives set in Uberlândia encouraged widespread use of a similar model applied to the coffee sector: making available subsidized credit, selected seeds, rural extension, fertilizers and defensive chemicals. Providing these options to support specific crops allowed planners to influence farmers' choices, evident in the slogan: "plant what the government guarantees."[536]

The arrival of *Hemileia vastatrix* in Brazil shocked participants in the coffee industry, from growers and workers to agronomists and state planners. The institutional response to it was, however, rather quick, wide reaching, adaptable, and sustained. With the broad-based support of federal planners and international researchers, the IBC managed to develop a multi-pronged programmatic response only a few months after the rust's first appearance. The far-reaching strategies to combat the rust revealed the general uncertainty of the time; responses ranged from burning millions of coffee trees to establishing control zones, incentivizing farmers to destroy their fields in specific areas, and employing scientific research to prevent the debilitating effect

[534] Cirne Lima, "Vamos plantar um novo Brasil," *O Ruralista,* September 1972, 1.
[535] Lima, "Vamos plantar," 1.
[536] Lima, "Vamos plantar," 1.

of the fungus. But as the fungus continued its march through Brazil's coffee regions, state planners narrowed their strategies, focusing on preventing infection and managing the rust on the farm. Efforts to eradicate the rust from Brazil failed. Within two years of its arrival, *Hemileia vastatrix* reached all the major coffee growing areas in Brazil. Within fifteen years the fungus had proliferated throughout Latin America.

Because the rust was a major threat, its arrival made available a solution to a pre-existing discursive and practical problem—that of modernizing coffee agriculture. Farmers could not solve the problem of the rust on their own, and the state and its technocrats provided solutions within a specific set of possibilities. Agronomists and technocrats took new technologies to the fields, teaching farmers why and how they should use them. They inspected and surveyed farms, categorizing them in quantifications that determined access to rural credit crucial for farmers to make changes and mitigate risk. The adoption of chemical sprays and hybrid coffee varieties marked a transition towards a different model of monoculture, which relied on purchasing chemical inputs and coffee seedlings in the marketplace. In the process, coffee agriculture experienced profound changes, modifying the institutional scaffolding that supported coffee growing, the choices available for farmers who sought assistance, and the lives and rhythms of coffee laborers. For state planners and technocrats, the ability to fight and manage the fungus and continue coffee growing was a victory for Brazilian agricultural research and, more broadly, for national development.

Incorporating the coffee leaf rust into the broader catalogue of problems facing coffee cultivation highlighted the inherent tension of intense monoculture farming. Over two years Brazilian state planners established an approach to control the fungus with additional inputs, favorable environmental conditions, and cultivation methods—all of which depended on

technological advancements and practices. The coffee leaf rust was a natural disaster in part because of the system of plantation agriculture, which provided fertile monoculture grounds for the fungus. Ironically enough, in fighting the rust few planners questioned disturbing the monocultural organization, and ultimately called for more densely grown coffee trees to enable and cheapen chemical controls and raise productivity.

The period from 1970-1972 marked the creation of a new model of coffee growing supported by the state. Moving forward, planers integrated the methods of scientific control and further incorporated new ideas of appropriate climates and environments for coffee agriculture. Planners targeted the south and southwest of Minas Gerais, once considered unappealing for coffee growing due to low soil fertility. Yet, the region's long dry seasons and higher elevation, combined with the technology to improve soil fertility, attracted the attention of planners. Once the techniques of managing the rust were entrenched in coffee agricultural practices, the vast majority of coffee trees were planted in Minas Gerais. The first half of the 1970s not only witnessed enormous technological changes in the coffee fields, but also a drastic change in the geography of Brazil's coffee cultivation. As agronomist José Edgar Pinto Paiva argued, "we thought the rust would ruin coffee but it did the opposite; higher costs but more efficiency."[537]

[537] Paiva, interview, October, 2016.

Chapter Four: Frozen Coffee Trees and Frostbitten Workers: How Modernization Schemes responded to Environmental Crisis in Southeast Brazil, 1972-1977

In the early hours of July 18th, 1975, temperatures dropped below freezing point in the coffee-producing regions of Paraná and São Paulo. For two days the temperature hovered around zero degrees Celsius (32 degrees Fahrenheit), devastating the coffee fields. Farmers looking for the familiar dense green shrubs arrayed in long corridors instead saw skeletal forms. The dark trunks of their trees rose from the ground with branches sprawling outward, painted white by frost and snow. Shriveled leaves dangled, themselves darkened by the frost, and many fell to the ground. Paraná Governor Jamie Canet stated, "not even a single coffee plant remained in Paraná" (não sobrou um único pé de café no Paraná), as the frost wreaked economic havoc in the state.[538] While his observation veered toward the dramatic, since much of the coffee survived, his geographic assessment was too narrow: the frost also affected São Paulo fields to a great extent, and even reached parts of Mato Grosso and Minas Gerais states. In total, over a billion coffee trees were affected by the "black frost."[539]

In the fifteen years before this frost, the Brazilian government launched a series of efforts to remold the Brazilian coffee industry, especially at the farm level. As discussed in Chapter Two, concerted national efforts began in the 1960s to reduce the number of coffee trees. The government's programs varied by design and objective. For most of the 1960s, planners promoted coffee eradication to curb overproduction. By the end of the decade, recognizing a potential coffee shortage after having eradicated nearly two billion coffee trees (just under half of

[538] Karla Matida, "A geada que mudou a economia agrícola do Paraná em 18 de Julho de 1975," *Revista Cafeicultura* (2010): 8.
[539] Instituto Brasileiro do Café (IBC), *Plano de renovação e revigoramento de cafezais* (Rio de Janeiro: 1976), 4.

the national total), federal planners halted their destruction and designed new programs to incentivize coffee planting. The planners reimagined the role of coffee in the national economy: no longer a barrier that prevented agricultural change, coffee itself became the subject of modernization. Their conception of what modern coffee entailed would change over time, but the core components included the adoption of selected plant varieties, petroleum-based fertilizers and pesticides, and labor-saving machinery.

In the late 1960s, the relative value of coffee declined in Brazil's growing and diversifying national economy. But it remained a significant economic activity in southeast Brazil and a national political priority. In 1970, the federally operated Brazilian Coffee Institute (IBC) described in a video commercial how the revenue from coffee exports "financed hydro-electrical dams that produce energy for industrial development, and for highways that run north-to-south, integrating Brazil, and bringing progress."[540] By linking coffee growing with visions of national development, state planners demonstrated the value they placed in the crop. Yet, in the 1970s a series of ecological events challenged efforts to transform Brazil's coffee industry. Concerns over a coffee shortage in 1970 were exacerbated when *Hemileia vastatrix*, a debilitating coffee fungus, was identified in Brazil. Commonly called the coffee leaf rust, the fungus reduced the productive capacity of infected trees. The federal government invested to combat the fungus, first seeking to eliminate it from Brazil before developing strategies to mitigate the rust's harmful effects on coffee farms, as discussed in Chapter Three.

The first two years of the 1970s saw agricultural experts refashioning their vision for coffee growing, incentivizing planting using methods to lessen the impact of the coffee leaf rust, and concurrently increasing plant yields. Agronomists and technicians identified how certain

[540] IBC-Grupo Executivo de Racionalização da Cafeicultura (GERCA), *Controle da ferrugem do cafeeiro*, video (1970), 06106-02, Arquivo Nacional, Rio de Janeiro, Brazil.

environmental conditions could help naturally mitigate the fungus's damage, especially in the state of Minas Gerais. Planting new coffee fields did not radically change the relative distribution of the coffee growing landscape in these years: the state of Paraná continued to grow the most coffee, and farmers in general scantly adopted the processes that state planners deemed modern.

The destruction caused by the 1975 frost caused a different type of crisis in the Brazilian coffee industry. It offered an opportunity for state planners and experts to implement programs to transform the agricultural structure of frost-prone regions, and the geography of coffee growing. Government planners devised and led a strategic retreat of coffee growing in Paraná state as an economic and political priority. They incentivized planting new coffee fields in the less frost-prone regions, mainly in Minas Gerais state. This valorization of Minas Gerais for coffee growing coincided with the conclusions of agronomists who also valued areas with higher altitude and more predictable rain patterns that mitigated the effects of the coffee-leaf rust. In the frost-stricken regions government institutions incentivized landowners to plant annual crops less vulnerable to the cold. A rotation of soybean and wheat emerged as the most economically and ecologically viable options. Further, soybeans and wheat fit snugly in the state-led agricultural modernization agenda.

The government offered farmers resources to recover from the frost, but access to support was shaped by the state's modernization agenda to "rationalize" agriculture. Rationalization can be delineated in two ways. The first represented an approach to farming that was different from "traditional" farming, seen as inefficient and wasteful of resources. As discussed in the previous chapter, this form of rationalization aimed to increase productivity and yields of coffee trees and farms. This model held productivity (measured by yields generated by a tree or a farm) as synonymous with profitability. Thus, rationalization aimed to grow more coffee in a

quantitatively measurable way, and required material changes on the farms and in the practices of farmers. These changes included the above-mentioned adoption of selected coffee varieties, chemical fertilizers and pesticides, and machines in the fields, as well as agricultural extension to educate and instruct farmers in the new ways of growing coffee and administering farms.[541]

A second iteration of rationalization emerged in the planning of high-level state officials seeking to redraw the geography of agriculture in southern Brazil. Planners aimed to modify where certain crops would be grown across regions; decisions that were informed by agricultural experts, and in relation to changing economic valuations and ideas of appropriate environments. Applying this concept of rationalization was contingent on a variety of factors: the ability of the federal government to commit resources, institutions to enact the programs, available technology, and markets. Both forms of rationalization relied on the notion of technological triumphalism to solve what planners viewed as long-standing structural problems in agriculture.

The 1975 frost caused tremendous destruction, but it was not the first frost event in the coffee growing areas of southern Brazil. Frosts struck Paraná during the 1960s and early 1970s, but the 1975 frost stood out for the concerted response by state planners. The government marshaled incentives and devised policies to shift the coffee frontier northward while simultaneously promoting other agricultural activities in the former coffee growing regions. These trends began prior to the frost but lacked the emphatic investment of the government to accelerate the changes. The frost demanded the attention of the state and provided the rationale to pursue existing agricultural transformation goals.

This chapter first examines the changes in the coffee industry in Paraná and parts of São Paulo during the early 1970s. I investigate the activities of the Brazilian Coffee Institute (IBC)

[541] IBC, *Plano de renovação e revigoramento de cafezais 1975-76, normas de execução* (Rio de Janeiro: 1976), 4.

and landowners in Paraná and São Paulo states as the coffee leaf rust became widespread. I trace the increased value of soybean and wheat cultivation, which corresponded to new technological innovations that made these crops more appealing for landowners, especially in specific environments well-suited to technological adaptation. The improving economic prospects of soybeans combined with the arrival of the coffee leaf rust made coffee less economically appealing for landowners even before the 1975 frost. Moreover, the IBC's investment and subsidies to plant new coffee fields favored different geographic regions. Yet all of these factors, including the shifting goals of the government, took time to have a substantive impact on how farmers grew their millions of coffee trees in Paraná.

This chapter then investigates how different actors in the coffee industry responded to the 1975 frost. I examine the responses among politicians and state-employed technocrats, coffee growers and landowners (if they transitioned out of coffee), and workers. While the environmental event was framed almost unanimously as a disaster, these three groups pursued different goals that revealed unequal power relations in the coffee sector. State planners designed recuperation strategies that signaled a strategic state-led retreat from supporting new coffee planting in Paraná, and incentivized new planting further north, especially in Minas Gerais. Though the coffee economy did not collapse, planners decided that coffee would no longer be viable in Paraná.

Figure 4.1: Map of Brazil. Highlighted states include Minas Gerais, São Paulo, and Paraná.[542]

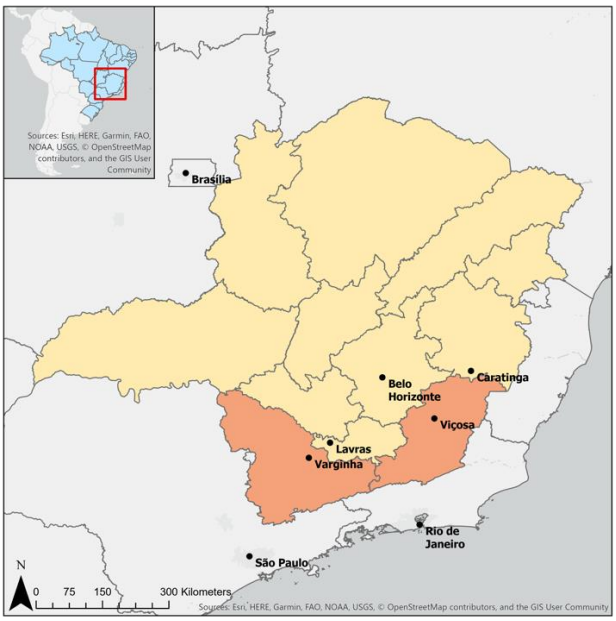

Figure 4.2: Map of Minas Gerais state. The highlighted regions include the Sul de Minas to the southwest and the Zona da Mata to the southeast.[543]

The federal government's post-frost recuperation strategy did not conform precisely to the expectations of affected coffee growers. However, farmers seeking state support largely conformed to the dictatorship's developmental agenda. How state planners designed and implemented these recuperation programs exposed tensions with landowners, but also reaffirmed the government's support for this class. Workers, however, did not have the same lobbying power. With scant immediate attention from the military regime, the ranks of unemployed and temporary non-contract labor swelled. I examine the debates in the popular press surrounding the hundreds of thousands of workers unemployed after the frost, their changing relations with landowners, and the role of workers in the government's agricultural agenda.

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[542] Map of Brazil, Political boundaries shapefiles sourced from the Database of Global Administrative Areas: https://gadm.org/download_country_v3.html. Mesoregion boundaries sourced from the Instituto Brasileiro de Geografia e Estatística, city locations sourced from GeoNames: https://www.geonames.org/. Emory University, 2019, OpenStreetMaps.

[543] Map of Minas Gerais, Political boundaries shapefiles sourced from the Database of Global Administrative Areas: https://gadm.org/download_country_v3.html. Mesoregion boundaries sourced from the Instituto Brasileiro de Geografia e Estatística, city locations sourced from GeoNames: https://www.geonames.org/. Emory University, 2019, OpenStreetMaps.

The immediate unemployment of large numbers of workers powerfully brought to the surface longer-term transformations in the role of workers in agricultural modernization. Before the frost, the coffee fields in Paraná and São Paulo were largely considered traditional, using scant technology or agronomic advice. These coffee farms employed many permanent and temporary workers compared to other crops.[544] Efforts to rationalize agriculture on the farms after the frost aimed to reduce labor needs to improve farm profitability. This effort was explicit in Paraná, where soybeans and wheat required far fewer workers and new fields further incorporated labor-saving machinery. The scale of unemployment in Paraná after the frost stood out but also dovetailed with an existing trend. The increase in the number of daily contract workers with scant legal protections spurred a mass migration of laborers from Paraná in search of new opportunities. These developments show how the frost ruptured the agricultural structure in Paraná and acted as a catalyst for agricultural modernization, revealing the federal government's priorities during this period of acute ecological and economic crisis.

Managing Environments and Navigating Disaster

The 1975 frost immediately shocked the expectations of coffee growers and forced them to make decisions that were beyond their usual consideration. As a sudden event, the frost fractured the complex rhythm of coffee production. The fields represented an investment in time and money, especially since coffee required 3 to 4 years to reach productive maturity. The Arabica coffee tree follows a lifelong productivity arc, producing its highest yields for 10-15 years before gradually declining. Coffee farmers were aware of the productive cycles of the coffee trees on their farms. A few forward-thinking farmers would replant segments of their

[544] IBC-GERCA, *Programa de racionalização da cafeicultura brasileira* (Rio de Janeiro: 1962), 3-4. Estimated at 1 worker for every 3000 trees, with additional workers required for the annual harvest.

coffee trees to continually rotate the productive peaks, although most Brazilian farmers in Brazil in the mid 1970s did not employ this technique. Most of the coffee trees in Paraná were older and declining in production, the product of the 1950s planting boom in the state. Combined with the recent arrival of the coffee leaf rust discussed in the previous chapter, coffee farmers likely anticipated worsening income if yields further declined. However, these factors were largely predictable, posed known risks, and could be ameliorated over time with the right investment and strategy.

Agriculture is inherently dependent on managing environments to produce desired outcomes, namely the growth of selected plants and the elimination of others. Harmful environmental events threaten the cultivation of agricultural crops. They puncture farmers' expectations and force them to assess the economic costs and risks of planting again. The most commonly identified events include prolonged drought, changes in seasonal rain patterns, widespread erosion, disease or pest outbreaks or, as this chapter examines, frost. These events are sometimes portrayed as extraneous forces that act upon an agricultural landscape. Yet in many cases the environmental event is in part the product of those landscapes, such as soil erosion caused from land use practices. An environmental event holds the potential to spur a series of changes, but its impact can be contingent on additional factors. The available technology, know-how, climatic and soil potential, and market value all shape farmers' choices.

Brazil's coffee industry displayed considerable durability in dealing with environmental risks, evident in Brazil's nearly two centuries as a leader in global coffee production. But assessing Brazil's coffee growing as a whole elides the constant challenges that farmers faced. Coffee growing in Brazil has been remarkably mobile, as the crop was first cultivated in the northeast of the country before planting surged in the Paraíba valley of Rio de Janeiro state, from

there moving westward over the hills of São Paulo state.[545] The coffee "frontier," or the newest center of production, then moved to Paraná, and onward to Minas Gerais. The mobility of coffee over time in Brazil depended on many factors that both "pushed" and "pulled" at where farmers grew coffee, perhaps none more influential than nutritional exhaustion in one region leading to the felling of forests to capitalize on the rich nutrients of the soil in a new region.[546]

The geographic size of Brazil and its vast number of climates capable of growing coffee made the movement of the crop ecologically possible within national borders. The limited geographic space of smaller nations might foreclose the possibility of a highly mobile coffee frontier.[547] Environmental challenges and events shaped the movement of coffee growing in Brazil, sometimes over the long-term and at other times occurring in a single night. In each case, the decisions of farmers intersected with a specific social, economic, political, and technological context that shaped their available choices. In this way, coffee is not unique; similar challenges threaten all forms of agriculture. Depending on how risk, loss, and vulnerability are measured, these environmental events can sometimes be described as disasters.

The responses to the 1975 frost reveal how the organization of coffee growing housed certain vulnerabilities, especially since the risk of frost was known. Mark Carey's study of climate change and melting glaciers in the Peruvian Andes provides a telling contrast to the 1975 frost. Carey emphasizes the impact of glacial related disasters on various social groups, including

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[545] Rogério Naques Faleeiros, *Fronteiras do café: fazendeiros e "colonos" no interior paulista: 1917-1937* (São Paulo: Universidade do Sagrado Coração, 2010), chapter 1.
[546] Stanley J. Stein, *Vassouras: A Brazilian Coffee Country, 1850-1900* (Cambridge: Harvard University Press, 1957); Warren Dean, "The Green Wave of Coffee: Beginnings of Tropical Agricultural Research in Brazil: 1885-1900," *The Hispanic American Historical Review* Vol.69, No. 1 (Feb., 1989); Ana Luiza Martins, *História do café* (São Paulo: Editoria Contexto, 2008).
[547] Stuart McCook, "Global Rust Belt: *Hemileia vastatrix* and the Ecological Integration of the World Coffee Production since 1850," *Journal of Global History* 1. No. 02 (2006); Mario Samper K., "The Historical Construction of Quality and Competitiveness," in *The Global Coffee Economy in Africa, Asia, and Latin America, 1500-1989* (Cambridge: Cambridge University Press, 2003).

residents, government officials, technocrats, and tourists. Each group experienced the glacial related disasters differently, and competed to impose their vision for disaster mitigation that problematized a single concerted response.[548] For Carey, efforts over glacial control after disasters reflected a power struggle both between invested social groups and between humans and the physical environment.[549] The responses to the 1975 frost in southern Brazil reveal a more direct and authoritarian response by the military government, which soon after the event decided a clear line of action. But unlike glacial control which required principally a technological response, measures to mitigate risk from the frost required the buy-in of landowners who chose how to marshal their farms. It also required the availability of resources and viable alternative crops to which landowners could turn.

The 1975 frost revealed how the response to an environmental event was contingent on the context of the time and informed by long-term processes. Historian Virginia Garcia-Acosta argues that "disasters should be understood as processes unto themselves, rather than merely events that trigger processes."[550] Vulnerability to the frost increased in Paraná due to clear-cutting and burning of the dense forest to plant coffee, removing the protective biological cover that buffered winds and prevented cold temperatures from reaching the ground.[551] Planners, farmers, and workers in Paraná knew of the potential risk of a frost before 1975. Previous frosts provoked debates among planners about relocating coffee fields in Paraná towards higher elevation areas, away from the lower valleys where cold air gathered. Efforts to relocate coffee to mitigate the threat of frost within Paraná demonstrated planners' concerns, but also the limits

[548] Mark Carey, *In the Shadow of Melting Glaciers: Climate Change and Andean Society* (Oxford: Oxford University Press, 2010), 5-6.
[549] Carey, *Shadow of Melting Glaciers*, 6.
[550] Virginia Garcia-Acosta, "Historical Disaster Research," in *Catastrophe & Culture: The Anthropology of Disaster* (Santa Fe: School of American Research Press, 2002), 59.
[551] IBC-GERCA, *Informativo* (June 1972), 7.

of farmers' actions without either selling their land or removing their coffee trees for other crops. Moreover, unpredictable frosts were not the only threat to coffee growing in the 1970s.

Exploring "Rational" Agriculture after the Rust Proliferated

After the coffee-leaf rust arrived in Brazil in 1970, the federal government responded with a formidable campaign to combat one of the greatest environmental threats to coffee growing. By 1972, efforts to first eradicate the fungus and then contain its spread had clearly failed, as discussed in chapter three. The IBC and its agronomists shifted their efforts towards developing methods to control the debilitating impact of the coffee rust on the farm. They also identified climatic conditions that naturally lessened the impact of the fungus. In this context, and concerned about declining national coffee production, the IBC increased efforts to plant new coffee fields.

The IBC offered incentives and technical assistance for farmers to plant coffee along lines that the institution considered modern.[552] The institute divided resources among many states, even though Paraná was the principal coffee growing area at the time. Minas Gerais emerged as a prominent player in the IBC's coffee planting plans. The south of Minas Gerais also contained farmers who had eradicated their coffee in the previous decade with support from the Executive Group for the Rationalization of Coffee Growing (Grupo Executivo de Racionalização da Cafeicultura—GERCA). The IBC valued a "coffee growing tradition" when identifying regions to offer resources for new planting programs.

Minas Gerais emerged as a booming hub for coffee planting. In March 1972, the IBC-GERCA's bulletin *Informativo* detailed their efforts in the south of Minas Gerais, focusing

[552] IBC, *Programa de renovação e revigoramento de cafezais* (Rio de Janeiro: 1973), 12-13.

specifically on the municipality of Machado. The bulletin heralded the action of the institution's extension agents who worked in the region to promote new coffee planting. The bulletin's simple slogan that "higher productivity brings greater profits" captured the institution's ideology and its strategy to engage farmers.[553] Productivity and profitability were seen as synonymous in the view of the IBC, perhaps overlooking the possibility of rising costs in the future and the decline of state subsides.

The IBC`s Director of Production, José Maria Jorge Sebastião, accompanied leaders from the institution's regional headquarters in Varginha to visit Machado in March 1972. They heralded the region`s participation in the coffee planting program. To some extent, Machado typified a broader trend of increasing coffee planting across the south of Minas Gerais, but it stood out for another reason. Machado's environment possesses similar ecological characteristics to the "cerrado" (savanna) even though it is not located in the geographic area called the cerrado, further west. The IBC's rural extension team recognized that the land was "fraco" (weak), implying that the soil lacked nutrients, but purported that fertility could be increased with attuned fertilizer treatments. The cerrado soils of Machado offered a training ground to experiment with coffee growing. The IBC's technocrats noted that coffee producers in the region responded favorably to extension advice, adopting new technology and techniques in their planting, and organizing the farms so as to accommodate harvest machines when they were available.[554] The IBC celebrated planting coffee in "unused areas" and employing workers in the region, linking the new coffee planting with notions of land-use and local economic development. These ideas undergirded planting in Minas Gerais, but they also revealed the inspiration to devise a model to approach coffee farming in the cerrado further west.

[553] IBC-GERCA, *Informativo* (March, 1972), 2
[554] IBC-GERCA, *Informativo* (March, 1972), 3.

In April 1972, the IBC announced a new three-year plan to "Renovate and Reinvigorate Coffee Fields." Politicians inaugurated the plan in Caratinga, Minas Gerais, a leading center for coffee leaf rust research, reflecting the heightened priority of the state in the IBC's planning. The state Secretary of Agriculture, Alysson Paulinelli and the IBC`s Director of Production, Sebastião, attended the inauguration. They launched a plan to finance 600 000 new coffee trees, adding to the national total of just over 2 billion trees. In line with the IBC's work in Machado, their strategies targeted coffee planting in areas previously deemed unsuitable by adopting new coffee varieties and technologies. Selecting these regions would be informed by research on the coffee-leaf rust.[555] This technological triumphalism combined with careful environmental awareness and profiling, while dovetailing with the economic developmentalist agenda. As agronomist José Braz Matiello explained to me in an interview, planting in Minas Gerais "depended on changes in technology," and "wherever coffee grew, jobs and wealth followed."[556]

The valorization of Minas Gerais for coffee planting by state planners paralleled their concern over the damages caused by periodic frosts in Paraná. In July 1972, only a few months after the IBC announced the three-year plan to plant coffee, a frost struck Paraná's coffee fields. Coffee producer organizations, representatives from the IBC, and the Ministry of Agriculture met with the governor of Paraná, Pedro Viriato Parigot de Sousa, to debate the impact of the frost. They recognized a conflict in the modern coffee model in Paraná. To fight the coffee-leaf rust, the IBC called for greater spacing between coffee rows to allow tractor-pulled sprayers to more efficiently apply fungicides and pesticides.[557] The open corridors between trees also enabled mechanical weeding that reduced labor needs throughout the year.[558] However, this

[555] IBC, *Informativo* (May 1972), 2.
[556] José Braz Matiello, Interview by author, Rio de Janeiro, September, 2016.
[557] No author, "Café debate hoje seus problemas," *O Estado de S. Paulo*, 13 July, 1972, 14.
[558] IBC. *Informativo* (June 1972), 5.

spatial organization also increased the plant`s susceptibility to frost: "opening" the fields allowed cold winds to more easily reach branches and tree trunks compared to "closed" fields, intensifying the damage caused by a frost.[559] Closely planted trees slowed the frost and cold from penetrating. Some researchers called for the development of spraying techniques for "closed" plantations, or inversely, new technologies to lessen frost damage.[560] Yet, the "paradox", as planners described it, revealed how frost and fungus presented conflicting challenges to the modernizing efforts in Paraná that would increase costs in one form or another. This realization did not foreclose planting in Paraná because political influence maintained support for coffee producers in the region, but it presented a tension that was not as prominent in areas less prone to frost, rendering other regions more appealing to federal planners.

The 1972 frost intensified government planners' paranoia over declining coffee stocks. In response, a conglomerate of officials, led by the Ministry of Agriculture, met to signal new investments in Robusta (conilon) coffee. After the October 1972 Second Planning Meeting of the National Commission on Coffee, government planners launched a new study on the technical, economic, and political aspects of Robusta cultivation. It is little surprise that the Brazilian state aimed to expand Robusta coffee growing since the species possessed natural resistance to the coffee leaf rust and could be grown at lower altitude and in warmer climates.[561] Moreover, Robusta coffee could replace low-quality arabica coffee beans in the expanding soluble (instant) coffee trade. Despite facing different challenges, similar modernizing strategies developed for Arabica coffee were applied to Robusta: training researchers, analyzing climatic factors, identifying techniques for specific regions and strengthening rural outreach networks. The

[559] No author, "Café debate," 14.
[560] IBC, *Informativo* (June 1972), 7.
[561] Ministério da Agricultura, *O exploração do cafeeiro no Brasil* (October 7, 1972), 22.

strategy similarly focused on improving profitability "per unit of land, capital, and labor."[562] Political planners' rhetoric about modernizing Arabica coffee applied equally to Robusta coffee, showing the proliferation of the ideas of modernization as a general approach, and not solely as a response to controlling the coffee rust—these ideas of modernization became the norm in the view of the state.

Soybeans and Coffee Compete in Paraná, 1972-1974

Beyond coffee concerns, the 1972 frost in Paraná also prompted debates regarding the viability of alternative crops. In the early 1970s, soybean production in Paraná, and southern Brazil, accelerated at fantastic rates. Paraná's farmers adopted soybeans in the mid-1950s as a temporary crop planted between new or recovering coffee trees.[563] By the late 1960s, new technologies and rising prices for soybeans made the crop more appealing. In August 1969, agronomist Ady Rual da Silva highlighted how soybeans grew well when rotated with wheat, claiming that "the inputs used for wheat left a residual effect (that benefited soybeans), only needing to till the soil with a disc."[564] Moreover, he noted that the relatively flat topography of the land in Paraná permitted mechanization that was indispensable for wheat and soybeans.[565] The federal government launched programs to subsidize credit and agronomic advice for soybean cultivation. Their systematic efforts show how the state aggressively pursued agricultural modernization for other crops beyond coffee, and how Paraná's agricultural landscape underwent significant transformations before the 1975 frost. National soybean

[562] Ministério da Agricultura, *O exploração*, 24.
[563] Lucas Mores, "História ambiental do agroecossistema do café no norte do Paraná" (master's thesis, Universidade Federal de Santa Catarina, 2017), 292.
[564] Ady Rual da Silva, "O trigo no norte do Paraná," *O Estado de S. Paulo*, 20 August, 1969, 11.
[565] Silva, "O trigo no norte do Paraná," 11.

production grew at a remarkable pace: in 1970, Brazil produced less than 4 percent of the world's soybeans. By the end of 1980, its share had increased to 27 percent.[566]

Expanding soybean cultivation displaced a variety of crops rather than turning new lands to agriculture.[567] In 1972, Cotia, a major agricultural cooperative in the municipality of Jataizinho, Paraná, abandoned cotton for a wheat and soybean rotation. The cooperative explained their transition in terms of technological possibilities and labor demands. A representative explained that soybeans and wheat solved the problem of securing temporary workers during the cotton harvest. Another member noted that mechanization offered a solution and landowners could "release permanent employees and care for the harvest with only daily contract workers"[568] Similar changes appealed to coffee growers who relied heavily on temporary labor for the annual harvest.[569] However, on productive coffee lands, farmers were reluctant to uproot their trees without formidable incentives, which were not available at the time.

The federal government strongly supported maintaining or replanting coffee trees. By the end of 1972, the IBC's program to reinvigorate coffee fields financed the planting of 305 million coffee trees.[570] Concerns about coffee shortages revealed moments of leniency in the state`s efforts to modernize the crops in the short run. The IBC continued to promote new plantations using "modern agronomic practices" but they also reduced efforts to uproot or eradicate coffee in the short-run. Only 6 million trees were eradicated through governmental programs, a marginal

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[566] Philip F. Warnken, *The Development and Growth of the Soybean Industry in Brazil* (Ames: Iowa State University Press, 1999) 9.
[567] Warnken, *The Development and Growth of the Soybean*, 17, 27.
[568] No author, "Terra ficará logo cansada," *O Folha de S. Paulo*, 8 October, 1972, 55.
[569] Ivan Sergio Freire de Sousa and Rita de Cássia Milagres Teixeira Vieira, "Soybeans and Soyfoods in Brazil with Notes on Argentina," in *The World of Soy* (Champaign: University of Illinois Press, 2008), 235.
[570] IBC, Ministério da Indústria e Comércio (MIC), *IBC-GERCA 72* (Rio de Janeiro: 1972), 2.

number that demonstrated the state's concern about underproduction.[571] This form of state support revealed internal and temporary compromises in the approach to modernization that responded to paranoia about declining national coffee stocks—a baseline quantity of trees. In the IBC's view, the application of fertilizers on traditional coffee fields could boost yields in the short run, even as planners considered these choices economically inefficient. Planting continued to take priority, as the IBC and GERCA approved credit contracts for 1973 to plant over 100 million new trees in Minas Gerais, and nearly 100 million in Paraná state, some of which were intended to replace older low-yielding trees.[572]

The flurry of coffee planting in Brazil stemmed in part from an uncertain international market. Governments had signed the International Coffee Agreement (ICA) in 1962 to regulate international trade prices and flows, but paused the agreement's economic provisions regulating prices in 1968.[573] The Brazilian government sought to increase coffee production to defend its international market share and to gain leverage in future ICA negotiations.[574] Rising coffee prices justified the state's investment. A sack (60 kilos per sack) of exported coffee that fetched an average of 53 USD on the market in January 1972, rose to 89 USD by January 1974. Moreover, IBC President Carlos Alberto de Andrade Pinto claimed that efforts to increase productivity showed positive results. According to the IBC's statistics, productivity per 1000 trees averaged around 13 sacks of processed coffee. Andrade Pinto signaled a gradual reduction in government support for new plantations.[575] While investment declined compared to previous years, the IBC's financial support to plant coffee for 1973-1974 revealed the sharp geographical

[571] IBC, *Programa para a execução da política cafeeira 1973: gabinete de presidência* (Rio de Janeiro: 1972), 3.
[572] IBC-GERCA, *Progamma 72* (Rio de Janeiro: 1972), 26.
[573] Gavin Fridell, *Coffee* (Cambridge: Polity Press, 2014), 64.
[574] IBC, *Programa para a execução da política cafeeira 1973*, 3.
[575] Carlos Alberto de Andrade Pinto, IBC, *Informativo* (February, 1974), 3, 11.

changes. Of the nearly 150 million coffee trees planted that year, Minas Gerais planted 63 million, São Paulo 40 million, and only 10 million in Paraná—the same amount as the marginal coffee growing state of Mato Grosso.[576]

The decision to slow coffee planting coincided with political changes as Ernesto Geisel became the President of Brazil in March 1974. General Geisel played a role in the 1964 coup, and later served as a minister of the Supreme Military Tribunal, and president of the economically and politically influential Petrobrás (the national petroleum company).[577] As president, Geisel's economic policies sought to reduce direct state intervention and accord a greater role for private capital. Geisel also changed several political posts, dispatching Minister of Finance Delfim Neto to an ambassadorship in France, and replacing him with Mario Henrique Simonsen. Geisel promoted Alysson Paulinelli, the former Minas Gerais Secretary of Agriculture who campaigned for modern coffee growing in the state, as the federal Minister of Agriculture. Politically, Geisel's rise to the presidency marked a shift away from the "hard line" politics of previous presidents Costa da Silva and Médici.[578]

In 1974, the IBC reduced planting programs but continued efforts to "rationalize" coffee by encouraging the incorporation of technologies and techniques to raise yields on farms. In their view, the "rational organization of labor…utilizing machines and modern inputs, make it possible to reduce costs of coffee production."[579] In August 1974, the IBC surveyed coffee growers to assess their farming costs. Despite regional variation, analysts concluded that farms needed to produce over 10 sacks of coffee per 1000 trees to generate an economic surplus.[580]

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[576] IBC-GERCA, *Relatorio annual* (Rio de Janeiro: 1974), 20.
[577] Skidmore, *The Politics of Military Rule*, 160-161.
[578] Skidmore, *The Politics of Military Rule*, 162.
[579] IBC, *Informativo* (February, 1974) 6.
[580] IBC, MIC, *Custo de produção de café: ano agrícola 73-74, safra 74-75* (Rio de Janeiro: December 1974), 5

However, at least half of farms responded that their production fell below the threshold. In the view of the IBC, these farms tended to compensate workers poorly and were prone to collapse, thus linking low productivity with labor instability.[581] This conclusion aligned with the IBC's position that higher yields directly correlated with farm profitability.

Framing coffee modernization as a benefit for workers entirely overlooked the changing labor demands associated with higher-productivity farms. They required fewer workers overall and relied more heavily on the use of daily contract labor.[582] These trends stretched back decades since coffee producers often employed a mix of permanent and temporary workers on their farms. But after the Rural Labor Statute (ETR) extended labor laws to rural workers in 1963, landlords increasingly dismissed permanent workers in favor of daily contract labor. The informal status of temporary workers allowed employers to avoid more costly responsibilities of registered permanent workers.[583]

Similar trends in rural labor employment applied to other agricultural activities where farmers adopted labor saving technologies. Export commodities selected by the government for programs to boost production best typified the trend. To accelerate the expansion of soybean cultivation in Paraná, government bodies jointly created the National Center for Soybean Research (CNP-Soja) in Londrina in 1975. As a joint venture, the Agronomic Institute of Paraná and Embrapa (Brazilian Agricultural Research Corporation) mandated the center to apply new techniques and technologies to soybean cultivation.[584] Embrapa established other stations that

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[581] IBC, *Custo de produção de café*, 5.
[582] IBC, *Custo de produção de café*, 5.
[583] Thomas D. Rogers, *The Deepest Wounds: A Labor and Environmental History of Sugar in Northeast Brazil* (Chapel Hill: University of North Carolina Press, 2010), 138. Verena Stolcke, *Coffee Planters, Workers and Wives: Class Conflict and Gender Relations on São Paulo Plantations* (London: The MacMillan Press, 1988), 116-117. The rural labor law extended the urban labor laws of the CLT to permanent rural workers. This included eight-hour work days, a year end salary bonus, indemnification for dismissal, and a minimum wage law.
[584] Margarida Cássia Campos, "A Emprapa-soja em Londrina-PR: a pesquisa agrícola de um país moderno" (PhD diss., Universidade Federal de Santa Catarina, 2012), 37.

similarly privileged research on one or more specific crops in areas either already productive or potentially productive—part of the new model to intensify agriculture established in 1972. Support for the CNP-Soja emanated from the highest levels of government, including the president of Embrapa, José Irineu Cabral, Agriculture Minister Alysson Paulinelli, and Paraná's governor Jaime Canet.[585] Paulinelli celebrated the agreement, stressing that federal researchers could convey the "know-how" to continue expanding soybean production, and eagerly visited the productive regions in Paraná, heralding the productivity of soybeans and potential for further growth.[586]

Frozen Fields Reveal Contradictions in the Coffee Sector, July 1975

On July 18, 1975, the "black frost" struck the coffee growing regions of Paraná, parts of São Paulo, and stretched into Mato Grosso and Minas Gerais states. It became known as the "black frost" for the way the cold 'burnt' the leaves, turning them dark brown and black. A frost typically occurs when the minimum temperatures fall below .5 C, usually accompanied by clear skies and little wind, allowing cold air to gather. As a tropical crop by origin, coffee trees are especially sensitive to any frost, but the impact varies depending on its intensity.[587] A superficial frost burns only the leaves while the branches remain unaffected. A partial burn typically strikes the higher parts of the tree, including the leaves, branches and in some cases the upper trunk. After light and partial burns, workers could still prune the affected parts and the plant could regrow. A severe frost affects the entire tree, in some cases even freezing the roots and killing

[585] No author, "Embrapa administrará o centro nacional da soja," *Folha de Londrina*, 6 March, 1975, 11.
[586] No author, "Jamie Canet e Alysson Paulinelli visitam a Coopervale em Palotina," *Folha de Londrina*, 11 June, 1975, 9.
[587] Robert A. Rice and John Vandermeer, "Climate and the Geography of Agriculture," in *Agroecology* (New York: McGraw-Hill Publishing Company, 1990), 21-22.

the plant.[588] Frosts occurred in Paraná in 1963, 1967, 1969, and 1972. But the 1975 frost was much worse than the earlier ones given its geographic reach and the temperatures that fell as low as –5 C in the heart of Paraná's coffee growing areas.[589]

In 1975, commentary following the frost conveyed a sense of profound destruction. Regional newspapers in Paraná, the *Folha de Londrina* and *Panorama,* and the nationally oriented *O Estado de S. Paulo*, covered the event extensively with screaming headlines, such as: "Frost devastates crops in the South-Central" and "The worst frost in the history of São Paulo and Paraná." While newspapers heralded "the end of coffee", government officials' responses were more measured. Although figureheads such as the IBC president Camilo Calazans de Magalhães and the Paraná Governor Jamie Canet initially expressed their shock in similar ways to the sensationalist news coverage, they quickly reversed their stance.[590] On the same day that Canet reportedly claimed that "not a single coffee tree survived the frost" he also issued a statement saying the government was immediately developing plans to support producers whose crops had been harmed.[591] In the same spirit, most politicians and technocrats urged calm. For instance, Irineu Pozzobon, the chief agronomist at IBC's regional headquarters in Paraná recognized the damage that stretched across two hundred municipalities and 900 million coffee trees. But Pozzobon argued that "this frost, like all the others, will not determine the end of coffee growing."[592] Agriculture Minister Paulinelli called for optimism, signaling that the government would help and that the "spectacle" should end.[593]

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[588] IBC, *Recuperação e condução de cafezais geados* (Rio de Janeiro: 1976), 6.
[589] No author, "Informe técnico," *Revista do Comércio de Café* (Rio de Janeiro: August 1975): 3.
[590] No author, "Não sobrou um único pé de café," *Folha de Londrina*, 19 July, 1975; No author, "Ministro promete assistência do governo," *Folha de Londrina*, 20 July, 1975, 1; No author, "Receita cambial do café deverá crescer," *O Estado de S. Paulo,* 20 July, 1975, 31.
[591] "Ministro promete assistência," 1.
[592] No author, "Tudo é marrom e muito desolador," *Panorama,* 19 July, 1975, 5.
[593] "Não há motivo para desperto, o governo vai ajudar," *Panorama,* 22 July, 1975, 8.

Paulinelli's description of the "spectacle" referred directly to the claims of destruction by the rural associations representing coffee farmers. These associations tended to be led by large-scale landowners due to the internal structure where votes were distributed based on the amount of coffee they grew. Wilson Baggio, the president of the Rural Union and Coffee Cooperative of Cornéllo Procópio, emerged as a widely cited commentator on the destruction of the coffee fields. Baggio and his father Pedro described the frost as the most destructive event in their decades of coffee growing. "Everything was destroyed," stated Pedro; his farms, which normally produced 100 000 sacks, "will not produce a single sack…the destruction was complete."[594] Pedro Baggio's comments ended with a succinct signal: "we wait for government action."[595]

Coffee farmer associations' emphasis on the destruction led directly to requests for state support on a massive scale. Otherwise, they claimed, producers would be forced to abandon coffee.[596] As Lucas Mores argues, Paraná's coffee interests framed the impact of the frost as more destructive than the São Paulo newspaper did, often focusing on coffee while eliding the damage to other crops and livestock.[597] The lobbying by influential coffee farmers in Paraná was nothing new. A month before the frost, Wilson Baggio threatened that without further federal financing, large-scale farmers risked financial ruin and would uproot coffee to join the "soy fever" sweeping the region.[598] The frost certainly harmed these farmers, but their claims fit within a familiar practice of lobbying the government for support, which in turn demonstrated the political leverage of large-scale coffee farmers in the region.

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[594] No author, "Sete vezes tragédia," *Panorama*, 19 July, 1975, 7.
[595] "Sete vezes tragédia," 7.
[596] No author, "Para PR, o plano de café erra na exclusão," *O Estado de S. Paulo*, 22 June, 1975, 52; "Sete vezes tragédia," 7.
[597] Mores, "História ambiental do agroecossistema," 280-290.
[598] "Para PR, o plano do café," 52.

On July 24, 1975, President Geisel announced measures to address the frosts in the Center-South region and the flooding in the Northeast of the country on radio and television. He signaled the government's commitment to support farmers harmed by frost by delaying loan repayments and earmarking funding to recover coffee, milk, and leather production, and to create rural jobs.[599] Geisel's statement signaled a prorogation of loan contracts on a remarkable scale: three years for annual crops and five years for perennials, including coffee. Credit to recover was also subsidized and set at a 7 percent annual interest rate, low by comparative standards.[600] Geisel signaled a firm commitment to "recover" agriculture in the affected regions in the shortest period of time, but the precise details of the plans were left to other governmental organs. Playing a key role, the IBC indicated that coffee recovery was technically possible in Paraná by uprooting lifeless trees, pruning or stumping damaged ones, and replanting. The IBC framed these measures as an emergency response, and that long-term coffee planting strategies should still focus on less frost-prone regions.[601] Paraná governor Jamie Canet similarly supported recuperating coffee but noted that the agricultural economy needed to diversify.[602]

What recovery represented, and for whom, became the battleground for rural associations representing farmers. These associations argued that the frost would ruin two future annual harvests, and that producers were dependent on the government. They challenged how government financing worked, especially for farmers who grew different crops. Farmers could access financial support for damaged coffee trees through the Bank of Brazil and the IBC, but not for their other crops. This institutional structure left diversified farmers undercapitalized or

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[599] No author, "Governo libera recursos e inicia recuperação," *O Estado de S. Paulo*, 24 July, 1975, 22.
[600] No author, "Todas as dívidas serão prorrogadas," *O Estado de S. Paulo*, 24 July, 1970, 23; IBC, *Plano de renovação e revigoramento de cafezais 1975-76* (Rio de Janeiro: 1976), 8.
[601] IBC, *Plano de renovação e revigoramento de cafezais, 1975-76, normas de execução, geada* (Rio de Janeiro: 1976), 4, 21.
[602] No author, "Futuro preocupa, mas Paraná não altera programas," *O Estado de S. Paulo*, 24 July, 1975, 26.

having to turn to increasingly expensive alternative sources of credit.[603] The government's model assumed farmers grew only coffee, which may have played an informative role in the choices of farmers moving forward. Dependence on a single crop increased ecological and economic risks, but perhaps offered greater state support through a single government agency that promoted that activity.

Some coffee farmers remained skeptical that cutting their coffee and planting wheat and soybeans would ensure stable returns. They speculated that widespread adoption of soybeans would cause over-production and drive down prices come harvest time.[604] Others complained that alternative crops were not economically or ecologically viable. Jorge Maluly Neto, the president of the Rural Union of Piraju that represented farmers, argued that since "the topography of our region only permits coffee growing, we have to continue producing coffee."[605] Meanwhile, the IBC's agronomists saw an opportunity to continue promoting coffee modernization. In the municipality of São Manoel, São Paulo, agronomist Lina Leme Cezário Garcia explained that most of the coffee in the region was old with low-yielding trees, struggling with the coffee rust, and that "now, with the damage (from the frost), the fields can be renovated."[606] These views reveal the diverse responses by interested parties, but they were all linked by demands for state support to help manage the ecological crisis principally as an economic event.

Other actors in the IBC called for a pause to assess the damage and develop a concerted strategy. Agronomist and now former IBC Director of Production, José Maria Jorge Sebastião, argued that many coffee trees that were partially affected could be recovered in a year or two. In

[603] No author, "Café, a sobrevivência em jogo," *O Estado de S. Paulo*, 27 July, 1975, 28.
[604] No author, "Nas mãos do governo: o future da agricultura," *O Estado de S. Paulo*, 27 July, 1975, 28.
[605] "Café, a sobrevivência em jogo," 28.
[606] "Café, a sobrevivência em jogo," 28.

the meantime, he suggested that farmers seek the advice of agronomists to plant cereal crops between the coffee rows to offset the costs of recuperating the coffee. The practice of intercropping had previously fallen out of favor in modernization plans.[607] As Lucas Mores notes, this form of outreach in response to frosts represented a new addition to rural extension manuals.[608]

By the end of July, Agriculture Minister Paulinelli spoke directly to the coffee situation in Brazil. He claimed, "Brazil does not desire, nor can it lose its position in the international coffee market."[609] The Minister of Agriculture called for agricultural sector to "fight, enthusiastically, to plant more and better."[610] The IBC followed suit, launching the Emergency Plan for the Recuperation of Frozen Coffee Fields that detailed the best practices producers could adopt to recuperate frost-struck trees, or more emphatically plant new ones. The plan stressed the continued importance of coffee in Brazil despite robust national economic growth.[611]

Strategies to recuperate the coffee industry emphasized planting new coffee fields that corresponded to goals of rationalizing coffee. In August 1975, Calazans stated that "within 20 years the coffee plantations in Brazil will be entirely renewed according to the best agricultural techniques"[612] Moreover, he indicated that Brazil would not compete with the cheap labor of other international producers, but would turn to technology to remain competitive in the industry.[613] To do so, the government would further subsidize chemical inputs and expand credit availability at reduced interest rates. Calazans reaffirmed Brazil's commitment to remain a major

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[607] "Café, a sobrevivência em jogo," 28.
[608] Mores, "História ambiental do agroecossistema," 290.
[609] Alysson Paulinelli, in "Brasil não quer perder mercado," *O Estado de S. Paulo*, 30 July, 1975, 1.
[610] No author, "Não pode haver desestímulo, desespero, abandono," *Folha Rural: Suplemento da Folha de Londrina*, 27 July, 1975, 1.
[611] IBC, *Anuário estatístico do café*, (Rio de Janeiro: 1989). This number is an average of the 1970s, the annual contribution of coffee oscillated significantly due to the frost in 1975.
[612] No author, "A Plan for a New Coffee Farming," *Revista do Comércio de Café* (August, 1975), 35.
[613] "A Plan for New Coffee Farming, 36.

coffee producer, stating "the Brazilian government right now is applying massive resources to the recovery of trees affected by the frost. More than Cr$ 8 billion (approximately one billion dollars USD)...will be reverted to the farm sector—to coffee farmers."[614] Clearly in response to the frost, much of the state's investment in coffee trended towards less frost-prone areas. The elimination of the next year's harvest and the choices of farmers to diversify into other crops significantly changed the agricultural landscape in Paraná and the experiences of many people who lived and worked in the rural areas struck by the frost.

Labor in a Coffee Field and the Chill of Vulnerability

As government officials, coffee policymakers, and farmers assessed the damage caused by the 1975 frost and debated how to respond, thousands of workers found themselves immediately unemployed. Every coffee farm in Brazil required labor to cultivate the crop. Worker contracts divided between permanent and temporary workers and could include a variety of arrangements that changed. Permanent workers signed annual contracts that could be task-based, or they worked as sharecroppers upon an agreed area of land and typically received a set percentage of the coffee harvest. Scholars have emphasized the development of the colono labor system created in the late nineteenth century that persisted formally until 1963, and informally into the 1970s.[615] As a special class of "resident contract workers," colonos received a task-based payment for the number of coffee trees they worked, and a set income for each sack of coffee

[614] Camilo Calazans, in "Calazans: Hour of Truth for the Trade," *Revista do Comércio de Café* (September, 1975): 16-17.
[615] Thomas H. Holloway, *Immigrants on the Land: Coffee and Society in São Paulo, 1886-1934* (Chapel Hill: University of North Carolina Press, 1980); Stolcke, *Coffee Planters, Workers and Wives*; Cliff Welch: *The Seed was Planted: The São Paulo Roots of Brazil's Rural Labor Movement, 1924-1964* (University Park: Pennsylvania State University Press, 1998).

harvested.[616] Their contracts also included access to a small parcel of land to cultivate consumable or cash crops. The colono style of contracts had been in decline, especially after the Rural Labor Statute was passed in 1963. For example, a 1973 study of two large-scale farms in Maringá, Paraná, showed that the number of permanent hired worker families declined from 63 to 14 over the course of a decade.[617]

Other arrangements usually paid workers a regular monthly salary or daily wage. In some cases, workers were paid in cash for their labor, while in others they earned a fixed amount per task performed, the most common being payment for each harvested sack of coffee. Many farms also required animal care for transport or plowing, although the arrangement varied by region and technologies employed. Other positions included farm administrators and machine workers who could be employed permanently or temporarily. Anthropologist Verena Stolcke studied coffee workers in São Paulo in the 1970s, examining the decline in permanent labor and the increase in casual-contract workers. Stolcke notes that a variety of factors beyond legal changes spurred the transition towards relying on daily contract workers, including landlord evictions, coffee eradication programs that eliminated jobs, and workers seeking other positions. But the shift towards temporary labor arrangements increased during the 1960s and into the 1970s.[618]

All coffee farms required a series of tasks that varied by the composition and seasonal demands. The essential elements of coffee farming included clearing the land for planting, weeding, trimming and pruning the trees, and applying inputs (organic or chemical, in powder or, later, spray).[619] The harvest required additional labor, usually occurring between May and

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[616] William H. Nicholls and Ruy Miller Paiva, *Changes in the Structure and Productivity of the Brazilian Agriculture, 1963/73: Ninety-Nine "Fazendas" Revisited, Tome I—Brazil South and Southeast* (Rio de Janeiro: IPEA/INPES, 1979), 279.
[617] Nicholls and Paiva, *Changes in the Structure,* 305.
[618] Stolcke, *Coffee Workers,* 122
[619] IBC, *Cultura de café no Brasil: manual de recomendações* (Rio de Janeiro: 1974).

September depending on the coffee tree variety, climate, and style of harvesting. In the early 1970s, harvesting included three different approaches. The first involved workers bending the branches downward and firmly running their hands along the branches to strip the cherries from the trees and collecting them from the ground. The second followed the same process, but first placed a large cloth below the trees. Placing the cloth required more time (especially when done thousands of times) but it helped eliminate some impurities like dirt and rocks. The first two processes worked best when the coffee cherries matured at the same time. The third and considerably less popular method involved selectively hand-harvesting the ripe cherries from the trees, ensuring the highest quality by eliminating unripe beans.[620] Workers then winnowed the coffee by tossing it into the air at just the right angle to separate leaves, sticks, and stones, that required a practiced technique and a strong back.[621] The next step involved washing the coffee and separating unwanted elements before drying it on a terrace for hulling before reaching the "green coffee" stage when the coffee could be sacked and ready for market.

The damages caused by the frost eliminated many of the immediate labor needs on coffee farms. Demand for year-round labor and temporary labor for the next year's harvest also declined. The impact of the frost ensured that coffee trees would hardly yield beans the following year. Farmers who chose to recuperate or eradicate would need some workers to perform the tasks, but only a fraction of the labor compared to what was required for a healthy coffee field. Moreover, a full year without coffee yields made other crops more appealing. Soybeans, wheat, and cattle pasture each required a fraction of workers compared to coffee. But these patterns were not new by 1975.

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[620] Gervásio S. Cavalcanti eds., *Cultura de café* (Campinas, São Paulo: Instituto Campineiro de Ensino Agrícola, 1973), 63-64.
[621] Stolcke, *Coffee Workers,* 156.

Previous frost events in Paraná brought to the surface the tension between agricultural crisis, diversification, and rural employment. After the 1969 frost in Paraná and São Paulo, an unnamed and insightful critic observed how farmers responded by dismissing workers.[622] Rural unions representing workers (different from the large-scale farmer associations) met to discuss how the frost, like a drought, provided an opportunity for coffee farmers to dismiss their employees, citing economic losses. The worker union described how the "social function" of employment had been eroded; that the employer no longer cared about those who depended on the work to survive, maintain their family, and educate their children.[623] Observations from the 1969 frost foresaw the responses in 1975, which forcefully brought the issue of rural unemployment to the surface.

Examining the 1975 frost and its impact more locally drew attention to the experiences of workers, and specifically to the impact on temporary workers. These workers composed a discursive category sometimes referred to as "casual" or "daily" workers, or the popular term in Paraná and São Paulo, "bóias frias." The term bóias frias referred to the "cold lunches" they carried with them to work. The term likened workers not simply as a meal, but as the hardiest meal of the day, lacking heat for the traditional rice, beans, and (ideally) meat. Estimates for the number of unemployed workers after the frost ranged widely. *Folha de Londrina* reporter Francisco de Oliveira suggested that if even half of Paraná's coffee was destroyed, at least 150 000 workers would lose their jobs, mostly daily workers.[624] The *Folha de S. Paulo* used the IBC's statistic that coffee farms in Paraná directly employed over a million people to estimate that 600 000 would be unemployed soon after the frost.[625]

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[622] No author, "Geada, pretexto para despedir," *O Estado de S. Paulo*, 25 July, 1969, 23.
[623] No author, "Geada, pretexto para despedir," *O Estado de S. Paulo*, 25 July, 1969, 23.
[624] Francisco de Oliveira, "Chega ao fim um ciclo do café no Paraná," *O Estado de S. Paulo*, 19 July, 1975, 11.
[625] No author, "Governo dará apoio sem favorecimentos," *O Estado de S. Paulo*, 20 July, 1975, 2.

Portrayals of the experiences of casual rural workers captured a life of vulnerability. Workers boarded labor trucks at five in the morning to arrive on a coffee farm to work—eating their cold lunch in the fields.[626] Jamie Zanay, a bakery owner in the rural town of Tupã, São Paulo, explained how the workers congregated at his bakery doors to wait for the labor trucks. In an interview with the *Folha de S. Paulo*, Zanay explained: "they have nothing…they work today to pay what they ate yesterday, and they have no assistance." Zamay estimated that a worker received only 25 or 30 cruzeiros per day of work, and struggled to find employment for 180 days per year."[627] He identified the surge in laborers seeking work in the morning after the frost struck the coffee fields. But Zamay also identified former tomato, watermelon, melon, and wheat harvesters who had lost their jobs.[628]

Luis Fernando da Silva, a 22-year-old coffee worker who found himself unemployed, spoke of his situation: "I always worked on the farm. My entire family as well. Now I don't know if we will have work. We will have to search for any kind of job, what can we do?"[629] An unnamed colleague of Fernando da Silva lamented: "I don't know what the rural people will do. All I know is that there will be a lot of hunger."[630] In their individual reflections, none of these workers argued for state support, seemingly a conception beyond imagining. Their portrayal of the situation offered few options in Paraná

Ricardo Kotscho, reporter and editor of *O Estado de S. Paulo*, wrote a detailed assessment of the impact of the frost on rural labor. He suggested that the frost would end the coffee cycle in Paraná because farmers had been "waiting for a frost" to capture government

[626] No author, "E agora, Bóia Fria?," *Panorama,* 20 July, 1975, 3.
[627] No author, "Desemprego agora é a nova ameaça," *O Estado de S. Paulo*, 20 July, 1975, 29.
[628] "Desemprego Agora," 29.
[629] No author, "Açúcar terá produção reduzida," *O Estado de S. Paulo*, 22 July, 1975, 21.
[630] "Açúcar terá," 21.

resources to eradicate coffee for soybeans, wheat or pasture. Kotscho foresaw the government intervening to support the coffee economy, but argued that "social problems" had reached a "critical mass," referring to the expansion of urban slums around the cities of Maringá and Londrina, Paraná.[631] Kotscho compared the changes in labor between coffee and soybeans, where "coffee fixed men to the land…one coffee field of 60 alqueries required on average 50 families and the same area cultivated with soy could be managed by a single man."[632] The editor further critiqued the government's labor legislation—or rather the lack of application, as having failed in its "apparent mission to benefit the rural man, while in practice caused further harm."[633] Observantly, Kotscho hypothesised that recuperating coffee would not solve the problem, since the 200 million coffee trees planted in Paraná through GERCA's modernization programs only employed temporary labor during the harvest.[634] This insight demonstrates how opportunities for workers were constricted by modernization efforts, a process accelerated by the frost, and the efforts to further rationalize agriculture in the region thereafter. Neither modernized coffee nor soybeans offered salvation for most of workers rendered unemployed in 1975.

A Problem for Whom? Debates over Unemployment after the Frost

Not all observers portrayed the plight of daily workers in the same light. Coffee farmer associations frequently lobbied for modification or repeal to the rural labor legislation since its implementation in 1963. Mário Cintra Leite, an influential coffee producer in Ourinhos, São Paulo, defended the colono system when he opposed a worker strike in 1963. He opposed both

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[631] Ricardo Kotscho, "O futuro depende da soja," *O Estado de S. Paulo*, 19 July, 1975, 11.
[632] Kotscho, "O futuro depende da soja," 11; An alqueire in southeast Brazil equalled around 2.4 hectares. See Joe Foweraker, *The Struggle for Land: A Political Economy of the Pioneer Frontier in Brazil from 1930 to the Present Day* (Cambridge: Cambridge University Press, 1981), 48.
[633] Kotscho, "O futuro depende da soja," 11.
[634] Kotscho, "O futuro depende da soja," 11.

wage labor and moving workers off the farm, noting that the workers' life was difficult but at least none of them went hungry. Striking workers framed the relationship differently, emphasizing their poor quality of life, and hidden exploitative costs for food, services, and access to resources.[635] After the 1975 frost, coffee farmer association leaders argued that government legislation caused rural unemployment, and that the state was therefore responsible for the unemployed. Cintra Leite rejected the notion that landowners were responsible for swelling urban migration and rising unemployment. Cintra Leite argued instead that landowners were the victims, unable to afford the workers because of onerous expenses.[636] His call for a return to the colono system included an explicit social element that would prevent familial degradation and apathy towards the virtues of labor, and "spare the insecurity of living around the urban centers."[637]

Even as the jobs disappeared after the frost, the rhetoric of landowners focused on how workers lacked discipline and commitment, and how they were easily manipulated by dishonest and unethical lawyers who led workers to the labor courts.[638] Conflating moral degradation with changes in employment demonstrated the enduring paternalist view of landowners towards workers, but also the social stigmas associated with the bóia-fria class. Producers lobbied for a return to the colono system as a morally redemptive strategy specifically because the dictatorial government was concerned with "social problems," which could include petty crime, violence, and political unrest stemming from unemployment.

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[635] Mario and Rafael Cintra Leite, *Diário da Sorocabana,* Febuary 7, 1963; On the origins of the strike see Departamento de Ordem Política e Social (DOPS), "Greve Fazenda Lageadinho," São Paulo (16 February, 1963).
[636] No author, "Cafeicultor pede a volta do colonato," *Folha de Londrina,* 25 July, 1975, 15.
[637] "Cafeicultor pede a volta," 15.
[638] "Cafeicultor pede a volta," 15.

Mário Cintra Leite's claims obscured the relationship between large-scale landowners and their employees. A few weeks before the frost, journalist Carlos Amuda published a contentious interview with Olavo Godoy, who led a farmer association in Londrina. Godoy bitterly expressed his view that the rural labor legislation needed to be rescinded or overhauled, and that the politicians who created it only sought to exploit the wealth of the large-scale agriculturalists.[639] Carlos Amuda described a contrary reality, where fewer and fewer workers were living and working permanently on farms, and in which the vast majority did not have the protection of the rural labor laws. He estimated that only 10 percent of the large-scale farms in northern Paraná followed the worker legislation, even 12 years after its passage.[640] These stark statistics demonstrated the ability of landowners to avoid the application of worker laws and corollary responsibilities. Rather, the popularization of temporary labor cleaved closer to the changing labor needs on the farm, shaped by different crops and the adoption of labor-reducing modernization processes. The frost caused a crisis that exposed this structure due to the scale of labor dismissal, intensifying trends of rising unemployment.

Paraná`s government officials struggled to address the situation or offer remedies. Paraná's secretary of labor, Vinícius Ferras Tores formed a working group to study the options but recognized that there were few methods to absorb the large number of unemployed people or deter their migration towards urban areas.[641] State deputy and president of the Agricultural Federation of Paraná, José Lazzaro Dumonte, warned of the "serious social issues" from displaced coffee labor. "Coffee," stated Lazzaro Dumonte, "is still the greatest employer for men in the rural [area] and it needs the government's attention with care and urgency."[642] Yet,

[639] Carlos Amuda, "Bóias frias o impasse que permanece," *Folha de Londrina,* 6 July, 1975, 7.
[640] Amuda, "Bóias frias o impasse," 7.
[641] No author, "Não há como deter migração," *O Estado de S. Paulo,* 22 July, 1975, 23.
[642] José Lazzaro Dumonte, in "Não há como deter," 23.

officials differed in their assessments of the problem. Leite Chaves, a senator from Paraná, argued that more than 800 000 people could be rendered unemployed.[643]

On July 23, 1975, the federal minister of labor, Arnaldo Prieto, claimed that there was no official knowledge of a crisis of unemployment provoked by the frosts, nor in the northeast provoked by the flooding.[644] An editorial by *O Estado de S. Paulo* challenged Arnaldo Prieto's bold claim, arguing that all indications suggested mass unemployment in Paraná, especially for the bóias-frias.[645] On July 29, Arnaldo Prieto tempered his position and recognized the surging unemployment, only to suggest that state projects, like the Itaipu hydroelectric dam construction and the Rodovia dos Imigrantes highway projects could help absorb the unemployed labor.[646] The minister met with the "leaders in rural areas" (the farmer association leaders) to strategize how to minimize the "negative social effects" stemming from the frost. Prieto did not explain what the social effects entailed, but they likely fit within the same referential context of the military regime, which conflated unemployment with crime, violence and squalor. After the meeting, a journalist inquired if the government would respond to this emergency by adopting measures to solve the structural problem of the bóias-frias. The minister acknowledged the problem and addressed the journalist, stating: "You look very happy. I think we should change positions and you become the Minister of Labor."[647]

In the absence of a clear governmental plan to address unemployment, farmer associations amplified their ambitious calls to overhaul rural labor legislation. Olavo Godoy used the frost to continue attacks on the rural labor laws, arguing that the high cost of labor prevented

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[643] "Não há como deter," 23.
[644] No author, "Ministro ignora desemprego," *O Estado de S. Paulo*, 23 July, 1975, 12. In 1975 a major flood occurred in Pernambuco state.
[645] "Ministro ignora desemprego," 12.
[646] No author, "Grandes obras podem absorver desempregados," *O Estado de S. Paulo*, 29 July, 1975, 20.
[647] Arnaldo Prieto, in "Ministro do trabalho vem ao Paraná ver os efeitos social das geadas," *Folha de Londrina*, 29 July, 1975, 1.

producers from recuperating their damaged coffee fields. He suggested that if the labor laws were changed, coffee producers would recommence coffee growing and offer work to hundreds of families, and help solve the problem of the bóias-frias.[648] While Godoy wielded the influence to meet with the minister of agriculture, other organizations articulated a different vision. The leader of the civil construction workers' union, Otávio Dias Ribeiro, argued that the urban areas could not handle the flow of unemployed workers, which would create a "belt of misery."[649] Dias Ribeiro approached the issue from a different angle, opposing modernizing farms that would further dismiss workers and add to the unemployment lines.[650] Mechanization, in his view, would not create new jobs after the crisis, but instead eliminate permanent worker jobs, swelling the ranks of bóias-frias.

Calls to slow agricultural modernization were few and did not correspond with the government's recuperation plan or with the approach to dealing with thousands of unemployed workers. In late July, Agriculture Minister Alysson Paulinelli announced that the future of agriculture would depend on modernizing activities and the prevention of "irrationalism" in the rural economy.[651] President Geisel and Paraná's Governor Canet proposed no solution beyond federal work projects to create jobs and "reduce the social effects of the frost."[652] IBC officials followed the path set by the federal government and endorsed agricultural rejuvenation to create jobs. IBC official José Maria Jorge Sebastíão agreed, contending that recuperating coffee would not only guarantee the livelihood of farmers, but "will generate thousands of jobs for people who live and depend directly on coffee, this includes the bóias-frias."[653] Sebastião's comments, like

[648] Olavo Godoy, in "Sindicato pede mudanças no Estatuto do Trabalhador," *Folha de Londrina*, 29 July, 1974, 4.
[649] Otavio Dias Ribeiro, in "Entre os trabalhadores do desemprego e da fome," *Folha de Londrina*, 29 July, 1975, 4.
[650] "Entre os trabalhadores," 4.
[651] No author, "Paulinelli: eu nuca disse que Paraná não deve cultivar café," *Folha de Londrina*, 30 July, 1975, 1.
[652] No author, "Garantida a posição do Paraná," *O Estado de S. Paulo*, 31 July, 1975, 22.
[653] José Maria Jorge Sebastíão, in "Café, a sobrevivência em jogo," *O Estado de S. Paulo*, 27 July, 1975, 28.

those of politicians, continued to overlook how rational agriculture demanded increasingly less labor overall, and peak labor demands for the harvest benefited from temporary contract workers.

The cacophony of opinions from politicians, technocrats, journalists, and workers, show the absence of a unified strategy to address the surging number of unemployed laborers after the frost. Unable to secure jobs, thousands of families took to the highways and migrated away from the frost-stuck regions. Some sought opportunities in regional urban hubs, like Londrina, or the bulging mega cities, particularly São Paulo. Others migrated northward, hoping to find work on the expanding sugarcane fields in São Paulo state, in the government-led colonization programs in the north of Brazil, or among the millions of new coffee trees being planted in the south and west of Minas Gerais state. Some workers learned to live with this mobility, cycling from farm to farm and region to region, following seasonal harvest patterns for contract labor, once they were learned.[654] In subsequent years, workers increasingly unionized to make claims on the state, while others turned to the courts to seek compensation for unlawful dismissal and failure to pay owed wages. The accelerating out-migration marked small rural towns with absence both in terms of the population and local commercial activities. Schools grew emptier and shops and hotels closed. While processes of rural emigration and agricultural mechanization were already in place, the impact of the black frost in Paraná went beyond the economic, and left a lasting mark on the local socioeconomic makeup.

The juxtaposition of two videos depicting coffee workers shows stark transformations over the 1970s. The first, produced by the IBC to inform farmers how to identify the coffee leaf rust, portrays coffee farms being harvested by workers. In the video, a group of young people,

[654] Janaina Jacome dos Santos, "Trabalho e trabalhadores rurais: memórias e experiências" (PhD diss., Universidade Federal de Uberlândia, 2010), Introduction, 63.

principally women, bend coffee branches downward to strip ripe coffee beans off with their hands, guiding them into the wicker baskets strapped around their waists. The workers appear casually working on a sunny day, conversing with each other while a voiceover describes how coffee accounted for over 40 percent of national exports.[655] It is easy to infer the connection between the audio and image: these workers filled the millions of sacks of coffee that were economically crucial for the country.[656]

The second video, produced in 1980 by the television station *Coroados*, based in Londrina, Paraná, portrays coffee workers differently. Made possible because of political changes that reduced control over television content, reporters interviewed workers in the fields and urban makeshift neighborhoods allows first-person commentary. All the workers claimed to have formerly worked on coffee fields, and collectively told a similar story of how frost crippled their expectations for steady work. One man noted that it had not been great before, but that the situation worsened after 1975, and that it had been really bad ever since. Another described the experience as "each day worse." They described a dearth of opportunity, with more workers waiting in the towns than the contractors needed, or than the labor trucks that ferried them to the fields could hold. Some workers talked about migration because, as one claimed: "there is nothing here …and not just here, but all over." One unnamed man explicitly lamented about how machines continued to take away the opportunities they had hoped would return after the frost. The documentary estimated that the bóias-frias working class numbered a million people in Paraná.[657]

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[655] IBC-GERCA, *Controle da ferrugem do cafeeiro*, video (1970), 06106-02, Arquivo Nacional, Rio de Janeiro, Brazil.
[656] IBC, *Anuário estatístico do café* (Rio de Janeiro: 1971).
[657] "Os filhos do café," *TV Coroados*, Londrina, Paraná, 1980.

Coffee Trees Migrate North to Minas Gerais: 1976-1977

In 1976, the IBC established a strategy to rejuvenate the coffee industry once again. As part of a new "emergency" plan, the institute dedicated resources to assessing the frost and supporting recovery of the less-damaged trees. Most of their resources, however, were applied to planting "rational coffee" in areas less prone to frost. The first plan outlined new financing for over 100 million trees, with the largest share in Minas Gerais. The impact of the frost shaped how resources would be distributed, prioritizing "ecological zones for planting" as they defined them.[658] These projects also adopted strategies of regional economic development that were implicit in previous programs but now identified as integrated criteria. Using state-led coffee planting programs as regional economic development programs was not new, but integrating calculations into the official programming represented a different phase. The IBC considered identifying areas with available labor, assessing the degree of development on the property, the lack of alternative agricultural options in a region, the potential impact of coffee growing on the income of municipalities, and capacity to increase the technology used in agriculture. They also promoted producer associations to lessen the IBC's bureaucratic responsibility to commercialize the product and more easily make available inputs and machines to members.[659]

After the frost decimated coffee yields in Paraná and harmed harvests in São Paulo, Minas Gerais emerged as the largest coffee producing state in Brazil, generating nearly 5 million sacks of coffee in 1975. Minas Gerais was the only state that increased production that year.[660] This productive boom stemmed from planting initiatives in the state earlier in the decade in response to the arrival of the coffee leaf rust. In the three years after 1975, Minas Gerais planted

[658] IBC, *Plano de renovação e revigoramento de cafezais 1975-76: normas de execução* (Rio de Janeiro: 1976), 3.
[659] IBC, *Plano de renovação* (1976), 4.
[660] Camilo Calezans de Magalhães, "Geada," *Revista do Comércio de Café* (Rio de Janeiro: August, 1975): 8.

more coffee trees than any other state, totalling 517 million plants, ensuring that it would consolidate its position as the leading national producer.[661] Crucial for the planners who identified regions for new plantations, most of Minas Gerais harbored little risk of frost. Moreover, producers actively responded to incentives to plant coffee, as evidenced by the success of the IBC-GERCA's planting programs.[662]

The regional economics of Minas Gerais made coffee growing an appealing agricultural activity for many farmers. The infrastructure of the Association of Credit and Rural Assistance (Associação de Crédito e Assistência Rural) discussed in Chapter One played a key role in reaching farmers and conveying knowledge and incentives. Compared to Paraná and São Paulo, a sluggish agricultural sector in Minas Gerais offered cheaper land prices and available labor.[663] New farms did not have to address the problems associated with transitioning from permanent to temporary labor. The construction of new coffee fields provided opportunities for workers. Small-scale coffee growers (less than 10 000 trees) also accessed the IBC's resources, especially in the eastern Zona da Mata region that contained principally small-scale landowners, in part due to the more mountainous landscapes.[664] Yet, the expansion of coffee planting did not imply a new labor structure, but rather that the friction brought to the surface by the frost in Paraná did not proliferate in Minas Gerais in the same way, and that labor relations were less contentious when workers found jobs rather than facing dismissal.

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[661] Vera Dantes, "Signs of Recovery in First Normal Crop," *Revista do Comércio de Café* (Rio de Janeiro: January, 1978): 18.
[662] José Luís dos Santos Rufino, *Programa nacional de pesquisa e desenvolvimento do café* (Brasília: EMBRAPA, 2006), 60.
[663] Rogério Geraldo Ribeiro de Andrade, *Política cafeeira e grupos de interesse* (Belo Horizonte: Fundação João Pinheiro, 1995), 33.
[664] Glória Zélia Teixeira Caixeta, "Importância sócio-econômica da cafeicultura em Minas Gerais," *Informe Agropecuário* (EPAMIG: 1978), 4.

Despite this optimistic vision of new coffee fields, the same processes inherent in modernizing coffee undergirded the expansion of coffee in Minas Gerais. While the expansion opened new jobs for workers on new plantations, planters sought to construct rational fields that continued to emphasize reducing labor costs and raising labor efficiency. Coffee cultivation greatly expanded after 1975 along rational lines. The IBC estimated that the production of new plants and new techniques was double the production of 'traditional' coffee. Moreover, estimates suggested that this coffee provided an income twenty times superior to milk production, the second most widespread rural activity in Minas Gerais.[665] This comparison shows how coffee appealed in a context of choices facing landowners. More broadly, it shows how coffee growing in regions considered more agriculturally underdeveloped offered possibilities that eluded landowners in Paraná and São Paulo, and how these perspectives were distinctly shaped by government policies and incentives, and by natural conditions.

Conclusion

Later commemorations of the 1975 frost evoked the theme of total destruction, centering on the coffee sector specifically. On the fortieth anniversary of the frost, the Rio de Janeiro based newsgroup, *O Globo*, interviewed producers who lived through the event. Mauro Sato, who grew coffee in 1975, described the destruction: "I remember until today, a frost that cannot be forgotten…it froze the ground and formed a layer of ice. Very early (in the morning) the coffee was already black."[666] As Sato recalled, "normally the plant darkens when the sun comes out, but in 1975, the coffee was already dark, black; during the night it had already burned."[667] Geraldo

[665] IBC, *Resultados de pesquisas cafeeiras, 1971-82* (1983), 415.
[666] Rodrigo Saviani, "'Geada negra' que destruiu pés de café no Paraná complete 40 anos," *O Globo,* 18 August, 2015.
[667] Saviani, "Geada negra."

Grecco, another coffee producer from northern Paraná described the event as "terrible, you went to bed with green fields, and as the day cleared, everything turned burnt. I didn't save anything. I lost it all."[668] These reflections are linked to the theme of immediate destruction, almost exclusively referencing coffee.

The frost has often been portrayed as an environmental disaster that triggered the end of the coffee cycle in Paraná and created unemployed masses. This characterization is only partially accurate. Coffee growing continued in Paraná, but never again at its pre-frost levels as farmers moved into wheat, soybeans, and pasture. Thousands of people who had been rendered unemployed after the frost struggled to find work in an increasingly constricted laboring landscape. In reality the frost was not a trigger, but rather a catalyst and part of the broader transformation that had been ongoing for over a decade. Unlike previous frosts, the 1975 event stood out because it struck Paraná at a time when available technology, state policies, and viable agricultural alternatives incentivized landowners to adopt changes in a short period of time. The event intensified these changes despite—or perhaps because of—the friction between government organs, producers, workers and the environment. The impact of the frost on workers did not prompt the government to offer solutions, but rather to recognize rising unemployment as a problem that was distinctly tied to the project of agricultural modernization, and one that would not disappear.

Tracing the geographic patterns of agricultural transformation reveals the intersections between national commodity governance and ideas of appropriate ecologies that coalesced after the frost and developed forcefully in the following years. The frost provides a window into how a climatic event intertwined with and catalyzed modernization objectives. Coffee farmers and

[668] Saviani, "Geada negra."

landowners managed to lobby the state for support, albeit within the context of the government's modernizing agenda. Workers experienced modernization very differently from farmers, both those who were rendered unemployed after the destructive frost, and those who found new jobs in new coffee plantations. Thus, the frost represented both an opportunity and a disaster for different individuals and groups, but ultimately propelled change in the larger project of agricultural modernization.

Chapter Five: Fields of Construction:

Building Modern Coffee in Minas Gerais, 1969-1990

In 1977, the Brazilian Coffee Institute (IBC) published a small comic book that narrated the history of coffee around the world and its arrival in Brazil. The comic book tells the story through the perspective of an anthropomorphized coffee bean named Moquinha, O Cafezinho Legal (Moquinha, the cool little coffee tree), who appears as a hero fighting for the proliferation of coffee around the world before thriving in Brazil. The authors emphasize how Brazil's receptive environments offered a seemingly natural home for coffee, despite the plant`s foreign origin. Moquinha confesses to being "dazzled by Brazil," exclaiming that, "here in Brazil, I found an ideal climate and spread across the fields of the entire country."[669] After a series of journeys conquering Brazilian farms, Moquinha appears among other more human-like figures, all of whom wear crowns while holding sacks of money. "I am the absolute king" declares Moquinha, and have made many kings, the coffee kings."[670]

In the comic book's narrative of coffee conquering Brazil, only two images stand out as moments of struggle. The first portrays Moquinha lamenting the arrival of his enemy, the coffee rust, which attacks his trees. In the second Moquinha is sketched shivering in the cold among leafless coffee trees, having suffered the destruction of frost. These images referred to the arrival of the debilitating coffee leaf fungus *Hemileia vastatrix* in 1970, and the 1975 frost that devastated coffee fields in Paraná and parts of São Paulo. Yet, Moquinha's reflection on troubling times is short lived. In the following frame he is dancing in the sun with productive coffee trees, stating that "Brazilians are optimists. After a strong frost knocked us down, we rose

[669] Instituto Brasileiro do Café (IBC), *Moquinha, cafezinho legal!* (Rio de Janeiro: IBC, 1977), 24.
[670] IBC, *Moquinha, cafezinho legal!*, 28.

with vigor," and emphasizes that chemical products helped defeat the rust—a recognition of modernization efforts to overcome environmental threats.[671] The tale of Moquinha represented the IBC's simplified narrative of success. It elided the considerable efforts of state planners, technocrats, and farmers to construct modern coffee fields, and how careful consideration of environmental factors shaped the selection of Minas Gerais as the principal site of coffee planting in the 1970s and 1980s.

Figure 5.1: Moquinha, cafezinho legal! Instituto Brasileiro do Café (Rio de Janeiro: IBC, 1977). Text in left image: "But here! I also found enemies. The frost that burns my coffee plantations." Text in right image: "And my other enemy: the rust, a fungus that treacherously attacks my plantations."

Starting in the late 1960s, Brazil's military government massively invested to modernize coffee growing and increase the number of trees in the country. At the time, Minas Gerais was a marginal coffee growing state compared to Paraná and São Paulo. By the end of the 1970s,

[671] IBC, *Moquinha, cafezinho legal!*, 29.

Minas Gerais led Brazil in coffee production, as farmers planted coffee trees by the millions. This chapter examines how coffee fields were constructed in Minas Gerais. I trace how state planners, agricultural scientists, and economists increasingly valued Minas Gerais for coffee growing and how efforts to construct modern coffee unfolded in the 1970s in the state. This chapter then analyzes the continued evolution of what modernization entailed in Minas Gerais through the 1970s and early 1980s. I show how modernization goals remained variable, as agronomists and researchers consistently aspired for ever higher productivity. I correlate the expansion and intensification of coffee growing in Minas Gerais with the personal accounts of IBC employees who were active in shaping the programs and operations on the ground. Their narratives show the boundaries of what government modernization programs sought to change, especially in the context of economic crisis in the 1980s and the experiences of farmers and workers as government support eroded.

Farmers planted coffee in Minas Gerais with the support of financial incentives subsidized by the government, and technical assistance sourced through the state-operated IBC. But the promotion of coffee growing in Minas Gerais stemmed from three prominent and interconnected factors. First, the government's high-level planning approach to agricultural development provided a commitment to modernizing coffee and willingness to reconfigure the national geography of coffee production. Second, environmental events disrupted how planners and farmers evaluated coffee farming. Minas Gerais possessed environments that mitigated the damage caused by the fungus and decreased the chance of damaging frosts. Lastly, technological changes and agronomic research made it possible to turn nutritionally lacking soils in Minas Gerais into productive agricultural spaces. This transformation represented a victory for

Brazilian science and correlated with the military regime's emphasis on agriculture in national development goals.

The rapid expansion of the IBC's infrastructure in Minas Gerais in the early 1970s and collaboration with the Association of Credit and Rural Assistance's (Associação de Crédito e Assistência Rural—ACAR) network of rural extension technicians provided a solid foundation to promote coffee growing. These technocrats brought a modernizing ideology developed through the IBC to farmers, providing the technology and know-how for what they considered to be modern coffee. Yet even while farmers planted new trees, how planners determined what "modern" coffee constituted continued to evolve based on the shifting context, new problems, and strategies to seek higher productivity per hectare of farmed land. Research outpaced the actions of farmers, who remained consistent targets of criticism from coffee experts for their inability to keep stride. Efforts to manage a productive space responded to the constantly changing "biological process" that supported even the most organized agricultural systems.[672] Attempts to control nature, as planners sought to do in Minas Gerais' coffee fields, grew more complex over time in response to threats or the continued pursuit of higher productivity.[673]

The IBC's coffee modernization programs rhetorically served all coffee farmers who agreed to a plan of action and who possessed the collateral to secure a loan. Yet by the 1980s, economic crisis highlighted the fissures in the model. Farmers who adopted chemical fertilizers and pesticides, or who purchased machines relied on technology that was often susceptible to price fluctuations. Many farmers failed to manage rising costs that coincided with falling

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[672] Warren Dean, *Brazil and the Struggle for Rubber: A Study in Environmental History Rubber* (New York: Cambridge University Press, 1987), 6.

[673] Donald Worster, "Transformations of the Earth: Toward and Agroecological Perspective in History," *The Journal of American History* Vol. 76, No. 4 (March, 1990): 1101; John Soluri, *Banana Cultures: Agriculture, Consumption, and Environmental Change in Honduras and the United States* (Austin: University of Texas press, 2005); Steve Marquardt, "'Green Havoc': Panama Disease, Environmental Change, and labor Process in the Central American Banana Industry," *The American Historical Review* Vol. 106, No. 1 (Feb., 2001): 50.

financial returns from the sale of their coffee, and increasingly expensive financial credit. For technocrats working with the IBC, coffee modernization programs offered an avenue to contribute to national economic development and a perceived betterment of the country. However, the economic crisis of the 1980s and fall of the military dictatorship in 1985 diminished the IBC's operations, and simultaneously revealed the social tensions associated with modernization in coffee agriculture. Indeed, efforts to control ecology intersected with the social organization of coffee growing, and impacted the lives of farmers, laborers, and agricultural regions in Minas Gerais.[674]

Many of the voices in this chapter are those of agronomists who worked for the IBC in Minas Gerais. In October 2015, I attended a coffee research conference in Poços de Caldas, Minas Gerais. Procafé, a leading coffee research institution in Brazil today, hosted the conference. After the federal government closed the IBC in 1990, Procafé emerged as a private research institution and acquired the IBC's former headquarters in Varginha. The conference attracted influential actors in the coffee industry, including the Minas Gerais Secretary of Agriculture Carlos Melles, and the presidents of the National Coffee Council and of Embrapa Café, the federal coffee policy and agricultural research institutions respectively. Agronomists dominated the conference's presentations, covering a swath of new research on different aspects of coffee growing. Nearly all presentations focused on increasing profitability or farm production, reflecting the conference's slogan, "with more technology, better coffee is achieved."[675]

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[674] Ivette Perfecto and John Vandermeer, *Coffee Agroecology: A New Approach to Understanding Agricultural Biodiversity, Ecosystem Services, and Sustainable Development* (New York: Routledge, 2015).
[675] Procafé, *41 Congresso Brasileiro de Pesquisas Cafeeiras,* Poços de Caldas, Minas Gerais, 2015.

Much of the activity outside the auditorium revolved around a group of six older men. I recognized former IBC agronomist José Edgard Pinto Paiva among them; we had previously corresponded and agreed to meet at the conference. I approached Paiva to introduce myself and reiterated my interest in understanding how Minas Gerais surged as a site of coffee growing, and how coffee connected with agricultural modernization efforts. Paiva enthusiastically told me that I had come to the right place, gesturing towards the others and exclaiming "it is all right here."[676] Over the next two days I struck up conversations with the other five men, all agronomists who had worked with coffee and held prominent roles in the IBC, mostly in the state of Minas Gerais. Initial conversations turned into interviews, follow up meetings, and new contacts.

Their views provide a retrospective narrative that adds insight beyond institutional documentation, but also tends to celebrate the achievements of the coffee program rather than offering critiques. They framed their work as distinctly tied to regional and national economic development through the process of modernizing coffee fields. Their casual use of the term "modernization" fit with their career trajectory; all of them joined the IBC in the late 1960s and early 1970s when the military government prioritized coffee modernization programs. This overarching idea provided a mandate to pursue research and transformations in coffee growing that aligned with national development goals. Further, their recollections were linked by a general sentiment of achievement when discussing the 1970s and part of 1980s. This perspective made sense considering Minas Gerais state came to lead the nation in coffee growing during that period. However, they also shared a general sentiment of an incomplete modernization, either due to farmer incompetence or ultimately the erosion of governmental support.

[676] José Edgard Pinto Paiva, interview by author, Poços de Caldas, Minas Gerais, October, 2015.

These agronomists provided the perspective of mid-level institutional actors tasked with creating and implementing coffee programs. To expand the picture, I also drew on several Minas Gerais state level institutions that also played significant roles in the effort to modernize coffee in the state. ACAR worked with rural extension and farmer instruction, and the Minas Gerais Agricultural Research Business (EPAMIG) participated in coffee-focused research along similar lines as the IBC. This consortium of institutions together contributed towards and invested in expanding modern coffee in Minas Gerais.

Coffee, Agriculture, and Stagnation in Minas Gerais

In the early twentieth century, Minas Gerais agriculture specialized in dairy production. In addition to cattle, coffee growing played a prominent role in the Sul de Minas (southern Minas Gerais) and the Zona da Mata (southeast) regions. The coffee growing boom that sprawled across São Paulo state stretched into southern Minas Gerais during the 1910s and 1920s.[677] But costly transport to São Paulo's distant ports reduced profitability in Minas Gerais.[678] In the 1930s, a global economic crisis constricted the international coffee trade and drove down coffee prices. Minas Gerais' producers were especially affected, where farms averaged lower coffee yields (the amount of coffee cherries harvested per tree, also used as a measure of productivity) and lower quality compared to São Paulo. At the time, the quality of coffee was determined by the number of visual defects and the size of the coffee beans. Thus, with lower quality and yields, the decline of prices in the 1930s exacerbated the situation for farmers, rendering the

[677] Marcos Lobato Martins, "A marcha do café no Sul de Minas, décadas de 1880-1920: Alfenas, Guaxupé, Machado e Três Pontas," *Revista Territórios & Fronteiras, Cuiabá* Vol. 7, N.1 (Jan-June 2014): 297.
[678] Martins, "A marcha do café," 299.

lowest quality coffee unmarketable. Many farmers abandoned coffee for dairy production and foodstuffs for local and regional markets.[679]

Spurred by the coffee market's collapse during the 1930s, the federal government strengthened its involvement in the national coffee industry. The government created the National Coffee Council in 1931, which became the National Coffee Department (DNC) in 1933. The DNC destroyed millions of stockpiled sacks of coffee (60 kilos per sack) to reduce overproduction and to slow falling trade prices, either dumping them into the sea or burning small mountains of beans.[680] Not until World War II did prices markedly rebound, revived through international wartime trade agreements and post-war trade growth. In the early 1950s, coffee prices rapidly increased and planting boomed in Paraná, parts of São Paulo, and some regions of Minas Gerais. Comparatively, however, Minas Gerais continued to produce lower yields and what was perceived to be a lower quality of coffee.

The economy of Minas Gerais remained heavily dependent on agricultural activities in the 1950s.[681] As discussed in Chapter One, visions of an underdeveloped agrarian sector in the state prompted the creation of ACAR to improve farming practices and farmer incomes. Brazilian planners also deemed agricultural underdevelopment as contributing to emigration trends. Between 1940-1960 the state's population expanded from 6.7 million people to 9.7 million. Yet the number of people engaged in agriculture and livestock stayed consistently

[679] Maria Regina Nabuco Palhano, "Agricultura, estado e desenvolvimento regional em Minas Gerais, 1950/1980," *Cedeplar-UFMG* (Belo Horizonte: Universidade Federal de Minas Gerais, 1982), 65.
[680] Rogério Naques Faleiros, *Fronteiras do café: fazendeiros e "colonos" no interior paulista, 1917-1937* (São Paulo: Universidade do Sagrado Coração, 2010), 48-52.
[681] Marshall Eakin, *Tropical Capitalism: The Industrialization of Belo Horizonte, Brazil, 1897-1997* (New York: Palgrave Macmillan, 2001), 93.

around 1.8 million, signaling out-migration from agrarian regions towards urban centers amid strong population growth.[682]

In 1961, the Brazilian federal government launched the Executive Group for the Rationalization of Coffee Growing (Grupo Executivo de Racionalização da Cafeicultura—GERCA) to destroy coffee trees with low-yields, and to promote alternative agricultural activities in their place. As discussed in Chapter Two, Minas Gerais' farmers willingly participated in the program to uproot coffee, although most switched to pasture at rates well beyond the government's expectations. The willingness of farmers to uproot their coffee reflected the poor economics of the crop in the state at the time. In 1963, the value of coffee production in Minas Gerais had fallen below that of rice, corn, and beans. Agronomists attributed the low productivity of coffee growing in the state to the land, described as "exhausted, naturally weak, highly acidic, or eroded."[683] In 1966, Minas Gerais' coffee farmers averaged only 4 sacks of coffee per 1000 trees compared to São Paulo's 12 and Paraná's 20.[684]

In the late 1960s, government planners recognized that the combination of coffee eradication programs and destructive environmental events pushed the number of coffee trees nationally below desired levels. For the first time in decades, concerns grew that the national coffee industry might not fulfil export and internal consumption demands. In 1969, the IBC officially launched the Plan to Renovate and Reinvigorate Coffee Fields (Plano de Renovação e Revigoramento dos Cafezais—PRRC) to incentivize and instruct farmers to plant "modern"

[682] Associação de Crédito e Assistência Rural (ACAR), *Plano diretor: serviço de extensão rural 1962-1966* (Belo Horizonte: 1963), 9.
[683] ACAR, *Plano diretor, 1962-1966*, 32.
[684] IBC, *Programa de diversificação econômica das regiões cafeeiras, 1966* (Rio de Janeiro: 1966), 18.

coffee. At the time, modern coffee comprised a combination of chemical inputs that included fertilizers, machines, and high-yielding coffee varieties.[685]

In Minas Gerais, politicians and commentators criticized the impact of previous eradication programs for the state. Newton Pereira de Paiva, the president of the Minas Gerais Agricultural Federation's (Federação da Agricultura e Pecuária do Estado de Minas Gerais—FAEMG) coffee group claimed that any further destruction "will be the end of Minas Gerais' coffee growing. This year won't even produce a million sacks."[686] Representing farmers, Pereira de Paiva criticized their limited options, noting that "coffee left with the eradication, and cattle took its place. Men lost their jobs, causing a surge in serious social problems."[687] Agricultural journalist J.G. Rodrigues de Oliveira also argued that eradication harmed regional economies and spurred unemployment, which he estimated would cause "profound social problems, whose impact is yet to be felt."[688] Critics of eradication also asked for the government to invest in planting modern coffee anew in Minas Gerais, supported by technical assistance, fertilizers, and methods to control erosion. In lobbying the government, both Pereira de Paiva and Rodrigues de Oliveira similarly trumpeted new coffee fields as essential for two fundamental goals of the military government: preventing "social problems" and promoting economic development. Their vision overlooked how the new coffee fields did not require the same types of labor as the old, and in fact by design aimed to reduce labor needs.

In late 1969, the Sul de Minas and Zona da Mata were selected by the IBC for coffee planting. The two regions are ecologically different. The Sul de Minas lies at altitudes of

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[685] IBC, Grupo Executivo de Racionalização da Cafeicultura (GERCA), and the Divisão de Economia Cafeeira (DEC), *Pesquisa de renovação da cafeicultura* (Rio de Janeiro: February, 1969).
[686] Newton Pereira de Paiva, in "Minas não aceita nova erradicação," *O Estado de S. Paulo,* 2 July, 1969, 24.
[687] Pereira de Paiva, "Minas não aceita," 24.
[688] J.G. Rodrigues de Oliveira, "A cafeicultura do sudoeste mineiro," *O Estado de S. Paulo,* 30 July, 1969, 6.

between 800 of 1250 meters above sea level, with gradual hills and stretching valleys. The region typically maintained a long dry season, ideal for the 'natural' harvesting method that was commonly used in Brazil whereby coffee berries dried on the trees.[689] The Zona da Mata had similar rain patterns but more dramatic topography and altitudes, and typically possessed a more diverse type of property ownership with more small-scale farms.[690] The IBC's agronomists and technicians believed that with the right technology, the lands and climates in southern and southeastern Minas Gerais were capable of growing high-productivity coffee. There was little effort to plant modern coffee in Minas Gerais in 1969, but the idea that the environments were viable for coffee planting further solidified during the early 1970s.

The Arrival of Coffee Leaf Rust and the Pursuit of Research

As the Brazilian Coffee Institute planned to expand coffee planting in early 1970, the fungus *Hemileia vastatrix* reached Brazil. As discussed in Chapter Three, the IBC and a consortium of national and international bodies mobilized to address the arrival of the rust. Planners identified Minas Gerais as the battleground to study the fungus, hoping initially to prevent its spread to the main coffee growing areas in São Paulo and Paraná. As agronomist Saulo Roque de Almeida reflected in an interview, the "war against the rust (ultimately) brought great benefits for Brazilian coffee because it forced us to use science and technology—to modernize."[691]After failing to eradicate and geographically contain the fungus, they researched methods to limit the impact on the farms.

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[689] The term "Brazilian natural" refers to the method of coffee growing commonly used in the Sul de Minas whereby the coffee beans ripen on the tree and absorb moisture from the outer cherry Most regions of Brazil harvested in this manner, but the Sul de Minas possessed a long dry season that lessened the threat of rot. José Edgar Pinto Paiva, interview by author, Varginha, Minas Gerais, October, 2016.

[690] Paulo Rebelles Reis and Rodrigo Luz da Cunha, eds. *Café arábica do plantio à colheita* (Belo Horizonte: EPAMIG, 2010), 42-48.

[691] Saulo Roque de Almeida, interview by author, Varginha, Minas Gerais, October, 2016.

In response to broad efforts to address the problem that coffee leaf rust posed, institutions in Minas Gerais participated with federal programs. In April 1970 ACAR partnered with the Minas Gerais Development Bank to increase financing and technical assistance for coffee farmers.[692] ACAR also agreed to support the work and leadership of the IBC in efforts to identify the spread of the fungus, using the institution's network of offices located through agrarian regions of the state.[693] In the same year, the Minas Gerais state government created its own agricultural research institution, the Integrated Program of Agricultural Research of Minas Gerais (PIPAEMG), and began researching coffee varieties resistant to the rust.[694] PIPAEMG partnered with the Campinas Agronomic Institute (ICA) and the federal agricultural universities in the Minas Gerais cities of Viçosa and Lavras.[695] Institutional integration provided a broad research network to study coffee and the rust in Minas Gerais.

The agronomists I interviewed all emphasized the significance of the rust's arrival in Brazil. A few retrospectively reflected on how the threat to coffee provided them with an opportunity to pursue research more emphatically. José Edgard Pinto Paiva, who ran the operations of the IBC's headquarters in Varginha, Minas Gerais, announced with pride that "coffee is a Brazilian technology. Agronomists and technicians were trained in Brazil, at Brazilian facilities. Where else could they train for coffee?"[696] His enthusiasm offers insight into how the IBC's agronomists described their work as highly nationalistic, with dominion over coffee and belief in technological and scientific innovation. Similarly, José Braz Matiello, who joined the IBC as an agronomist in 1968 and worked on technical research and disease control,

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[692] No author, "Revitalização da cafeicultura mineira," *O Ruralista,* March, 1970, 1.
[693] No author, "Lançado no sul o programa de racionalização da cafeicultura," *O Ruralista,* April, 1970, 1.
[694] EPAMIG, *Intrépida semente, 70 anos de história da fazenda experimental de Machado* (Varginha: EPAMIG, 2006), 80.
[695] Reis and Cunha, *Café arábica*, 69.
[696] José Edgard Pinto Paiva, interview by author, Poços de Caldas, Minas Gerais, October, 2015.

happily detailed his international trips through Latin America to present Brazil's research on the fungus.[697] Yet in these recollections, both Matiello and Paiva stressed that it required time and the formidable resources of the IBC to develop technical methods to control the fungus.

The notion of research expertise among the IBC's agronomists coincided with descriptions of the IBC's capacity to execute projects. In 1971, the Minas Gerais-based ACAR independently launched a plan to plant 50 million trees. Their program adopted modernization goals similar to those of the IBC, encouraging farmers to limit soil erosion, apply chemical inputs, analyze soil nutrition, and promote mechanization.[698] They aimed to triple the productivity of coffee farms although this estimate was still theoretical in the early 1970s. ACAR's technicians, however, acknowledged the formidable challenges in realizing these goals. In their view, farmers knew little about chemical inputs, new varieties, or how to space planting on a coffee field.[699] The IBC took leadership over this project in the same year, expanding its operational capacity in the state, while collaborating with ACAR's outreach network.

Despite coordinating efforts to promote coffee in Minas Gerais, the training of ACAR technicians differed considerably from that of the IBC. I met agronomist Antonio José Ernesto Coelho at a coffee cooperative in Varginha, the central coffee hub in southern Minas Gerais. Initially he worked for ACAR in the town of São Sebastião do Paraíso, also in southern Minas. He explained that ACAR's longstanding presence in agrarian regions made the institution familiar to farmers, but it lacked funding. The extension and technical assistance workers were mainly agronomists, like himself. Yet they instructed in activities that ranged from home economics and gardens, to crops and dairy production. Moreover, high demand placed huge

[697] José Braz Matiello, interview by author, Rio de Janeiro, September, 2016.
[698] ACAR, *Plano anual de trabalho* (Belo Horizonte: 1971), 13-14.
[699] ACAR, *Plano diretor: serviço de extensão rural 1968-1972* (1972), 84.

stress on the extension agents, who often traveled to farms to meet with families. In Coelho`s view ACAR engaged in too many activities to do any of them well.[700]

Coelho's began working for the IBC in 1968 at Varginha. The IBC paid better, he explained, and focusing on one crop made his work more effective. Coelho advanced in the IBC and took a leading position in choosing locations for regional offices throughout southern Minas. The lower probability of frost in the region played a key role in identifying coffee areas, but other factors influenced the IBC's local selectivity. Coelho considered whether farmers had a "tradition" of coffee growing.[701] Coelho's use of the term "tradition" represented a familiarity with the crop rather than a pejorative association with low-yielding and low-technology cultivation. Moreover, farmers had to be willing to enter a relationship with the IBC in order to access subsidized loans, technologies, and technical assistance. They sought areas where farmers signaled their willingness to grow modern coffee. For him, "the whole project was development. It was all entirely associated with socio-economic development." Coelho participated in the founding of fifteen regional IBC posts, all of which successfully expanded coffee in their areas. In a somewhat dismissive assessment, Coelho explained that with the formidable financial and technical support of the IBC, "those who did not plant coffee were silly."[702]

The IBC's Varginha headquarters documented the process of building coffee fields in Minas Gerais in the early 1970s. A series of photos outlined the steps, first clearing the land of former activities, turning the soil, and marking the planting lines. Agronomists at the time experimented with different spacing between coffee plants and rows, considering strategies to mitigate the spread of the fungus and maximize production. Once the coffee seedlings were

[700] Antônio José Ernesto Coelho, interview by author, Varginha, Minas Gerais, July, 2016.
[701] See Chapter Two for details on the changing construction of "traditional" coffee farming in Brazil.
[702] Coelho, interview, July, 2016.

planted, farmers intercropped beans or corn between the rows. Arabica coffee plants typically required three to four years to mature, and during this process needed to be pruned, trimmed, weeded, and fertilized and fumigated at different times.

Agronomist Durval Rocha Fernandes explained these steps to me when we met at the Procafé conference in 2015. Fernandes started working for the IBC in 1966 and participated in GERCA's eradication efforts in Paraná. In 1969 he moved to the IBC headquarters in Varginha, to work in technical assistance and promote coffee planting. Speaking specifically about the IBC's response to the coffee leaf rust, he emphasized that the research on experimental farms sought to form a "package" for coffee planting that would limit the effect of the rust and increase yields. Their goal, explained Fernandes, was to turn a property with nothing into a profitable coffee farm.[703] This package, as he described, provided the IBC with baseline expectations with which to engage farmers. Having these resources mattered in turning a coffee modernizing-rhetoric into an outreach program that shaped how farmers cultivated.

From 1971 to 1972, total agricultural production in Minas Gerais expanded by a massive 18 percent, riding strong federal and state level investment. Growth increased the following year by 11 percent. The Minas Gerais agricultural newspaper, *O Ruralista*, celebrated the increase and acknowledged that farmers were participating in development programs. Editors of *O Ruralista* described the farmers as receptive to change, "motivated to work and supported by the government's technicians." The editors also heralded the "vital importance" of agronomists and technicians to continue increasing productivity, portraying an ongoing battle.[704] Coffee played a key role in the agricultural boom in the early 1970s, and state Secretary of Agriculture Alysson

[703] Durval Rocha Fernandes, interview by author, Poços de Caldas, Minas Gerais, October, 2015.
[704] No author, "Alysson mostra progresso da agricultura mineira," *O Ruralista,* December, 1973, 9.

Paulinelli publicly encouraged farmers to plant more coffee for the national economy since the rust threatened the harvests.[705]

I asked all the agronomists I talked with why farmers planted coffee in Minas Gerais after the rust arrived. Access to the IBC's financial and technical support emerged as the most prominent theme in their responses. But other details helped inform who planted in the early 1970s. Having purchased land in southern Minas in the early 1970s, Paiva used his own story: "those who were familiar with the technology were the ones who went to the Minas Gerais frontier…the land was cheap and [people] had great access to financing."[706] Paiva's comment highlighted the importance of technological knowledge, and understanding of the environments that were considered appropriate for coffee growing at the time. Durval Rocha Fernandes mentioned that farmers who destroyed their coffee through GERCA's programs in the 1960s found alternative crops underwhelming and seized the new opportunity to plant coffee again.[707]

A 1973 assessment of coffee planting in southern Minas Gerais revealed a different metric based on farm scale. Farms larger than 100 hectares were significantly more likely to have planted coffee compared to small-scale farms of ten hectares or less.[708] Large-scale farms were more capable of accessing the IBC's credit arrangements, and better capitalized and therefore more willing to take on the risks associated with changing crops. The economic impact of the coffee was notable: despite occupying only 19 percent of available farmland, coffee contributed a disproportionate 56.8 percent of the farm income for coffee growers in 1973 in southern Minas. A hectare of coffee generated on average double the raw income of dairy production and seven

[705] "Alysson Mostra Progresso," 6.
[706] José Edgard Pinto Paiva, interview by author, Poços de Caldas, Minas Gerais, October, 2015.
[707] Durval Rocha Fernandes, interview by author, Varginha, Minas Gerais, October, 2015.
[708] EPAMIG, *Diagnóstico da cafeicultura da Zona Sul do Estado de Minas Gerais, ano agrícola 1972-1973* (Belo Horizonte: 1973), 11.

times the income of rice.[709] These statistics do not appear to account for costs, but the government's financial subsidies for coffee certainly lessened perceived financial risk.

The efforts of the IBC's technicians showed considerable results in Minas Gerais, and contributed to a surging agricultural sector in the state. Coelho highlighted the success of coffee planting around the city of Machado, in the Sul de Minas, as emblematic of the IBC's efforts. In 1974, the regional newspaper *Folha Machadense* celebrated how coffee helped contribute to a record 25 percent agricultural growth in the region that year. The newspaper heralded the municipalities' potential to plant more coffee and produce over 400 000 sacks of coffee in their region alone, noting how the surge in coffee planting created six thousand jobs and eliminated unemployment around Machado.[710] On a national scale, Minas Gerais led the country that year in planting over 100 million trees.[711]

Escaping the "Black Frost," Coffee Planting Accelerates in Minas Gerais

In 1974, General Ernesto Geisel assumed the presidency of Brazil's military regime and signaled that agriculture would be a key area for economic growth. Geisel's government launched the ambitious Second National Development Plan: 1975-1979 to continue the strong economic growth rates reached during the early 1970s. Aiming for around ten percent GDP annual growth, the economic plan faced almost immediate challenge when the 1973 oil embargo drove up international oil prices.[712] In 1974, Brazil imported 80 percent of its petroleum. As oil prices quadrupled, Brazil's import costs jumped from 6.2 billion USD to 12.6 billion USD

[709] EPAMIG, *Diagnóstico da cafeicultura,* 11.
[710] No author, "Produziremos 400 mil sacas de café," *Folha Machadense,* 3 July, 1974, 5.
[711] No author, "Renovação cafeeira no pais," *Folha Machadense,* 14 April, 1974, 1.
[712] Thomas E. Skidmore, *The Politics of Military Rule in Brazil, 1964-1985* (New York: Oxford University Press, 1988), 178.

between 1973 and 1974.[713] Brazil borrowed on the international market to cover the costs, which ballooned the national deficit dramatically from 1.7 billion to 7.1 billion USD.[714] Moreover, as a product derived from petroleum, real fertilizer prices more than doubled in 1974.[715]

Geisel shuffled important political posts, ousting the Minister of Finance Antônio Delfim Netto for Mário Henrique Simonsen, a noted academic and more orthodox economist.[716] Geisel also appointed Alysson Paulinelli, Minas Gerais' Secretary of Agriculture and agronomist specialized in fertilizers, to the federal post of minister of agriculture in March 1974. Upon taking office, Paulinelli spoke about the government's goals for agriculture and that he "received orders from President General Ernesto Geisel to give priority to strengthening fertilizers for Brazilian producers."[717] Paulinelli's appointment was closely tied to the government's ambitions for agricultural modernization. Paulinelli supported the programs in Minas Gerais that saw strong short-term growth and promoted the opening of agriculture in the cerrado (savanna) region that stretched across the interior of Brazil. He trumpeted the value of modernizing agriculture and especially the use of fertilizers to raise yields; he claimed to know "everything that happens with this [fertilizers] modern input."[718]

Amidst the economic uncertainty, agronomist and leading fertilizer researcher, Eurípides Malavolta called for greater state investment in agriculture to produce export commodities.[719] Malavolta argued that "miracle seeds do not exist without inputs (petroleum based agricultural

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[713] Werner Baer, *The Brazilian Economy: Growth and Development,* 7th ed. (Boulder, Colorado: Lynne Reinner Publishers, 2014), 76.
[714] Baer, *Brazilian Economy*, 79-80.
[715] Celia Regina Roncato Penteado Tavares Ferreira, and Natanael Miranda dos Anjos, *Evolução do setor de fertilizantes no Brasil, 1954-80* (São Paulo: Governo do Estado de São Paulo, Secretária de Agricultura e Abastecimento, 1983), 25.
[716] Skidmore, *The Politics of Military Rule,* 162.
[717] Claudio Amaral, "Fertilizantes, a prioridade do novo ministro," *O Estado de S. Paulo, Suplemento Agrícola,* 3 March, 1974, 53.
[718] Amaral, "Fertilizantes, a prioridade," 53.
[719] Eurípides Malavolta, "Produção de adubos," *O Estado de S. Paulo, Suplemento Agrícola,* 27 January, 1974, 3.

chemicals), and seeds alone do not cause a green revolution."[720] Rather than reducing investment in the face of economic crisis, planners instead called for greater resources to increase agricultural production by using the most modern technologies and techniques. The military regime pursued this strategy by offering a general 40 percent subsidy for fertilizers. The government also invested heavily in sugarcane production as a source of alcohol-based fuel to lessen dependence on imported oil.[721] Investment rolled into the cane industry. Between 1975 and 1984, the Brazilian government spent 10.5 billion USD on sugarcane programs to generate ethanol as a fuel alternative. Much of this investment funneled towards the state of São Paulo, where processing plants and fields of sugarcane rapidly sprawled across the rural landscape.[722] Sugarcane exemplified the government's ambition to expand non-food commodity production, which also included coffee.

In July 1975, a massive frost struck the coffee growing areas of Paraná and parts of São Paulo states. As discussed in Chapter Four, millions of trees were killed and around a billion trees were unable to produce coffee the following year. Shortly after the frost, the government announced programs to support coffee farmers whose crops had been struck. The IBC channeled resources to help recover lightly damaged trees, or to uproot coffee and plant different crops, prioritizing wheat and soybeans. The IBC restricted resources for new coffee planting in Paraná and parts of São Paulo. Minas Gerais largely avoided the frost, and the state's coffee sector temporarily led the nation in coffee production with nearly 5 million sacks of coffee in 1975. Minas Gerais did not maintain this position when the damaged fields in São Paulo recovered, but

[720] Eurípides Malavolta, "Política de adubos," *O Estado de S. Paulo, Suplemento Agrícola,* 31 March, 1975, 2.
[721] Thomas D. Rogers, *The Deepest Wounds: A Labor and Environmental History of Sugar in the Northeast Brazil* (Chapel Hill: University of North Carolina Press, 2010), 181.
[722] Rogers, *Deepest Wounds*, 198-199.

its temporary pre-eminence signaled coming geographic transformations in the national coffee industry.

The 1975 frost represented a turning point, after which state planners curtailed further planting in Paraná and expanded coffee growing it in Minas Gerais. Speaking after the frost, Paulinelli explained that Paraná should give preference to wheat and soy, and that Minas Gerais should lead in coffee growing since the state possessed the largest amount of viable land for the crop.[723] His comments fit within a high-planning perspective assessing which crops should be grown and where, under the assumption that rationalizing agriculture would fundamentally contribute to national development.

Individuals and institutions in Minas Gerais again lobbied for federal investment to expand coffee growing in the state after the frost. Caio Junqueira, the president of the Minas Gerais Agricultural Federation's coffee commission argued that producers in the state had already shown they could grow high-yielding coffee. He stated that "we can consider Minas Gerais coffee growing free of danger."[724] Moreover, Minas Gerais governor Aureliano Chavez proposed a plan after the frost to double coffee production in the state, also arguing that the climatic conditions for coffee were better in Minas Gerais than in São Paulo and Paraná.[725]

Remaking Minas Gerais for Coffee after the 1975 Frost

Federal resources poured into southern and southeast Minas Gerais after the 1975 frost in an effort to reinvigorate the national coffee industry. Producers in Minas Gerais planted over 500

[723] No author, "Paulinelli: eu nunca disse que Paraná não deve cultivar café," *Folha de Londrina,* 30 July, 1975, 1.
[724] No author, "A agropecuária à espera da redefinição," *O Estado de S. Paulo*, 20 July, 1975, 8.
[725] No author, "Minas quer elevar a produção," *O Estado de S. Paulo,* 31 July, 1975, 22.

million more coffee trees over the following three years, a larger total than any other state.[726] The federal government was unwilling to abandon the crop or allow it to fall (for long) below desired levels of total production. Planting coffee seemed a lucrative choice for farmers. Speculation of a global coffee undersupply after the frost drove international prices upwards, roughly doubling from 63 USD per sack in 1975 to 153 USD in 1976.[727]

The 1975 frost intensified earlier trends to increase planting in Minas Gerais. The IBC at Varginha acquired a new experimental farm to test different coffee varieties, seeking to identify high yielding and rust-resistant plants. Agronomist José Braz Matiello stressed how the 1975 frost "ended coffee in Paraná," referring to the government's decision to redirect coffee investments to other regions. Matiello also noted migratory patterns among farmers who chose to leave Paraná to plant coffee in Minas Gerais or further west. According to Matiello, the combination of high coffee prices and comparatively cheap land in Minas drove a coffee planting boom in the state.[728] Durval Rocha Fernandes remarked that the expansion of coffee in Minas Gerais after the frost was possible because the IBC developed a network of technicians, technology, chemical inputs, and knowledge specifically for the environments in the state. Fernandes succinctly stated his view: "a property with nothing could find the IBC and the institution would do nearly everything to ensure coffee cultivation."[729]

Travelers passing through the region commented on the transformations taking place. Sigurd W. Schindler, a commercial coffee trader, visited the major coffee growing regions in 1976. The prominent Brazilian coffee trade magazine *Revista do Comercio de Café* published his

[726] Vera Dantes, "Signs of Recovery in First Normal Crop," *Revista do Comércio de Café* (Rio de Janeiro: 1978): 18.
[727] IBC, MIC, *Informações sobre a cafeicultura brasileira* (Rio de Janeiro: March, 1977), 5.
[728] José Braz Matiello, interview by author, Rio de Janeiro, September, 2016.
[729] Durval Rocha Fernandes, interview by author, Poços de Caldas, Minas Gerais, October, 2015.

account in both English and Portuguese, targeting an international audience. Schindler praised the changes he saw in Minas Gerais, impressed by the new coffee fields, and especially how producers were using nitrogen, potassium, and phosphorous. He also commented on the fundamental necessity of those inputs that made it possible to grow coffee in the "shrub country regions" in the state. His thoughts on Minas Gerais dramatically contrasted with his views on the coffee zones of Paraná and São Paulo, where "nothing impressed" him nor compared to the fields in Minas Gerais.[730]

In 1976, Minas Gerais received roughly fifty percent of the IBC's planting contracts.[731] For those following the IBC's recommendations, new coffee farms shared some characteristics, especially in terms of spacing between coffee on a farm. Spacing represented one of the first steps in cultivating rational coffee. Planting in rows allowed the seedlings to grow into unbroken lines, which when planted horizontally along slopes reduced soil runoff. Organized rows allowed for machines to pass and provided access to each tree. This layout would also accommodate mechanical harvesting should the technology become more accessible and economically viable. Sun-friendly varieties like Mundo Novo and Catuaí proved highly productive when planted closely together, increasing yields and the number of trees per hectare. In 1969, Minas Gerais coffee farms used around 300 000 hectares of land for around 100 million trees. By 1976, these numbers changed dramatically as roughly 400 000 hectares hosted over 600 million coffee trees.[732] These figures signaled that farmers uprooted their older coffee trees to plan new ones, and that the overall density of planting trees and spatial organization of farms underwent

[730] Sigurd W. Schindler, "The frost of July 1975 and its Present and Future Influence on Brazilian Coffee Production," *Revista do Comércio de Café* (Rio de Janeiro: June 1976): 9.
[731] Glória Zélia Teixeira Caixeta, "Importância sócio-econômica da cafeicultura em Minas Gerais," *Informe Agropecuário* (EPAMIG, 1978), 3.
[732] Teixeira Caixeta, "Importância socio-econômica," 3.

considerable transformation. Moreover, the act of planting was highly laborious and mostly done by hand. This work included preparing the land, measuring the spacing, and planting coffee seedlings millions of times.[733]

The boom in coffee growing in Minas Gerais indicates that the IBC's programs worked well in practice. Most agronomists I interviewed reiterated this portrayal, an understandable position since they monitored the agreements with farmers, but cases of fraud still occurred. Some producers did not pay back their loans or planted in ways that differed from their financial or technical agreements. Anecdotally, Matiello described some of the schemes used to fool inspections, including falsifying their landownership to match the number of trees they had agreed to plant. He also suggested that there was less fraud in Minas Gerais because of the strong presence of the IBC's extension agents, especially compared to Espírito Santo state where the IBC accorded fewer resources and fraud was more prominent.[734] The IBC's documentation on fraud was likely destroyed after the institution closed in 1990. But cases of fraud were not limited to farmers. In November 1976, reports emerged that chemical companies participated in their own schemes by reporting false fertilizer sales to collect the government subsidy.[735] These examples offer a glimpse of how actors in the coffee industry sought to gain from the system. However, many producers who accessed credit or sourced advice tried to follow the agreements accordingly.

In 1976, the IBC held its first coffee research conference in Minas Gerais. The state's secretary of agriculture, Agripino Abranches Viana, celebrated the recent surge of planting that benefited Minas Gerais and national economic development.[736] For Abranches Viana, coffee

[733] José Braz Matiello, interview by author, Rio de Janeiro, September, 2016.
[734] José Braz Matiello, interview by author, Rio de Janeiro, September, 2016.
[735] No author, "Fraude no crédito rural," *O Ruralista*, November, 1976, 1.
[736] IBC, *A importância da cafeicultura na economia mineira* (Poços de Caldas: October, 1976), 3.

created rural jobs and helped "alleviate the social pressures stimulated by the rural exodus," referring to urban migration. Abranches Viana stressed how coffee in Minas Gerais created jobs for working families.[737] At the same conference, IBC director José de Paula Motta Filho continued to promote further planting. He predicted that national production would still fail to reach national goals.[738] For Motta Filho, the future of coffee planting continued to depend on Minas Gerais. He stressed the profitability of coffee compared to other crops in the state. On average, coffee planting occupied only around 20 percent of the land area on producing farms but contributed 70 percent of the income on those farms, reaffirming an earlier survey.[739] Where coffee was planted also mattered to Motta Filho, who praised how coffee opened areas that were previously not used for agriculture, emphasizing coffee's capacity to turn the "sterile and useless vegetation" of the Minas cerrado into rational coffee growing areas.[740]

As coffee trees reached productive maturity, researchers identified significant regional differences within Minas Gerais. The Zona da Mata in the southeast possessed more extreme hill slopes and less predictable weather patterns, and farmers struggled to increase yields and quality.[741] At the same time, coffee growing in the Sul de Minas surged. However, from a developmentalist standpoint, coffee was essential to the Zona da Mata region, since planners saw few viable alternatives. Despite lower productivity in the Zona da Mata, coffee accounted for a remarkable 90 percent of the income, and was cultivated mainly by small-scale farms.[742] Showing some degree of malleability in the coffee program, the IBC acknowledged the

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[737] IBC, *A importância da cafeicultura na economia mineira* (Poços de Caldas: October, 1976), 3.
[738] Jose Paula Motta Filho, "IBC: diretrizes do programa de renovação e revigoramento de cafezais," in *1 Simpósio Mineiro do Café* (Poços de Caldas: October 1976), 1.
[739] IBC, *A importância da cafeicultura*, 12.
[740] Motta Filho, "IBC: diretrizes do programa," 10.
[741] EPAMIG, *Agropecuário, café: tecnologia para garantir produtividade, sistema estadual de pesquisa agropecuária* (Belo Horizonte: August, 1978), 2.
[742] IBC-GERCA, Agência Regional de Caratinga, *Relatório 1977* (1977), 4.

fundamental role coffee played in the Zona da Mata even if yields were lower than in the Sul de Minas. Officials in the regional headquarters in Caratinga, Zona da Mata, described their work as a social function as much as increasing yields, as the number of people growing and working with coffee continued to increase. They highlighted not just technical outreach work, but also improvement in the standards of living, and upskilling labor through sponsored training courses.[743] The assessments from the IBC office in Caratinga revealed concern over a lack of viable alternative crops in the region, but also a degree of flexibility in the institution's drive for boosting yields, without negating an overarching belief in expanding their modernizing model.

As research institutions continued to pursue new methods of growing coffee and boosting yields, signals emerged that some producers were not keeping stride. Publications of informative pamphlets focused on conveying easy-to-understand instructions for the suggested practices. One bulletin, titled *O que é preciso para ser um bom cafeicultor* (what is needed to be a good coffee grower) summed up the wide-ranging expectations and points of concern. Authored by an IBC agronomist and an EPAMIG technician, they emphasized the importance of accepting the advice of experts and that inputs and soil corrections demanded time, "and only the patient work of a coffee grower can make them reality."[744] But a good coffee grower also needed to be humble, listen to and respect opinions, and accept the "uncontrollable variables of coffee cultivation."[745] Although the reception of the bulletin remains unclear, the paternalistic recommendations extended beyond agronomic advice and impinged on the cultural and social choices of the farmers. This document points to the IBC's belief that they offered a model that ensured success,

[743] IBC-GERCA, *Relatório 1977*, 4.
[744] João P. Westin, "O que é preciso para ser um bom cafeicultor," in *IBC-EPAMIG: Informe Agropecuário* (Belo Horizonte: August 1978): 91.
[745] Westin, "O que é preciso," 91.

and anxiety over the capability of farmers to follow it. However, that model was to face challenges as the economic crisis of the late 1970s worsened.

Political Transition and the Variegated Patterns of Modernization

In 1979, the second international oil shock once again drove Brazil's petroleum import costs upward. In the short term, Brazil managed to attract foreign loans to stabilize the economy, which ameliorated immediate economic needs but also increased the national debt.[746] These short-term measures reflected the military dictatorship's commitment to a developmental imperative, emphasizing government intervention to drive economic growth. Coffee fit within this framework, and while it no longer led the way in generating trade revenue, it continued to account for a large share of commodity exports. Agricultural credit reached its peak in 1979, having increased fourfold over the decade.[747] The surging national debt in the early 1980s forced government planners to reduce agricultural credit and subsidies as part of a strategy to reduce state expenses.[748] Spurring economic growth through credit failed to outpace the crisis and rising inflation. The economic crisis eroded the military's legitimacy and represented a significant factor within a broader political transformation that paved the way for re-democratization.

By the end of Geisel's presidency some of the military's more authoritarian measures were revoked. By 1978, Geisel took steps towards social and political liberalization, repealing the authoritarian Institutional Act-5, allowing exiled Brazilians to return, and rescinded state-mandated censorship.[749] Worsening economic conditions coincided with rising political

[746] Skidmore, *The Politics of Military Rule*, 207.
[747] Herbert S. Klein and Francisco Vidal Luna, *Feeding the World: Brazil's Transformation into a Modern Agricultural Economy* (Cambridge: Cambridge University Press, 2019), 40.
[748] Herbert S. Klein and Francisco Vidal Luna, *Brazil 1964-1985: The Military Regimes of Latin America in the Cold War* (New Haven: Yale University Press, 2017), 100.
[749] Skidmore, *The Politics of Military Rule*, 209.

challenges from labor unions, led by urban worker strikes. In 1978, Luiz Inácio "Lula" da Silva led a trade union sit-down strike among metalworkers. The next year, strikes broke out in a variety of cities and included workers from other industrial sectors, as well as some sugarcane workers in rural areas. The same year, international interest rates pushed above 10 percent and inflation in Brazil spiked.[750]

In March 1979, General João Figueiredo became President amid popular political protest and a faltering economy. Former Finance Minister, Antônio Delfim Netto, returned from a posting abroad to become the minister of agriculture, which remained an area of emphasis for the new president. Economic policies oscillated rapidly as the state sought different strategies to stymie high inflation rates. In 1980 the government pursued more dramatic austerity measures, and greatly reduced subsidies for rural credit.[751]

Shortly after Figueiredo assumed the presidency, a debate regarding the coffee industry unfolded in the Brazilian senate. Senator José Richa, from Paraná, harshly criticized the government's management of the national coffee sector. Without directly indicting the IBC, he lambasted the government's incompetence for allowing Brazil to lose its international coffee market share and bargaining power. In his view, Brazil should have maintained massive coffee stocks to dictate market prices. Instead, the country had struggled to fulfil its export quota since the 1975 frost.[752] Pointedly, the senator critiqued the government's "incoherence" of trying to maximize trade prices internationally and minimize them nationally (what farmers received), and collect the difference through tax.[753] Richa's view was shaped by his connections with Paraná,

[750] Klein and Luna, *Brazil 1964-1985,* 97.
[751] Klein and Luna, *Feeding the World,* 42.
[752] José Richa, Brazil Senate, *Nota promissória rural: por que deve mudar, café os erros do esquema financeiro,* 29 June, 1979.
[753] Richa, *Nota promissória rural*.

where the IBC massively decreased its financial investment in coffee growing. However, this commentary also revealed how the shifting political climate enabled open disagreements within the government regarding coffee policy.

Amid the political criticism, national coffee production increased to 21 million sacks by 1979. Minas Gerais contributed around 8 million sacks as coffee trees continued to reach productive maturity. However, in May of the same year, yet another frost struck, this time reaching the Sul de Minas region. Unlike the IBC's response to the 1975 frost, in 1979 planners did not seek out new areas for planting, but instead focused on recuperation and turning more pasture into coffee plantations.[754] Planners doubted the economic viability of other crops in the state, a starkly different scenario compared to Paraná's surging soybean industry and São Paulo's sugarcane boom.[755] From 1979 to 1980, Minas Gerais' farmers received more than half of the IBC's national investment in coffee that year, more than São Paulo and Paraná combined.[756]

Investing to reinvigorate coffee in Minas Gerais made practical sense in the view of the IBC because productivity had been rising.[757] Over five years the number of coffee properties in the Sul de Minas had more than doubled, and they were being planted more densely, meaning more trees per hectare.[758] In 1980, average productivity in the region reached 18.5 processed sacks per hectare, considerably higher than the national average of 10.5.[759] The IBC linked rising

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[754] Francois le Chevalier, "Ecos do Sul de Minas," *Revista do Comércio de Café* (Rio de Janeiro: October, 1979): 59.
[755] Chevalier, "Ecos do Sul de Minas," 59.
[756] IBC- GERCA, *Relatório* (1979-80), 7.
[757] No author, "The IBC Recognizes that a Basic Relocation of Coffee-Production Regions, with Minas Gerais as the Front, has Occurred," *Revista do Comércio de Café* (Rio de Janeiro: June, 1979), 61. In 1979, productivity per 1000 trees in Minas Gerais was only slightly below São Paulo, which still led the nation. Yet measured by productivity per hectare, Minas Gerais led all coffee producing states, indicating that the trees in Minas Gerais were more densely planted, and yielded more coffee per area, a measurement that became increasingly used as a marker of modern coffee.
[758] IBC, *Levantamento da realidade cafeeira do Sul de Minas* (Varginha: 1980), 47.
[759] IBC, *Levantamento da realidade* (1980), 4.

productivity with creating jobs, claiming that "the Sul de Minas stopped exporting people and began to absorb them again."[760] This assertion was echoed by many of the IBC's agronomists who argued that coffee created jobs and even attracted workers to the state.[761] Minas Gerais had been considered a major exporter of labor in Brazil during the last two decades, many heading to Rio de Janeiro and São Paulo cities, as well as to the agricultural areas of São Paulo, Paraná, and Goiás.[762]

Efforts to modernize coffee showed positive results in terms of average yields and production, but farms tended to operate differently based on their landholding. Small-scale farmers, possessing 10 hectares or less, composed nearly 70 percent of coffee growing properties, but they contributed only 30 percent of the region's annual harvest.[763] Large-scale farms of 100 hectares or more actively sought technical advice, tested their soil nutrition, and used the IBC's laboratories to analyze their leaves at much higher rates. Spatial organization in the coffee fields also varied. All producers increased the number of trees per hectare, but large-scale farms reported the greatest increases in the density of their plantations.[764] All of this together shows that farms with more capital or access to financing adopted the modernization tenets to a greater extent. They pursued higher yields despite higher costs, suggesting that economies of scale benefited larger producers, while small-scale farmers pursued modernization with lower financial risk. This can also be seen in the tendency of small-scale farmers to dedicate less of their farm to coffee despite its comparative profitability. They maintained dairy and pasture activities as safe investments.

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[760] IBC, *Levantamento da realidade* (1980), 2.
[761] José Braz Matiello, interview by author, Rio de Janeiro, September, 2016.
[762] Fundação João Pinheiro, *Anuário Estatístico de Minas Gerais, 1960-1980* (Belo Horizonte: 1982).
[763] IBC, *Levantamento da realidade* (1980), 4.
[764] IBC, *Levantamento da realidade* (1980), 30.

In the early 1980s both large-scale and small-scale coffee farmers increasingly relied on temporary labor. Paid work on small farms was largely informal; only 16 percent of workers were legally registered, while on large farms the percentage reached 50 to 60. Employers saved money and administrative time by avoiding formal worker registration and the associated legal responsibilities. The IBC indicated that small-scale farms could rely more heavily on family labor, and that medium and large-scale farms should adopt an entrepreneurial philosophy and business administration outlook.[765]

The IBC also adopted the long-held perspective of large-scale farmers and criticized rural labor laws. The institution cited that higher costs to legally employ workers forced farmers to rely on unregistered temporary labors. The IBC's solution was to further modernize the practices and technologies on farms, thus increasing specialization among annually employed workers and using temporary labor during the harvest season. However, there were few positions that needed specialized skills, namely nursery care, marketers, soil specialists (which likely referred to agronomists), and machinists.[766] The IBC continued to offer technological and technocratic solutions to solve what they perceived as agricultural problems, which in this case included labor.

At the Third National Congress of Rural Workers, held in Brasília in May 1979, the National Confederation of Workers in Agriculture (Confederação Nacional dos Trabalhadores na Agricultura—CONTAG) signaled new efforts to promote rural worker unionization. Rural workers met amid a shifting political context where the military government took steps towards gradual re-democratization, albeit in ways they deemed agreeable.[767] Rural labor relations and

[765] IBC, *Cultura de café no Brasil, manual de recomendações* (Rio de Janeiro: March, 1981), 466.
[766] IBC, *Levantamento da realidade* (1980), 47.
[767] Skidmore, *The Politics of Military Rule.*

the refusal of many employers to follow the labor law became an increasingly polarizing issue in the early 1980s. The Minas Gerais Federation of Agricultural Workers (Federação dos Trabalhadores na Agricultura do Estado de Minas Gerais—FETAEMG), loosely coordinated by CONTAG, increased efforts to organize workers. FETAEMG's planners looked to the 1979 sugarcane worker strike in Pernambuco as a model for action, and as a method to navigate the legal regulations that restricted strikes.[768]

In August 1980, sugarcane workers called a strike in Passos, a municipality in southern Minas Gerais. They used similar strategies to Pernambuco's workers movement to paralyze production on the farms.[769] The workers sought better salaries, improved working conditions and transportation, and for employers to abide by labor laws.[770] The strike sprawled into nearby regions, gaining the participation of coffee workers with similar complaints, especially opposition to task-based daily payment, and unsafe conditions working with agricultural chemicals.[771] Motivated with new vigor after the national conference, FETAEMG sent representatives to Passos, who reported their surprise at the degree of worker organization in the region. Shortly after, FETAEMG announced their plan to educate and organize salaried workers in the Sul de Minas. Organizing agricultural workers into unions allowed them to negotiate collective labor agreements (Convenção Coletiva de Trabalho—CCT) with an employer, as they did in Passos.[772] Workers seeking to unionize faced a series of obstacles, which included the risk of being fired and blacklisted to prevent future hiring.[773] Yet in 1981, FETAEMG`s vision for

[768] Rogers, *Deepest Wounds*, 193-195.
[769] For details on the 1979 strike in Pernambuco in 1979 see Rogers, *Deepest Wounds*, 197.
[770] A Federação dos Trabalhadores na Agricultura do Estado de Minas Gerais (FETAEMG), *Relatório do movimento de paralisação do trabalho pelos trabalhadores rurais de Passos* (Belo Horizonte: 1980), 6.
[771] FETAEMG, *Relatório do movimento*, 6
[772] FETAEMG, *Relatório* (Belo Horizonte: 1981), 4.
[773] FETAEMG, *Relatório* (1981), 5.

rural worker unions focused on salaried workers and did not explicitly include temporary contract workers.

The myriad objectives proposed by FETAEMG for salaried workers aimed for potential future gains. In the same period, the voices of temporary contract workers reflected nostalgically on the past, while emphasizing their current vulnerability. Sociologist Ana Maria da Silva Dias interviewed temporary coffee workers in the Sul de Minas in the late 1970s. In this study, an unnamed 41-year old female temporary worker complained that daily wages provided next to nothing. An elderly male worker also lamented how everything had to be purchased; the farms provided nothing to sustain workers. A few others insisted that the value of their wages had been declining since the mid 1960s. Collectively, these comments show concern for economic security and a high degree of dependence on their irregular employment. Workers projected these concerns when discussing the challenges their children would face in the rural area, hoping that their children would find other professions or opportunities in the cities and an easier life.[774]

Institutions, Producers, and Workers React to the Economic Crisis

In 1982, Brazil's national economy dramatically worsened. International finance constricted after the 1982 Mexican debt crisis spread across much of Latin America.[775] Brazilian leaders furthered austerity programs, including tightening agricultural credit. In this context, the IBC's leadership carefully expressed discontent with the government's treatment of the institution, the first clear divergence between the state and the public institution. Commemorating the institution's 30-year anniversary, IBC president Otávio Rainho da Silva

[774] Ana Maria de Silva Dias, "Família e trabalho na cafeicultura," *Cadernos de Pesquisa* 37 (São Paulo: May, 1981): 33-34.
[775] Brian Whitener, *Crisis Cultures: The Rise and Fall of Finance in Mexico and Brazil* (Pittsburgh: University of Pittsburgh Press, 2019).

Neves first heralded their success, declaring that "the coffee sector is modern and vigorous."[776] Yet, with clear intent, he dedicated his speech to the thousands of IBC employees who worked for the nation but suffered from insufficient salaries, and unable to attract new talent. After over a decade of strong support, the IBC found itself in the public eye, dealing with a reduction in influence and operational capacity.

The same year, the IBC's director of production, José de Paula Motta Filho, wrote an article arguing for the IBC's necessity. Motta Filho outlined the IBC's successes with coffee and beyond, emphasizing the crucial role of governmental support in their work. He sketched out how in little more than a decade the number of coffee trees in Brazil increased from 2.2 billion trees on 1.9 million hectares, to 3.5 billion trees on 2.8 million hectares. He estimated that average production in Minas Gerais would increase to around 30 sacks per hectare.[777] More broadly, Motta Filho claimed that research to cultivate coffee in arid "cerrado" soils "truly paved the way for the development of the agricultural sector…permitting the making of Brazilian agriculture in the last ten years."[778]

Motta Filho recognized that Brazil no longer needed to pursue new planting programs but described the coffee landscape as disjointed, where some farmers grew high-yielding coffee, while others lagged. The IBC, he argued, still had work to do to improve quality, promote cooperative membership, train rural labor, and collaborate with regional development efforts.[779] Each of these aspects reflected a shift towards intensifying modernization rather than pushing more seedlings into soil.[780] Motta Filho recognized the troubling economic signals: "agriculture,

[776] IBC, *30 Anos de IBC* (Rio de Janeiro: 1982), 2
[777] José de Paula Motta Filho, *IBC: política de racionalização da cafeicultura no Brasil* (Rio de Janeiro: 1982), 6.
[778] Motta Filho, *IBC: política de racionalização,* 14.
[779] Motta Filho, *IBC: política de racionalização,* 14.
[780] Motta Filho, *IBC: política de racionalização,* 17.

in general, and coffee in particular, has been suffering the reflexes of the world energy crisis through its need for fertilizers, machines, and transport, whose high costs are contingent on the development of the sector."[781] In this statement, he recognized that the costs associated with coffee modernization increased, but proposed that the continued pursuit of modern methods to increase production would generate greater profits.

The IBC steadfastly supported the input-intensive and technologically dependent model of farming despite the economic crisis. Planners argued that further intensification would outrun rising costs. Yet, even the most vocal supporters of agricultural modernization recognized the dangers associated with the economic crisis. The magazine *A Rural*, published by the Brazilian Rural Society (SRB), investigated how the rising costs of inputs threatened the profitability of coffee, especially as credit through the Bank of Brazil became more expensive.[782] The SRB had trumpeted the benefits of agricultural modernization for decades. Their critique of the modern model of agriculture in the face of economic crisis suggests that large-scale farmers felt the impact of rising costs as well. However, there was no easy solution for producers who invested in modernizing their farms. In the view of the SRB, reducing or eliminating inputs all together would drive down agricultural productivity across the board.

The IBC's agronomists I spoke with generally said very little about the experiences of coffee workers in Minas Gerais during the economic crisis. As an exception, I talked in some detail on the topic with José Edgard Pinto Paiva, who seemed disinterested in worker experiences and more concerned with the availability and cost of labor for farmers in the 1970s to the 1980s. He mentioned that he currently employed an eighty-year-old man who has run his

[781] Motta Filho, *IBC: política de racionalização*, 14-15.
[782] No author, "Com crédito apertado adubação mais difícil," *A Rural: Revista da Sociedade Rural Brasileira* (February, 1983), 8.

coffee farm in southern Minas for decades. Paiva described how his employee had a home, a car, and a television, pausing for me to infer that the employee was well off. After discussing the history of his employee, Paiva seemed more at ease and mentioned the economic hardships among rural workers. However, he also cited a common trope, both historical and present, about the absence of *quality* workers who labored sincerely for their wage. These recollections demonstrate the boundaries of the agronomist's conception of coffee modernization, where workers represented one component in the collective costs of growing coffee.[783]

Despite the absence of workers in the narratives of agronomists, labor organizations increased their membership in the coffee growing areas of southern Minas. In early 1982, FETAEMG, the state-based institution that represented rural workers, celebrated the negotiation of a collective labor agreement (CCT) in nine municipalities in the Sul de Minas, describing it as a "first conquest in the relations and conditions of work for salaried workers."[784] But FETAEMG's leaders doubted if the labor laws would be applied in practice.[785] Landowners responded to worker unionization efforts by defaming and dismissing workers, especially union delegates.[786]

In April 1982, FETAEMG met with eight rural union leaders in southern Minas, including representatives of prominent coffee growing areas. The leaders described the CCT as a major step forward in ensuring worker rights, but an incomplete one. The representative from Carmo do Rio Claro explained that "we asked for a lot and we have not received it."[787] Others valorized how their efforts pressured employers, but that they needed more lawyers to take cases

[783] José Edgard Pinto Paiva, interview by author, Varginha, Minas Gerais, October, 2016.
[784] FETAEMG, *Relatório* (Belo Horizonte: February, 1982), 2.
[785] FETAEMG, *Relatório* (February, 1982), 2.
[786] FETAEMG, *Relatório* (February, 1982), 4.
[787] FETAEMG, *Relatório no Sul de Minas* (12 April, 1982), 3.

to the labor court. In regions where coffee boomed, rural labor leaders expressed their frustration that employers (farmers) were well organized and able to avoid applying the terms of their agreement. The representative from Alfenas pointedly explained that "the CCT is only valid where there is justice, and in my city, there is none."[788] Only the Monte Belo representative reflected on the challenges within the labor movement. In his view, the CCT benefited salaried workers but harmed the temporary contract workers who were excluded from the unions at the time. The exclusion of temporary workers enabled landowners to dismiss unionized workers more easily.[789] Furthermore, jobs were disappearing. In 1983, FETAMG estimated that the crisis had wiped out all the jobs created between 1973 and 1980, driving down agricultural production while farm costs surged higher.[790]

Amid mass mobilizations calling for popular elections in 1983 and political challenges to the military's influence over political party nominations, rural worker unions became more ambitious. At the First Minas Gerais Rural Worker Congress (Congresso Estadual dos Trabalhadores Rurais) in 1984, the president of FETAEMG, André Montalvão, called for changes in agricultural policy, ending violence against workers, and expanding agrarian reform programs. At the same congress, the president of CONTAG, the national agricultural worker organization, José Francisco da Silva prioritized the issue of temporary workers, whom he described as "extremely exploited."[791] He envisioned closer integration among all agricultural workers to join strikes and challenge employers, despite describing temporary workers as "almost impossible to organize."[792] In part, the structure of rural worker unions posed a problem

[788] FETAEMG, *Relatório no Sul de Minas* (12 April, 1982), 3.
[789] FETAEMG, *Relatório* (Belo Horizonte: May, 1982), 3.
[790] FETAEMG, *I Encontro estadual de conflitos de terra* (Belo Horizonte: November, 1983).
[791] FETAEMG, and A Confederação Nacional dos Trabalhadores na Agricultura (CONTAG), *1 congresso estadual dos trabalhadores rurais* (Belo Horizonte: November 1984), 49.
[792] FETAEMG, CONTAG, *1 Congresso Estadual*, 49.

since they were organized by municipality, and temporary workers tended to migrate following regional harvest patterns.

Organizing temporary workers presented various challenges. The newspaper *O Estado de S. Paulo* printed the story of Antônio Francisco dos Santos. He identified himself as a temporary worker from Paraná, who migrated to Minas Gerais in the 1980s but struggled to find work as an "outsider." He described a landscape of exclusion, where employers preferred workers native to the region, which added to a sense of isolation from not knowing anyone nor having family in Minas Gerais.[793] Migrant workers in new regions struggled to find stable work. As outsiders, they suffered from slander based on their accent, socio-economic level, or color of their skin, in addition to the general derogatory titles applied to temporary workers.[794] These factors highlighted the differences among temporary worker experiences, and their divergence from salaried workers, which made collective unionization challenging.

A Modernizing Model for the Few

The IBC continued to promote the construction of modern coffee fields, focusing on processes of intensification to increase farm yields. In a very material sense, the density of trees came to reflect the success of broader modernizing practices. Ever denser planting required many of the components of modern coffee. In the late 1960s a hectare of coffee in São Paulo and Paraná hosted around 700 to 800 trees on average. By 1984, the best organized farms hosted an average population of 1500 to 2000 trees per hectare.[795] These statistics support IBC agronomist

[793] No author, "Falta serviço e sobra gente," *O Estado de S. Paulo*, 15 December, 1985, 26.
[794] Roberta Brandão Novaes, *Gente de fora: vida e trabalho dos assalariados do café em uma região de Minas Gerais* (Rio de Janeiro: E-papers Serviços Editoriais, 2011), 35-37.
[795] José Braz Matiello, Saulo R. De Almeida, Antônio e Miguel, Arisson S. Viana, and Ângelo Paes de Camargo, *Cultivo de café no sistema de plantio adensado: instruções técnicas sobre a cultura de café no Brasil* (Rio de Janeiro: IBC, 1984), 1.

José Matiello's assertion that advancements in technology drove transformation on the farm, creating a foundation for modern coffee, and further reducing the space between trees.[796] The IBC still held that this model offered farmers the highest yields, reduced production costs, and ensured the highest possible income.[797]

For agronomists, the 1980s brought a new set of challenges and imperatives to continue modernizing the coffee fields. IBC agronomist Antonio José Ernesto Coelho described the 1970s as redrawing the coffee map and redefining how to grow the crop. For him, the 1980s focused on intensification, and coffee became more "industrial in a search for higher production, better varieties, and higher resistance to the (coffee leaf) rust." Research emphasized developing new machines and irrigation systems, as he described it "like putting the final touches on a home" by developing and adapting new technologies to intensify cultivation in the fields.[798] Matiello agreed with Coelho but noted how Brazilian producers tended to rely on chemicals to solve their problems, especially when dealing with pests and diseases.[799] Matiello described how Brazil's model differed from that of Colombia, where the state coffee institution used plant research and genetic diversity to make their coffee fields more complex and resistant. Technicians in Colombia, he explained, were "more academic, and less practical."[800] Brazilian agronomists and farmers sought short-term results from chemical inputs rather than long-term research on inherent plant resistance.

Amid the economic crisis from 1981 to 1985, average national coffee productivity fell from 10.5 to 8.5 sacks of processed coffee per hectare. In the Sul de Minas it also declined, from

[796] José Braz Matiello, interview by author, Poços de Caldas, Minas Gerais, October, 2015.
[797] Matiello, *Cultivo de Café no Sistema*, 4.
[798] Antonio José Ernesto Coelho, interview by author, Varginha, Minas Gerais, July, 2016.
[799] José Braz Matiello, interview by author, Rio de Janeiro, September, 2016.
[800] Matiello, interview, September, 2016.

18.5 to 16.5 sacks per hectare. Climatic event played a role in decreasing production as light frosts and drought struck the coffee growing regions, but farmers also reduced their use of agricultural chemicals due to its rising costs or scarcity.[801] However, coffee still represented the best option for many farmers, especially in Minas Gerais where planting continued to expand, because the economic crisis also reduced the value of alternative crops.[802]

Complaints about the economy and agricultural policy resonated among organizations representing both workers and farmers. Worker organizations clamored for applied worker rights and agrarian reform to improve access to land ownership.[803] Organizations representing farmers lobbied for greater state support, especially access to affordable rural credit.[804] However, the continued economic crisis revealed divergent experiences among different farm sizes. Small-scale producers continued to lag-behind the large-scale farms in terms of technology and farm organization, planting their coffee less densely on the farm.

Farmers turned to cooperatives to sell their coffee as the IBC's institutional presence declined in rural areas due to economic cutbacks. From 1980 to 1985, membership in coffee cooperatives in the Sul de Minas exploded from 5775 registered members to over 21000. Rather than extensions of social movements or communal based units, the government promoted Brazil's agricultural cooperatives. The IBC provided subsidies to cooperatives and collaborated with technical extension to instruct farmers in agricultural practices.[805] Leading members of the largest coffee cooperative in the Sul de Minas, Cooxupé, also held posts in the IBC during the

[801] IBC, *Levantamento da realidade cafeeira do Sul de Minas 1985* (Varginha: 1985), 5. Frosts occurred in 1979 and 1981, and droughts in 1984 and 1985.
[802] IBC, *Levantamento da realidade* (1985), 6.
[803] José Francisco da Silva, in *1 Congresso Estadual dos Trabalhadores.*
[804] No author, "FAEMG: incoerência marca a política agrícola nacional," *O Ruralista*, November, 1984, 1.
[805] José Geraldo Rodrigues de Oliveira, and Lucia Grinberg, *A saga dos cafeicultores no Sul de Minas* (Rio de Janeiro: Casa da Palavra, 2007), 15.

mid 1980s.[806] Large-scale farmers held influence over the operations and decisions of these cooperative-agribusiness organizations.

By 1985, chronic inflation and austerity policies closed the avenues for cheap rural credit.[807] Better capitalized large-scale growers could still locate financing for fertilizers and labor expenses, but they were also constrained to short term loans with high interest. With the erosion of government subsidies, small-scale farmers found themselves increasingly squeezed by the economic crisis. They employed strategies to shift labor costs to the family, but the inability to access credit also diminished profitability.[808] Unable to finance stockpiling after the harvest, many sold their coffee immediately after the harvest when prices were at the low point of the year. The model of modern coffee that small-scale coffee farmers invested in, albeit to a lesser extent than large-scale farmers, seemingly forced many into survival strategies.

Democratization and the Standardization of the IBC's Model

Failing economic policies in the early 1980s coincided with mass popular demonstrations calling for the return to civilian rule. In 1985, Tancredo Neves won Electoral College vote despite representing the oppositional Party of the Brazilian Democratic Movement (Partido do Movimento Democrático Brasileiro—PMDB), thus hastening the military government's plan for gradual re-democratization.[809] Tancredo Neves ran on a centrist platform, while curating the support of moderate factions of the military, including former president Ernesto Geisel.[810] Before being sworn in as President, Tancredo Neves fell ill and died, so vice president José Sarney was

[806] Oliveira and Grinberg, *A saga dos cafeicultores*, 18.
[807] Klein and Luna, *Brazil, 1964-1985,* 101-102.
[808] IBC, *Levantamento da realidade* (1985), 31.
[809] Skidmore, *The Politics of Military Rule,* 250-254.
[810] Skidmore, *The Politics of Military Rule,* 254.

inaugurated instead.[811] The new democratic government first took measures to address high inflation, launching the Cruzado Plan in 1987 that created a new currency, froze exchange rates, prices, and wages. However, the plan collapsed within a year and inflation again increased.[812]

Re-democratization brought considerable debate about the government's role in the Brazilian coffee sector. In the late 1980s, the IBC's resources were further reduced, while international coffee trade prices declined due to global over-production.[813] In 1987, international governments agreed to extend the International Coffee Agreement's trade quotas for two years, but large harvests in 1987 and 1988 continued to increase stockpiles. The total number of coffee trees in Brazil had reached around 4.2 billion by 1988, with Minas Gerais clearly leading national production.[814] The IBC continued to trumpet their crucial role supporting farmers and maintaining an export system based on years of international credibility.[815] Politicians, however, argued for broad acts of privatization and deregulation to lessen government costs, including the coffee industry.[816] Ultimately, decisions over the IBC were informed by major changes in the international coffee trade.

In 1989, international delegates met to renegotiate the ICA and voted against renewing the agreement amid shifting geo-political interests. Economist Robert Bates notes that the U.S. government's opposition to the agreement aligned with a broader policy shift to promote market liberalization and "free" trade.[817] The decline in international coffee governance coincided with a

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[811] Jerry Dávila, *Dictatorship in South America* (West Sussex: John Wiley & Sons Ltd, 2013), 153.
[812] Jerry Dávila, *Dictatorship in South America*, 153.
[813] Edmar Bacha, "Política brasileira do café, uma avaliação centenária," in *150 Anos de Café* (New York: Lis Gráfica e Editoria, 1992), 105-106.
[814] Bacha, "Política brasileira do café," 106-107.
[815] Rogério Geraldo Ribeiro Andrade, "A expansão da cafeicultura em Minas Gerais: da intervenção do estado à liberalização do mercado" (master's thesis, Universidade Federal de Minas Gerais, 1994), 61-64.
[816] Rogério Geraldo Ribeiro Andrade, "A expansão da cafeicultura," 64-65.
[817] Robert Bates, *Open-Economy Politics: The Political Economy of the World Coffee Trade* (Princeton: Princeton University Press, 1997), 174.

global movement to dismantle multinational commodity trade agreements in lieu of a more open-market approach.

In 1990, Brazil's democratically elected President, Fernando Collor de Mello, passed a new series of measures aimed to stabilize the economy. In this context, Collor de Mello closed the Brazilian Coffee Institute in May 1990, signaling the end of direct government management over the coffee sector. The IBC employed a large contingent of people, with estimates ranging from 4300 to 6400 staff, making it a target of cost-cutting measures.[818] Furthermore, international coffee trade prices fell considerably after the ICA was abolished, as producer countries dumped their coffee stockpiles on the market.[819]

The agronomists I met with frequently referred to the closure of the IBC as a major turning point, rather than the fall of the military regime and return to democratic governance. Durval Rocha Fernandes spoke most explicitly about the "debacle" around the IBC's closure. Fernandes met with Collor de Mello's representatives during the election and discussed the future of the IBC. At the meeting, Fernandes suggested dividing the IBC into two entities, one to commercialize and promote coffee, and another to provide technical assistance to farmers.[820] Fernandes angrily described Collor de Mello's decision to close the IBC as "betraying a promise," and exasperatedly claimed "no one understood how an organ so powerful fell."[821] In a similar vein, agronomist Ricci stressed, "it was a shame to close it (the IBC), what Collor did…the IBC was the iron arm of the producer."[822]

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[818] Bacha, "Política brasileira do café," 103.
[819] Gregory Dicum and Nina Luttinger, *The Coffee Book: Anatomy of an Industry from Crop to the Last Drop* (New York: New York Press, 1999), 75.
[820] Durval Rocha Fernandes, interview by author, Poços de Caldas, Minas Gerais, October 2015.
[821] Fernendes, interview.
[822] Ricci, interview by author, São Sebastião do Paraíso, Minas Gerais, November 2016.

The centrality of the IBC's closure in the narratives of agronomists suggests an effort to disentangle their work from the authoritarian regime, but it also reflects their identification with the developmental project. Their collective descriptions of the IBC's closure frequently embraced the language of a stalled modernization effort due to the erosion of state support. Julio Cesar, an agronomist who worked with the IBC and EMAPIG explained, "the IBC worked well, very well. It had research, influence, resources…afterwards, nothing."[823] However, after the IBC's closure, agronomists and technicians sought jobs in the private sector, and especially farmer cooperatives, to continue working on research and rural extension.[824] The agronomists who continued research on coffee varieties, agricultural chemicals, machines, and farmer engagement continued to describe their work as contributing to agricultural modernization. Their accounts demonstrate that despite the erosion of state support, the approaches to coffee modernization that were concretized under the IBC persisted as standard practice.

Conclusion

Political planners identified the potential to grow coffee in Minas Gerais by the late 1960s but had little reason to mount a massive replanting program at the time. After the arrival of the coffee leaf rust in 1970, agronomists and climatologists recognized that the environments of Minas Gerais helped reduce the fungus' debilitating affect. Efforts to fight the rust contributed to the construction of coffee research institutions and studies on coffee growing in regional environments. The rust increased the perceived value of coffee growing in Minas Gerais compared to other states, especially Paraná where soybeans and wheat offered strong economic returns. The 1975 frost justified a political decision to reduce government support for coffee

[823] Julio Cesar, interview by author, Lavras, Minas Gerais, July, 2015.
[824] José Edgard Pinto Paiva, interview by author, Varginha, Minas Gerais, October, 2016.

farming in frost-prone regions. The destruction caused by the frost also motivated the government to invest in major replanting programs to ensure continued coffee production in the country. Minas Gerais emerged as the priority area for coffee growing, as farmers and their workers pushed millions of seedlings into soil, following a modernization model of the IBC and with the support of state incentives.

Concerted political and financial investment by the federal and Minas Gerais state governments helped make coffee an appealing option for farmers. In the early 1980s, Minas Gerais was the decisive leader in Brazilian coffee production, with millions of planted seedlings still to reach productive maturity. Not all coffee producers adopted the technologies and techniques of modern coffee entirely, but the remarkable increases in productivity, especially in the Sul de Minas, show that many invested in the model. The IBC`s directors celebrated rising average yields in the early 1980s as evidence that their model worked—that the modernization package, if applied correctly, yielded results.

As the economic crisis crippled the economy in the 1980s, different segments of the coffee sector expressed their discontent, albeit in divergent ways. Technocrats found their operational resources reduced along with their salaries, producers faced rising expenses and uncertain coffee prices, and workers sought to hold on to their jobs and defend their labor rights. All of these groups lobbied the government for support, be it financial, economic, or judicial. The crisis revealed the deep fissures in the Minas Gerais coffee industry, which boiled to the surface as both workers and producers began to collectively organize to defend their interests, albeit with little material result for the workers in the Sul de Minas. Large-scale producers who

endured through the economic crisis reacted to the increasingly organized labor movement in agriculture by further investing in mechanization.[825]

After the dictatorship fell in 1985 and civilian governance returned, worker and producer organizations tweaked their rhetoric and redirected their concerns to the newly elected government. Despite sustained protest about their respective conditions, there was little criticism of the agricultural model that many farmers had adopted over the preceding decades, one that demanded they increasingly capitalize their farming practices. The economic crisis demonstrated the vulnerability of this model for different farm scales. Large-scale farms proved more durable to source credit and outproduce the declining coffee returns. Small-scale farms suffered from an absence of government support, many abandoning costly chemicals that only further reduced farm yields. Yet despite these divergent experiences, the ethos of coffee modernization espoused by the IBC had become the standard model for Brazilian agriculture.

[825] No author, "Na terra de melhor bebida, só decepção," *O Estado de S. Paulo*, 1 October, 1985, 37.

Conclusion

As I waited for an appointment at Procafé, a coffee research institution in Varginha, Minas Gerais, a man offered me a small plastic cup half-filled with black coffee, known as a "cafezinho." I happily accepted and began to chat with Paulo, as he introduced himself.[826] I was at the institute to meet an agronomist who had worked for the Brazilian Coffee Institute (Instituto Brasileiro do Café—IBC), the state organization that governed Brazil's coffee industry from 1952-1990. Also an agronomist, Paulo commented on the upcoming annual harvest and the problems farmers faced in 2016. He described his own work to improve coffee, which included the identification of high-yielding plant varieties and strategies to manage the problems of pests, diseases, and ecological conditions that harmed coffee yields.

I told Paulo about my historical research on the process of modernization in the Brazilian coffee industry from the 1950s to the late 1980s. I emphasized my interest in procedural questions of how and why coffee-growing technology and practices changed over time. I identified some key aspects of that change, including how farmers planted, how workers worked, and the active role of environments and ecologies in shaping agricultural spaces. In response, Paulo asked directly: "is the Brazilian coffee sector modern?"

Unsure what "modern" represented for Paulo, I answered equivocally, "yes and no," before sketching out a series of changes that occurred in the state of Minas Gerais. From the 1960s to the 1980s, coffee modernization programs transformed Minas Gerais from a marginal coffee producer to the clear leader in national production. How farmers grew coffee and managed their farms also changed: some adopted new technologies, employed machines, and used chemical inputs that included fertilizers, pesticides, and fungicides. These markers of

[826] Paulo, interview with author, Varginha, Minas Gerais, November 2016.

modernization each contributed to the central goal of the state-led programs, which was to increase coffee yields on farms through technological and scientific methods.

The description I provided Paulo intentionally avoided an assessment of whether the coffee sector was "modern." But hoping to connect my description of modernization as a historical process with Paulo's work, I offered examples of the highly mechanized agro-industrial coffee fields of some Brazilian farms. I anticipated that Paulo would mention the many coffee farmers who continued to work their land with hoes and did not use inputs. But when asked for his thoughts, Paulo replied that he simply did not know if the coffee industry was modern; yes, there were changes, but he doubted that coffee producers *thought* in terms of modern growing. Moreover, he explained how coffee research strode at least five years ahead of the practices of even the most advanced coffee farms.

My conversation with Paulo highlighted the contrast in perspectives between a historian seeking to understand change over time, and an expert, in this case an agronomist, employed to facilitate that change. Paulo's concern focused on evaluative questions of whether the coffee industry was modern or not. He envisioned a scenario in which farmers were able and desired to adopt the newest practices and technologies as defined by experts. My research focuses on the procedural components of modernization, which operated in pursuit of an idealized modern outcome, but which were fundamentally unable to achieve it, as the destination necessarily kept slipping over the horizon. Yet, as I demonstrate, focusing on procedural change reveals how definitions of coffee modernization changed over time, as did the role of the state and other participants. The farmers who sought to modernize their coffee fields in the 1950s operated under a different set of circumstances from those in the 1980s, and they all experienced modernization differently.

Many farmers around the world have pursued some form of "modernization" by adopting changes designed to increase yields and incomes. What modernization entailed, who participated, and how its definition changed over time, responded to the social context. The coffee industry in Brazil during my period of study offers a useful historical example because farmers, in concert with state technicians, pursued modernization objectives with considerable intent, and brought about dramatic changes. Brazil's coffee modernization programs were shaped by a confluence of political, economic, technological, and environmental factors that intersected to spur transformations in industry. In the 1950s, Brazilian politicians criticized the nation's reliance on coffee growing, framed as an emblem of the past that perpetuated backwardness and underdevelopment. By the 1980s, planners celebrated some of the results of their programs: they had influenced how and where coffee was grown, achieved average increases in national productivity, and incorporated technology and scientific research, even if the results varied across the coffee growing landscape. Furthermore, having never reached the ideal "modern" provided the justification for planners and researchers to further promote the pursuit of modernization.

I demonstrate how a political, bureaucratic, and technical apparatus designed and implemented programs to transform coffee growing and agriculture. I investigate why planners decided to modernize the coffee industry, placing the process in an international as well as national context, and how these programs appealed to democratic and dictatorial governments alike. The state-led coffee programs depended on considerable public investment, a commitment that highlighted the importance of coffee in the purview of state planners. But the pursuit of modernization coalesced around the idea that science and technology could fundamentally

transform coffee growing in ways that were previously impossible, and boost coffee productivity to previously unimaginable levels.

Through the federally-operated IBC, economists, agronomists, and agricultural technicians privileged increasing the productivity of coffee trees and farms as the central aim. Their measurements typically relied on yields, referring to the amount of coffee beans produced by a coffee tree, or a collection of trees on a measured area of land. The standardization of yields as a measurement lent structure to modernization efforts because it enabled the IBC's planners to demarcate low-productivity and high-productivity coffee plants, farms, and regions.

For new coffee planting, the IBC gave farmers incentives to acquire technologies and techniques that would raise yields and, theoretically, profitability. These incentives included fertilizers, pesticides, herbicides, and agricultural machines, as well as access to subsidized credit. These transformations in Brazil's coffee industry tell a story of both crop and nation. Coffee offers a worthwhile example since the crop held considerable economic importance in Brazil, but it also reflected broader processes as the Brazilian state once again embraced agriculture in an export-led economic model. As farmers adopted so-called modern practices through the state's programs, Brazil's economy diversified and coffee finally slipped from its position as the dominant agricultural crop and export commodity, to one among a handful of export crops. However, coffee still played a significant economic and symbolic role and the government viewed it as a developmentalist crop that generated revenue through taxation and provided jobs in agrarian regions.

This dissertation explains why coffee became a concerted target of state-led modernization in the 1960s, and not sooner, despite the crop's long-standing economic significance in Brazil. Historian Warren Dean investigated coffee farmers' lack of motivation to

adopt scientific methods to improve their farms in the late nineteenth century, when new ideas and research were in circulation.[827] He argues that "the miraculous expansion of Paulista (São Paulo) coffee seems to have depended almost entirely on natural comparative advantage and very little on the skill of the planters."[828] As in any context, the choices of coffee farmers were multi-faceted, shaped by access to labor, land, and alternative options. In the late nineteenth century, farmers responded to declining coffee prices by reducing expenses and lobbying the state to intervene with financial support. At the turn of the twentieth century, coffee farmers exerted enormous political influence to ensure their economic and political status. By the 1960s, the social and political power structure had shifted, and the influence of coffee farmers over government actions had declined significantly. Rather than the sole responsibility of the farmer, coffee modernization became a national imperative, facilitated by the stability that the international coffee agreement provided by regulating trade flows and prices.

In this dissertation, I examined the emergence of a rural extension ideology by tracing the creation and expansion of the Association of Rural Credit and Assistance (Associação de Crédito e Assistência Rural—ACAR), founded in Minas Gerais state. The institution's initial goals were to improve the lives of agrarian families in the early 1950s by providing expert knowledge to manage the home and agricultural practices, as well as access to subsidized credit. ACAR expanded its operations while planners modified their approach to engaging farming families. ACAR emphasized the need for education as part of longer-term relationships, while increasingly prioritizing farm production over household focused projects. The shifting priorities

[827] Warren Dean, "The Green Wave of Coffee: Beginnings of Tropical Agricultural Research in Brazil: 1885-1990," *The Hispanic American Historical Review* Vol. 69, No. 1 (Feb., 1989), 109-110.
[828] Dean, "The Green Wave", 115.

in the 1950s demonstrated how ACAR operated as a site where international and national agrarian development ideas were tested and integrated into agricultural policy.

In 1956, the federal government nationalized the ACAR system to reach farmers more broadly. This model adopted rural extension to convey knowledge, practices, and technical advice from experts to farmers. Even as planners hailed rural extension as the bridge connecting technicians with farmers, the terms of the engagement remained malleable to a series of state-led programs seeking to change how farmers operated. In the 1960s, Brazil's federal government became more involved in agricultural development initiatives and used rural extension to encourage crops they deemed national priorities. And while the material results of ACAR's programs proved significant over its decades of operation, the creation and national adoption of a rural extension articulated through ACAR provided a method for planners to pursue agricultural modernization broadly. Further, the network of rural offices established by ACAR, principally in the 1950s, helped facilitate the rapid expansion of coffee growing in the state when the federal government targeted Minas Gerais to cultivate modern coffee beginning in the late 1960s.

Coffee emerged as the target of the state's agricultural modernization efforts in the 1960s. The 1962 International Coffee Agreement established new regulations on trade flows and prices, providing some stability in the marketplace. Anticipating the agreement, Brazilian planners created the Executive Group for the Rationalization of Coffee Growing (Grupo Executivo de Racionalização da Cafeicultura—GERCA) to transform agriculture in the coffee growing regions and reduce overproduction, all in the name of national economic development. In practice, however, policymakers used GERCA to experiment with different approaches to agricultural modernization. They first mandated coffee eradication to specifically reduce the number of low-productivity trees (measured by yields per tree or hectare). This approach also promoted

agricultural diversification on former coffee lands, first emphasizing food crops and later other export commodities.

In the late 1960s, having destroyed just under two billion coffee trees, GERCA's mandate shifted to promoting coffee planting along lines that planners considered modern. GERCA's operations adapted to frequent political change, inflation and then strong economic growth, a series of frosts that harmed the coffee industry, and finally the risk of underproducing coffee in Brazil near the end of the decade. GERCA emerged as a vehicle for state planners to implement diverse programs for agricultural transformation that aligned with the developmental ethos, while further solidifying the system of rural extension to engage farmers. GERCA's myriad programs spurred profound changes in coffee growing areas. Their operational capacity also contributed to creating a framework for coffee modernization that would guide planting over the following decade. By the 1970s, planting coffee through GERCA firmly located the crop in the government's pursuit of agro-industrial agricultural production.

The government's efforts to modernize coffee and agriculture in southeast and southern Brazil was shaped by environmental events and threats. Two major events stood out: the arrival of a debilitating fungus in 1970 and an intense frost event that harmed nearly a billion coffee trees in 1975. Rather than abandoning coffee modernization efforts, planners responded to environmental threats through scientific investment and high-level political planning to redraw the geography of coffee growing. Both strategies relied on strong government commitment to growing coffee in Brazil. The fungus, *Hemileia vastatrix*, commonly known as "coffee leaf rust," was first identified in Brazil in January 1970. The potential proliferation of the fungus exacerbated concerns about potential coffee shortages, since the disease attacked the leaves of the coffee trees, reducing the amount of coffee berries produced.

State planners responded to the arrival of the fungus with varied and evolving strategies over the first two years. Initial shock gave way to an expansive effort to understand and combat the fungus. Planners launched efforts to eradicate the rust by burning trees in identified outbreak zones and they sought to contain it geographically, away from the principal coffee growing regions. Over the course of a year, these initiatives failed. Agronomists, economists, and rural extension agents shifted their attention to managing the rust as another agricultural threat on the farms. Through trial and error, they refashioned the existing model of modern coffee and fused it with new technologies and chemicals to lessen the impact of the fungus. Further, climatologists identified environmental criteria that could naturally limit the fungus' effects, namely regions with suitable elevation and long dry seasons. These happened to match the conditions in parts of Minas Gerais. The rust represented one significant factor among many that demanded constant adaptation in the effort to control agricultural environments. In doing so, researchers and agronomists accelerated their pre-existing aspirations for coffee modernization that prompted national institutions to invest in scientific research and rural extension to combat the fungus. Brazilian government planners chose to increase their investment in coffee growing at a decisive moment, rather than abandon the crop.

The 1975 frost struck the main coffee growing regions of Paraná and parts of São Paulo states. While not an entirely unpredictable event, the frost offered state planners an opportunity to implement programs to transform the agricultural structure of the frost-prone regions, and the geography of coffee growing more generally. The frost occurred in a context in which political will, available financial resources, and technology made it possible to divest from coffee growing in frost-prone regions and to promote other crops. Soybeans and wheat were less

vulnerable to the cold but also responded well to modernization techniques. In this transition, planners incentivized new coffee planting in less frost-prone regions, led by Minas Gerais state.

State planners described their response to the 1975 frost as part of the process of rationalization, which encouraged changes on the farm to increase productivity, as well as modifying where crops should be grown at a regional level. Efforts to promote coffee planting in Minas Gerais required strong financial and institutional support from the government, but also relied on the capacity of technocrats, available technology, and commodity markets to sell the goods. These trends had already been in place before the frost, especially as the military dictatorship strongly endorsed an export-led agricultural model in the mid-1970s. The frost provided the rationale to pursue existing agricultural transformation goals on a large scale and in a short period of time. The response to the frost demonstrated how a climatic event intertwined with and catalyzed modernization objectives.

The federal government's commitment to growing coffee and changing conceptions of appropriate environments for the crop contributed to the decision to construct new coffee fields in Minas Gerais in ways that state planners and experts considered modern. The IBC celebrated how the technologies of modern coffee and application of soil correctives improved soil nutrition in the state. Turning lands deemed marginal into productive spaces represented a victory of Brazilian science and met the military regime's aspirations for the role of agriculture in national development goals. By 1980 Minas Gerais had become the principal coffee growing state in Brazil. The rapid expansion of planting benefited from the IBC's partnership with ACAR and the agency's wide-reaching network of rural extension stations. These technocrats brought a modernizing ideology developed through the IBC to farmers, providing the knowhow and

offering access to technology and subsidized credit to plant what they considered to be modern coffee.

Even while constructing modern coffee fields in Minas Gerais, the conception of what it meant to be modern continued to evolve. Expectations of planners changed based on the context, and on whether they were seeking to manage new problems or aiming to further boost coffee production per hectare of farmed land. Yet by the 1980s, economic crises had highlighted fissures in the model, prompting the government to draw back investment and enact austerity programs. The Brazilian government withdrew subsidies for credit, technology, and chemicals fundamental to modern coffee growing, and reduced the IBC's operational capacity. Small-scale farmers struggled to afford the costs of production and sought strategies to minimize expenses. Large-scale producers proved more capable of accessing credit amid economic crises through cooperative support systems. These large-scale producers tended to further pursue modernization to increase productivity in order to offset higher costs.

The military regime fell from power in 1985 as the faltering economy combined with mass popular protest weakened its authority. The re-democratization of Brazilian politics coincided with the decline of government support for the national coffee sector. The civilian government struggled to address surging inflation. International lenders demanded further austerity measures and reduced direct government intervention in the economy. The government reduced funding for the IBC, which in turn encouraged private coffee cooperatives to organize coffee purchasing and logistics, and to sell agricultural chemicals and machines to its members.

In the late 1980s, civilian governance did not immediately resolve national economic problems as the trend towards economic austerity intensified. The coffee industry became a target of these programs in 1990 when the Brazilian government closed the Brazilian Coffee

Institute. This decision aligned with a global movement towards coffee market liberalization. In 1989, politicians had decided not to renew the International Coffee Agreement's price regulation or quota system, ushering in a period of "open market" trade. As a result, coffee producing nations sold their stockpiles, driving the market price down, and spurring a prolonged period of "crisis" for growers, marked by persistently low trade prices.

Many of the agronomists who worked for the IBC sought new jobs in the private sector. The expanding network of cooperatives offered similar employment opportunities to these agronomists as agents of rural extension, albeit in the private sphere and through the contingencies established by the cooperatives. The transition of agronomists and agricultural technicians towards the private sector demonstrated consistency rather than rupture. The erosion of state support did not disrupt the ideology of modern agriculture and the pursuit of modernization, though it did modify how farmers could access technology and agronomic advice. Agronomists remained the cornerstone of devising solutions to coffee growing problems. However, market liberalization brought new factors into play, including an emphasis on coffee quality and heightened competition between farmers for better prices. After 1990, productivity no longer equated to profitability in the modernization model. Over the course of the next decade, modern coffee continued to promote high-yielding varieties, the use of agricultural chemicals and machines, but also incorporated methods to increase quality, as defined by the market. The transition to a deregulated coffee industry did not challenge the long-standing modernization ethos of the Brazilian coffee industry, but rather modified its composition.

The pursuit of modern coffee in Brazil almost exclusively entailed planting monoculture between 1950 and 1990. Previous forms of farm organization, especially before the 1960s, maintained greater diversification, even if only in the form of subsistence food crops for workers

and their families. The model of modern coffee pursued by state-led programs in the 1970s and 1980s emphasized maximizing the farm for marketable goods, whereby even forms of diversification focused on marketable crops. Coffee farms planted as monoculture put into practice the logic of maximizing space, planting in rows for higher yields, and allowing for labor-saving mechanization. This intensive monoculture model is inherently fragile.[829] The coffee leaf rust demonstrated the vulnerability of monoculture, as the fungus benefited from closer density of Arabica coffee trees, evolving over its lifecycles. But all crops grown for long periods of time possess an inherent fragility and vulnerability to pests and diseases. Brazil's coffee industry chose to manage risks with agronomic research and, especially, through the application of chemicals, machines, and increasing productivity to offset rising costs. This model assumes the capacity of science to overcome risks, which has inherent limitations in the long-run both in theory and practice.

[829] Alan L. Olmstead and Paul W. Rhode, "The Red Queen and the Hard Reds: Productivity Growth in American Wheat, 1800-1940," *The National Bureau of Economic Research* (No 8863, March 2002): 946.

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