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## **1930–1990 - THE INTERVENTION OF THE BRAZILIAN STATE IN THE SUGAR-ENERGY SECTOR: IAA-PLANALSUCAR, PROÁLCOOL AND THE PARTICIPATION OF GILBERTO MILLER AZZI. DID WORK?**

**Rubismar Stolf<sup>1\*</sup>, Sizuo Matsuoka<sup>2</sup>**

<sup>1\*</sup>Corresponding author. São Carlos Federal University-UFSCar, Araras campus/ Araras - SP, Brazil.  
E-mail [stolfrubismar@gmail.com](mailto:stolfrubismar@gmail.com) | ORCID ID: <https://orcid.org/0000-0003-0555-9498>

### **KEYWORDS**

tate intervention,  
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### **ABSTRACT**

In Brazil, sugarcane is the crop whose agro-industrial development has taken the longest path and has the greatest prominence in the national agro-industry, without precedent. With 500 years of history, Brazil is today the largest producer of sugarcane raw material and sugarcane ethanol in the world. In addition, has the world's largest program for the replacement of fossil fuel by ethanol in vehicles and shares with India the position of largest sugar producer; in addition, it has developed the largest active sugarcane genetic improvement program in the world. However, in contrast to these achievements throughout its history, it has also received criticism even from businesspersons of the sector itself, mainly regarding State intervention and its inefficiency. This is a paradox: “success and inefficiency?” The general objective of this work was to analyze exactly this contradiction since the great agro-industrial development occurred especially during the 60 years of State intervention (1930–1990). We concluded that this intervention was a key element in the success of the agroindustry both during and after the intervention. Many personalities deserve mention in this process, in both the field of ideas and decisions and practical actions: politicians, public agents, businesspersons, sugar mill owners, agroindustry technicians, and independent producers. We selected a researcher, Dr. Gilberto Miller Azzi, as an example, due to the fact that, from 1955 onwards, as a researcher at the IAA, he represented the scientific and technological area of the Brazilian State, acting decisively for the achievements of the sector. In this regard, an analysis was made of the main factors that have leveraged the national sugar and alcohol sector from the 1930s to the present day.

### **INTRODUCTION**

Many authors have discussed the recent history of the sector and Proálcool. Examples include Belik (1985), Bray (1985).

Rodrigues (2003), Bertelli (2006), Natale Netto (1995; 2007), BiodieselBR (2006), Vieira et al. (2011), Bray et al. (2000), Michellon et al. (2008), Porto (2010), Figueiredo et al. (2011), Pastelli (2014), and Stolf & Oliveira (2020).

The intervention of the Brazilian State (1930–1990), for many, a harmful interference (interventionism), began in the government of Getúlio Vargas. The consolidation came with the creation of the IAA - Instituto do Açúcar e do Alcool (Sugar and Alcohol Institute), in 1933, with the objective of guiding promoting, and controlling the production of sugar and alcohol and its raw materials throughout the national territory. During this period, it had a strong presence in the sector:

<sup>2</sup> São Carlos Federal University-UFSCar, Araras campus/ Araras - SP, Brazil.

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### Timeline of the main interventions (1930–1990)

•**1931:** Beginning of the intervention by the Getúlio Vargas government. Regulation of ethanol for vehicles, for replacing fossil fuels, or in a mixture. It was applied later more in Brazil in the 1940s, during World War II, a resolution that raised the minimum percentage (20%) of anhydrous alcohol mixed with gasoline (Bray et al., 2000). This was a precursor vision of the “National Alcohol Program - Proálcool”, which would occur many decades later (1975).

•**1933:** Creation of the IAA - Instituto do Açúcar e do Alcool, to regulate the sector, especially to regulate sugar production, avoid large price fluctuations, and regulate stocks. Sugarcane producers in Northeast Brazil took this proposal to the government.

•**1950:** The Division of Assistance to Agricultural, Industrial, and Financial Production and the Division of Social Assistance of the IAA begins to operate.

•**1953:** Creation of the IAA healthy seedling production station – Araras/SP

•**1955:** One character will stand out in this story, Dr. Gilberto Miller Azzi (Figure 1). After graduating in agronomic engineering, he started to work in the IAA - the Regional Agronomic Technical Sector Office in Piracicaba, SP.

#### Turning point:

**1960:** Cuba–USA crisis. Implementing the socialist regime in Cuba with the loss of the USA sugar market.

**1961:** Brazil's strategy due to the crisis. The IAA developed a strategy to occupy the American sugar market and, over time, highlight the sugarcane sector on the world stage. The first action occurred in 1961 (Bray, 1985): IAA created the "Export Division", the "Sugarcane Agro-industry Recovery

Fund", the "Sugarcane Agro-industry Consolidation and Promotion Fund", and, in agreement with “Banco do Brasil”, the "National Industry Expansion Plan". This strategy continued throughout the whole intervention, with the addition of new actions:

•**1966:** IAA brought in a renowned breeding specialist to draw up a national plan for the production of new varieties. First step: the IAA in partnership with SINDAÇUCAR created the Sugarcane Experimental Station in Alagoas, to start a regional improvement program.

•**1967:** Establishment of the “Serra do Ouro” Flowering and Crossing Station, in Murici, Alagoas, initiating a regional IAA genetic improvement program.

•**1968:** The production station for healthy seedlings becomes the Experimental Station of the IAA-Araras-SP.

•**1971:** Creation of the National Program of Improvement of new sugarcane varieties (Planalsucar) by IAA. Project by Gilberto M. Azzi in collaboration with Morton Rotenberg, Antônio Maria C. Rocha and Sílvio Rugai. Azzi assumes the role of General Superintendent of the institution.

•**1975:** Creation of the Proálcool program for the large-scale replacement of fossil fuels by ethanol biofuel, in Otto cycle engines, by the Ministry of Industry and Commerce; it was up to IAA-Planalsucar to implement the program technically.

•**1976:** Premature death of Dr. Gilberto Miller Azzi.

•**1990:** End of State intervention with the dissolution and closing down of the IAA and, consequently, Planalsucar.

•**1991:** IAA-Planalsucar Dismemberment with the human and material resources transfer/distribution to the respective geographically closer Federal Universities

Let us now report the performance of the IAA intervention and that of Azzi in the aforementioned timeline.



FIGURE 1. Azzi working.

### AZZI-IAA: MIRABILIS ANNORUM – 1960–1975

The IAA's strategy to develop industry leadership emerged in 1960. From that year onwards, all actions by the State, represented by the IAA, were in this direction. To facilitate understanding, see the timeline of interventions, from 1960 to 1975 above. The focus will be these actions, point by point, as presented below:

In the early 1960s, the IAA envisioned the possibility of elevating Brazil to the position of a major global sugarcane producer. This strategy arose due to the US embargo on the import of sugar from Cuba (Cuba–US crisis of 1960), at the time the largest producer in the world (Ramos, 2007). Thus, in 1961, the IAA created the Export Division to move into the American sugar market. However, that was not enough. The incipient agro-industry

export market needed modernizing in the 1960s. Gilberto Miller Azzi engaged in the proposal on three fronts:

**Strand 1.** Creating entities representing the sector.

**Strand 2.** Make the private sector and the government aware that without a strong and comprehensive program of genetic improvement targeted at the development of new adapted and more productive varieties, it would be impossible to expand and modernize the sector. In other words, it would not be enough just to modernize and finance the industry, but also agriculture must be included.

**Strand 3.** Developing a broad genetic improvement program, by the IAA, to replace declining varieties with new, more productive varieties with periods of industrial use (PIU) more suitable for different regions.

**As for the first strand**, on July 16, 1963, in a historic meeting at the Instituto Zimotécnico da ESALQ-USP, Azzi, representing the IAA as convener, led a meeting with 83 technicians representing the sector who together founded STAB, the Society of Sugar and Alcohol Technicians in Brazil, today a world reference (Stolf & Oliveira, 2020). In this way, a body representing the sector appeared at the national level. Azzi assumed the first presidency of the institution, holding the position until

1966. Another highly representative institution created in the same year (1963) was the Cooperative of Cane Planters of the West of the State of São Paulo (Copercana, 2016).

**As for Strand 2** of the strategic plan, that is, to consolidate the idea of the need for a genetic improvement program, the IAA, in 1966, invited the renowned geneticist Albert John Mangelsdorf, from the Sugarcane Experimental Station in Hawaii, for a technical visit. Gilberto Miller Azzi and Carlos Krug from the IAC guided him (Belik, 1985; Figueiredo et al., 2011). As a result, the Geneticist prepared a report that recommended creating a broad National program for genetics. (Mangelsdorf, 1966). Immediately, Gilberto Miller Azzi began publicizing this report throughout Brazil and seeking support from the IAA and the agroindustry (Belik, 1985). In other words, it was up to Azzi to convince the business sector and the highest levels of the IAA regarding the advantages of establishing the so-called improvement program, the Mangelsdorf Plan. At the end of the same year as Mangelsdorf's visit (1966), Azzi took a curious vacation trip that resulted from a seed cane (a piece of stalk) that contributed 0.5 billion dollars: The story of NA56-79 (Box 1).

**BOX 1.** The history of NA56-79< Azzi's journey and the half billion dollar piece of seed cane.

Fernandes (1982), researcher and collaborator of Azzi, tells the story of Azzi's curious vacation trip and the history of NA56-79:

In 1966, after receiving the geneticist from Hawaii, A. J. Mangelsdorf, Azzi went on vacation at the end of the year and, from the south of Brazil, decided to head to Argentina. He went to the Experimental Station of genetic improvement of Tucuman, Argentina. In his enthusiasm, he brought back breeding material of the variety NA56-79 (one stalk). He planted it in the backyard of the IAA's Regional Agronomic Technical Sector, headquartered in Piracicaba (STAR), its physical base. From there, the variety was taken to the José Vizioli Cane Station in Piracicaba, by its director, Sergio Paranhos, and, later, reproduction and distribution also began at the seedling production station of the IAA in Araras (\*). In the face of the varieties in use, it became clear proof of the need for a wide-ranging program to replace inferior varieties. Azzi, in addition to being the IAA's official advocate of a comprehensive breeding program, brought the assurance of proof that investment in breeding would pay off handsomely. In fact, the variety soon took the lead in the planted area in the state of São Paulo and, later, in Brazil. The proof, with techno-economic numerical data, was presented by Pinazza et al. (1984) and Matsuoka (1991; 1993), indicating the extraordinary economic return of half a billion dollars in a decade, in the state of São Paulo. They used a large number of field trials showing the highest richness in sucrose contents, as published by Bassinello et al. (1976). Furthermore, the direction of genetic improvement for the future followed early varieties with high sugar content, characteristic of NA56-79.

(\*) Note: the Araras station became the South Regional Coordination of IAA-Planalsucar in 1971 and, later, the Center for Agricultural Sciences of UFSCar from 1990).

**As for the third strand** (developing and putting into practice a broad program of genetic improvement), the first answer came with the creation of the Sugarcane Experimental Station in Alagoas in 1966 in partnership with Sindaçúcar. Then, in 1967, the "Serra do Ouro" Flowering and Crossing Station was created, in Murici, Alagoas, a pioneering step in the Northeast, initiating a regional IAA genetic improvement program. In this action, the figures of Jarbas Oiticica, Antônio M. Rocha, and Rokuro Urata, the latter a Hawaiian assistant from Mangelsdorf (STAB Regional Leste, 2016), stood out. Oiticica (1994), who was previously visiting the breeding station in Hawaii, tells the story of this pioneering beginning in Alagoas in 1967. The Araras healthy seedling production area purchased in 1953 was elevated to the IAA Experimental Station in 1968, preparing to produce seedlings with Serra do Ouro seed for use in genetic improvement (STAB Regional Leste, 2016).

The second response to the IAA–Azzi action came from Copersucar joining, to create the Copersucar Technological Center (CTC) in 1969, which hired the same

geneticist from Hawaii, brought in by the IAA, with the main objective of collaborating on the creation of the new varieties program, abbreviation SP.

The IAA's response to its own strategic plan (Mangelsdorf–Azzi), initiated in 1966, followed shortly thereafter at the beginning of the next decade. In 1971, the IAA created the IAA's research arm, with the main purpose of developing a broad program for obtaining new varieties, the Sugarcane Improvement Program (IAA-Planalsucar), with regional research headquarters in Pernambuco, Alagoas, Rio de Janeiro, and São Paulo and numerous substations.

It fell to Gilberto Miller Azzi not only to design the entity, with the collaboration of Morton Rotenberg, Antônio Maria C. Rocha and Sílvio Rugai but also to assume the role of General Superintendent of the new institution (STAB Regional Leste, 2016).

Finally, the 1960s and early 1970s were the time when the Brazilian State, through the IAA, built the foundations for world domination in the sector. CTC-Copersucar, with a stronger presence in the state of São

Paulo, and IAA-Planalsucar, acting at a national level to support varietal improvement, incorporated other important areas: sugarcane management, quality of the raw material, agricultural mechanization, plant health, pest control, in short, various areas in the field of agronomy, as well as the

industrial and social areas. In addition, the IAA started to finance the modernization and expansion of the industry. At the same time, the new representative entities focused on the agricultural environment, also increasing its international participation (Figure 2).



FIGURE 2. Azzi, leading the Brazilian delegation at the 15th Congress of the International Society of Sugar Cane Technologists (ISSCT), South Africa, 1974.

In 1975, the Ministry of Industry and Commerce (MIC) created the Proálcool program. It fell to Azzi, superintendent of Planalsucar since 1971, to lead its implementation.

A victim of a disease, Dr. Gilberto Miller Azzi passed away in 1976, leaving a great legacy in favor of Brazilian sugarcane farming (Box 2).

**BOX 2. Excerpts from the curriculum of Gilberto Miller Azzi (1975). (\*)**

- 3.1.6 – “Study of the Agro-industrial and economic-financial situation of the Mills in the state of Mato Grosso”. Referrals and seminars, pages 195 to 214, 1961.
- 4.1.5 – Chairman of the agronomy session of the 15th congress of the ISSCT, held in Durban, South Africa, in June 1974 and General Chairman of Agriculture of the 16th congress of the ISSCT, held in South Africa.
- 4.2.22 – Eighth meeting of the Economy Committee of the Federal Senate held on 6/12/75, with the theme “Sugar economy in our country”, as quoted in the National Congress Diary (section 2), pages 3265/6, 1975.
- 4.2.23 – Third meeting of the group of Latin American and Caribbean Sugar Exporting Countries – GEPLACEA, as the technical delegate of Brazil representing the IAA, 28/Jun to 1/Jul/75, Lima, Peru.
- 4.2.3 – First Canaveira week in Piracicaba as an organizing member, by indication of the production assistance division of the Sugar and Alcohol Institute, 1958. Note: same for the second and third weeks (1959 and 1960, respectively)
- 4.3.18 – 16th congress of the ISSCT, International Society sugarcane technologists, 1971, Louisiana, USA, as representative of the Sugar and Alcohol Institute.
- 5.1.1 31 – “Survey of sugarcane varieties cultivated in the states of São Paulo, Paraná, Santa Catarina, Rio Grande do Sul and Goiás”. Brasil Açucareiro, pages 39 to 46, January 1972.
- 5.1.15 – “Recommended precautionary measures for the introduction of new sugarcane varieties in a producing zone”. Brasil Açucareiro, pages 55 to 57, March 1967.
- 5.1.16 – “Establishment by the IAA of criteria and methods for determining the level of sucrose and purity contained in the sugarcane received by the mills”. Brasil Açucareiro, pages 34 to 42, April 1967.
- 5.1.2 – “The IAA and subsistence crops in the sugarcane areas of São Paulo”. Brasil Açucareiro, pages 27 to 42, February 1960.
- 5.1.30 – “The status of sugarcane varieties cultivated in the State of São Paulo”. Brasil Açucareiro, pages 26 to 29, September 1971.
- 5.1.30 – “The situation of sugarcane varieties cultivated in the State of São Paulo.” Brasil Açucareiro, pages 27 to 29, September 1971.
- 5.1.31 – “Survey of sugarcane varieties cultivated in the states of São Paulo, Paraná, Santa Catarina, Rio Grande do Sul and Goiás”. Brasil Açucareiro, pages 39 to 46, January 1972.
- 5.1.33 – “Planalsucar and sugarcane research priorities”. Brasil Açucareiro, pages 11 to 20, June 1974.
- 5.1.34 – “Planalsucar: Why? What? As?”. Brasil Açucareiro, pages 46 to 50, March 1975.
- 5.1.35 – “Message from the superintendent to Planalsucar employees”. Brasil Açucareiro, pages 68 to 70.
- 5.1.36 – “Productivity in Planalsucar research”. Brasil Açucareiro, pages 38 to 42, February 1976.
- 5.4.1 – “Let’s talk sweetly”. Prepared through the IAA, for distribution to sugarcane producers, on the occasion of the delivery of selected seedlings in 1970, at the Araras experimental station.

5.4.2 – “Where Carnival begins”. IAA printouts for distribution to sugarcane producers, during seedlings delivery in 1971, at the Araras experimental station.

5.6.10 – “Planalsucar and the priorities of sugarcane research (lecture)”. VII Pernambuco Agronomist Week, October 1974, Recife, PE.

5.6.13 – “Planalsucar's role in sugarcane research (lecture)”. Piracicaba experimental station, on the occasion of Sugarcane Day, promoted by the São Paulo Secretary of Agriculture, through the IAC Agronomic Institute, May 21, 1976.

5.6.2 – “Varieties of sugar cane (lecture)”. Rural Association of Porto Feliz on May 3, 1959.

5.6.4 – “Recovery of Sugar Mills in the State of Mato Grosso (lecture)”. Instituto Técnico da USP, as a guest of the IAA, November 1961.

5.6.5 – “IAA policy and sugarcane abroad (lecture)”. Training Seminar promoted by Ciba-Geigy Química S/A, in São Carlos, April 1972.

5.6.7 – “Planalsucar within the national sugar situation (lecture)”. Sugar Technology Course, Rural Technology Department of Esalq USP, August 28, 1974.

5.6.7 – “Planalsucar and sugarcane research priorities (lecture)”. Graduate course at Esalq USP - discipline “Brazilian problems studies”, April 1974.

8.1.2 – Vote of praise by the President of the Council of the Instituto do Açúcar e do Alcool, for the dedication and competence shown in carrying out his work at the forefront of sugarcane research in his area of work. Ordinance December 261, 1971.

8.1.6 – Granting of the “Destaque a Lavoura” award, by the National Society of Agriculture, for the relevant services provided to Brazilian agriculture, at the head of Planalsucar (registration: *Jornal de Piracicaba*, edition of December 3, 1975).

8.1.7 – Nominated by the President of the IAA for the “Henning Albert Boilensen” Award, version 1975, established and maintained by ASSOCIOGÁS, for his relevant services rendered to Brazilian Agriculture, as head of Planalsucar.

(\* Only the items on his role in publicizing the need for Brazil to adopt a policy of genetic improvement of sugarcane and on the IAA-Planalsucar (provided by the family) are included. Note.: Original text and format).

### IAA-Planalsucar continued its work until its extinction in 1990

However, what is the result of this effort by the State, by the IAA (1933–1990), and by Azzi in this institution? In continuity, Stolf & Oliveira (2020) complemented this history.

In summary, the idea of the minimal state began predominating in the mid-1980s. The IAA went through difficulties until its extinction in 1990. Proálcool went into decline and its reputation in society diminished. It continued to function mainly by inertia. How to interrupt the huge structure of Brazil's largest agro-industrial engineering program?

However, Proálcool staged a recovery from 2003 onwards. The most relevant factor in this recovery was persuasion by the then Minister of Agriculture, Dr. Roberto Rodrigues, a staunch supporter of Proálcool (Rodrigues, 2003), who in January 2003 convinced the President of the Republic at the time, Luiz Inácio Lula da Silva, of its value. An agronomist, and university professor specializing in sugarcane, and with extensive international experience, he argued that Agroenergy (ethanol, bioelectricity, biorefineries, and biodiesel) had the potential to represent a new energy matrix. Brazil could be a great global leader in this new geopolitics previewed him. In addition, at the same time, this would comply with the Government's policy of increasing employment and income (the sector employs 152 times more people than the oil industry, according to Vieira et al., 2007).

Thus, the Government began to reinvest in the sector, replacing the IAA. Proálcool resurfaced with force, recovering its credibility in society. Thus, in the 2010s, the sector achieved stability with sustainability, becoming a world leader in the sector.

## RESULT OF STATE INTERVENTION

### Public–Private Partnership

In addition, was Gilberto Miller Azzi's dream of the IAA lost? Did the idea of leveraging leadership through a strong breeding program to obtain new varieties die with him? No. With the demise of IAA-Planalsucar and the closure of its buildings, labs and offices, program researchers from all over Brazil sought financial support from nearby sugar and alcohol plants, temporarily saving the genetic material in the field. After that, the Government provided a solution, transferring the human resources of each base to the nearest federal university all over Brazil. However, there were no legal accounting means of receiving external financial private support, which was increasingly necessary for continuity. Center-South Regional Coordination was one of the pioneers in solving this issue. At the time, two researchers stood out regarding the procedure: Dr. Sizuo Matsuoka (Chief Researcher of the Breeding Program at the time) and Dr. Antônio Carlos Gheller (researcher and administrative collaborator of the program), both from Center-South Regional (Araras, SP). At the same time, the UFSCar created the FAI - Foundation for Institutional Support for Scientific and Technological Development, to receive external private support. Then, the genetic improvement project became part of its portfolio, as this institution began to allow the receipt of support from the sector – the beginning of the public–private partnership. Following this example, several production units joined with each region of the former Planalsucar, now federal universities, and, under contract, collaborated with the respective universities, which began to transfer funds to regional sugarcane improvement programs.

Once this impasse was resolved, the Interuniversity Network for the Development of the Sugar and Alcohol Sector, RIDESA (Vieira et al., 2011; Santos & Wehrmann, 2016), was created, based on the union of the various universities located in the areas where there had formerly been regional coordination of the extinct Planalsucar (Figure 3).



FIGURE 3. Former headquarters of Planalsucar South Regional Coordination. Today, the main building of CCA-UFSCar, named “Gilberto Miller Azzi”.

The network is presided over by one of the university presidents, in rotation:

- UFAL - Federal University of Alagoas
- UFG - Federal University of Goiás
- UFMT - Federal University of Mato Grosso
- UFPI - Federal University of Piauí
- UFPR - Federal University of Paraná
- UFRPE - Federal Rural University of Pernambuco
- UFRRJ - Federal Rural University of Rio de Janeiro
- UFS - Federal University of Sergipe
- UFSCAR - Federal University of São Carlos
- UFV - Federal University of Viçosa

Complementing the network are 72 research bases (crossing stations, selection substations, etc.), 142 researchers, 83 agricultural technicians and 95 workers in the operational and administrative areas (Santos & Wehrmann, 2016) (Box 3).

**BOX 3. Team of professors and researchers from the 10 federal universities that make up RIDESA (Oliveira et al., 2021): world's largest sugarcane breeding program**

<p><b>1-FEDERAL UNIVERSITY OF ALAGOAS -UFAL</b>  Eng. Agr. MSc. Antônio Jorge de Araújo Viveiros  Eng. Agr. Antônio José Rosário Sousa  Eng. Agr. MSc. Bruno Fernando Costa do Nascimento  Eng. Agr. MSc. Carlos Alberto Guedes Ribeiro  Eng. Agr. Dr. Carlos Assis Diniz  Prof. Dr. Cícero Carlos de Almeida  Profa. Dra. Edjane Gonçalves de Freitas  Eng. Agr. Francisco Sampaio Filho  Prof. Dr. Geraldo Veríssimo de Souza Barbosa  Prof. Dr. Iêdo Teodoro  Prof. Dr. João Messias dos Santos  Prof. Dr. José Leonaldo de Souza  Prof. Dr. José Vieira Silva  Prof. Dr. Lailton Soares  Prof. Dr. Laurício Endres  Prof. Dr. Marcelo de Menezes Cruz  Profa. MSc. Vera Lúcia Dubeux Torres  Profa. Dra. Vilma Marques Ferreira</p> <p><b>2-FEDERAL UNIVERSITY OF GOIÁS - UFG</b>  Prof. Dr. Alexandre Siqueira Guedes Coelho  Profa. Dra. Bruna Mendes de Oliveira  Prof. Dr. Edward Madureira Brasil  Prof. Dr. João Batista Duarte  Biólogo Dr. Márcio Lisboa Guedes  Eng. Agr. Dr. Odilon Peixoto de Morais Júnior</p> <p><b>3-FEDERAL UNIVERSITY OF MATO GROSSO - UFMT</b>  Eng. Agr. Dr. Antonio Marcos Iaia  Eng. Agr. MSc. Daniel Paulo Ferreira  Eng. Agr. Ronie Jesus Silva</p> <p><b>4-FEDERAL UNIVERSITY OF PARANÁ - UFPR</b>  Prof. Dr. Bruno Portela Brasileiro  Profa. Dra. Claudete Reisdorfer Lang</p>	<p><b>6-FEDERAL RURAL UNIVERSITY OF PERNAMBUCO - UFRPE</b>  Bióloga Dra. Alane Ayana Vieira de Oliveira Couto  Eng. Agr. MSc. Amaro Epifânio Pereira Silva  Enga. Agra. Dra. Andréa Chaves Fiuza Porto  Eng. Agr. Dr. Djalma Euzébio Simões Neto  Quím. Ind. MSc. Francisco de Assis Dutra Melo  Eng. Agr. Elifas Soares dos Santos  Eng. Agr. Evanilson Paulino da Silva  Eng. Agr. Dr. Ismael Gaião da Costa  Biólogo Dr. Luiz José Oliveira Tavares de Melo  Eng. Agr. João Victor Queiroz Leite  Enga. Agra. MSc. Nathalia Sobral Bezerra  Eng. Agr. MSc. Paulo Rocha Machado  Eng. Agr. Dr. Willams José de Oliveira</p> <p><b>7-FEDERAL RURAL UNIVERSITY OF RIO DE JANEIRO - UFRRJ</b>  Eng. Agr. MSc. Celso Bitencourt Teixeira  Zootecnista Dra. Elizabeth Fonsêca Processi  Eng. Agr. MSc. Giovane Leal de Souza Silva  Eng. Agr. Ph.D. Jair Felipe Garcia Pereira Ramalho  Eng. Agr. Dr. Josil de Barros Carneiro Júnior  Eng. Agr. MSc. Josimar Nogueira Batista  Enga. Agra. Dra. Leticia Pastore Mendonça  Eng. Agr. Tamys Luiz Fernandes  Eng. Agr. Dr. Willian Pereira</p> <p><b>8-FEDERAL UNIVERSITY OF SÃO CARLOS - UFSCar</b>  Prof. Dr. Alfredo Seiiti Urashima  Eng. Agr. Dr. Antonio Ribeiro Fernandes Júnior  Eng. Agr. Dr. Danilo Eduardo Cursi  Prof. Dr. Hermann Paulo Hoffmann  Eng. Agr. Dr. João Carlos Civiero  Prof. Dr. Marcos Antonio Sanches Vieira  Profa. Dra. Monalisa Sampaio Carneiro  Eng. Agr. Dr. Roberto Giacomini Chapola  Prof. Dr. Rodrigo Gazaffi</p>
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Prof. Dr. Edelclaiton Daros Biólogo Fabio Vieira Rodrigues Eng. Agr. Francisco Gerber Eng. Agr. MSc. Guilherme Souza Berton Eng. Agr. Dr. Heroldo Weber Prof. Dr. João Carlos Bessalho Filho Prof. Dr. José Luis Camargo Zambon Profa. Dra. Lucimeris Ruaro Prof. Dr. Luiz Alberto Kozlowski Prof. Dr. Oswaldo Teruyo Ido Prof. Dr. Ricardo Augusto de Oliveira  <b>5-FEDERAL UNIVERSITY OF PIAUÍ - UFPI</b> Prof. Dr. Ademir Sérgio Ferreira de Araújo Prof. Dr. Carlos Humberto Aires Matos Filho Prof. Dr. Francisco de Alcântara Neto Prof. Dr. Gabriel Barbosa da Silva Júnior Profa. Dra. Gleice Ribeiro Orasmo Prof. Dr. José Evando Aguiar Beserra Júnior Prof. Dr. Rafael de Souza Miranda Profa. Dra. Regina Lucia Ferreira Gomes	Biotec. Dr. Thiago Willian Almeida Balsalobre Profa. Dra. Lívia Maria Chamma Davide (colaboradora UFSCar)  <b>9-FEDERAL UNIVERSITY OF SERGIPE - UFS</b> Prof. Dr. Arie Fitzgerald Blank Prof. Dr. Luiz Fernando Ganassali de Oliveira Junior  <b>10-FEDERAL UNIVERSITY OF VIÇOSA - UFV</b> Eng. Agr. Danival Ricardo da Costa Prof. Ph.D. Luiz Alexandre Peternelli Eng. Agr. Dr. Luis Cláudio Inácio da Silveira Prof. Dr. Márcio Henrique Pereira Barbosa Prof. Dr. Reinaldo Francisco Teófilo
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Adopting RIDESA varieties (RB Republic of Brazil) has been expressive. Thus, according to the IAC varietal census (Braga Jr et al., 2019), RB stood out as the most cultivated variety in recent seasons. Considering the 2018/19 harvest, the set of RB varieties totaled more than 60% in the North-Northeast of Brazil, and more than 56% in the Center-South, with 54.5% in the state of São Paulo, 71% in Paraná and 65.5% in Mato Grosso do Sul. In the 30-year period, there was an absolute predominance of RB varieties (Machado Jr. & Braga Jr., 1993; Gheller, 1996; Daros et al., 1999).

Thus, RIDESA became the world's largest sugarcane improvement program with the RB varieties. Besides, it is linked with the private sector, through consortia of production units, one for each university. In turn, the Sugarcane Technology Center (CTC), originally created by the private sector, recovered and continued the production of new varieties of the initials SP, and later CTC, always with the emphasis on the development of cutting-edge technologies, which stand out also in the world sphere. Nowadays, the Campinas Agronomic Institute (IAC), which had ceased investments in the 1970s as resources started to be diverted to other crops, due to the creation of the CTC, Planalsucar and Embrapa, is returning to the theme with the creation of the IAC Sugar Cane Center, taking as a model the public-private partnership of UFSCar/RIDESA (commented upon above). All of this puts Brazil at the top of the research on this crop, aided by private investment.

Creating a nationwide research program in a State covering 8.5 million km<sup>2</sup>, 80% of the European continent, was a really great challenge.

### Agroindustry Achievements (the 2010s)

The above describes just one of the successful areas of the sector influenced by the IAA. However, it is possible to list a whole series of items that led the national sector to assume world leadership in the 2010s, because of the pioneering work of the IAA:

- Largest sugarcane raw material producer in the world.
- Largest producer of sugarcane ethanol in the world.

- Largest program to replace fossil fuel with ethanol in vehicles in the world (Proálcool).

- Takes turns with India as the largest sugar producer.

- Largest sugarcane genetic improvement program in the world in terms of number of researchers, in operating regions and number of substations.

- Largest producer of organic sugar and alcohol in the world (Native, 2022).

- Agroindustry with energy self-sustainability (electricity cogeneration to also inject the surplus into the national distribution line).

- Effluents and polluting waste transformed into high-value biological inputs (vinasse, filter cake and others).

- Actions in relation to the environment: cessation of the burning of cane fields, and removal of manual activities related to cutting sugar cane.

- Research into obtaining second-generation ethanol: to transform cellulose (in this case, bagasse and/or straw) into fermentable sugar for ethanol production.

- Construction of industry to obtain second-generation ethanol: two on a large scale (Granbio and Raízen), and one experimental plant (Centro de Tecnologia Canavieira – CTC).

- Advanced studies on energy-cane for burning bagasse in boiler furnaces or, in the future, second-generation ethanol, take center stage: hybridization prioritizing genes from wild species with high fiber content that confer the capacity for high biomass productivity (Matsuoka et al., 2012 and 2014).

### GENERAL COMMENTS AND CONCLUSIONS

Each of these 12 items is evidence that, as a whole, allows us to conclude that the IAA's strategy, initiated by the creation of the Export Division in 1961 and subsequently implemented, was fundamental for the sector to assume world leadership, thus completely fulfilling its role. By the time of the abolishment, the IAA had already established the foundations of the sector's development

strategy. In this process, the name Gilberto Miller Azzi stands out (Chart 3).

The history of sugarcane and Proálcool, being wide-ranging and complex, still has multiple views to be covered. The motivation for this work arose in part because of the invisibility of the influence of the State (IAA-Planalsucar) in this achievement; when it was not ignored, negative views emerged, similar to a game in which, in the heat of the action, the protagonists forget that there is an arbitrator conducting the process, in this case, the State.

An industry with more than 400 years of history yet without expression until 1930 within 60 years it turned into a remarkable world success. Did it not work?

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