

RADAR AGTECH

STARTUPS, INNOVATION
ENVIRONMENTS AND INVESTORS
OF THE BRAZILIAN AGRICULTURAL ECOSYSTEM

BRAZIL 2025



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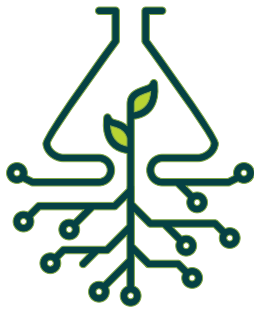


HOMO LUDENS



*Brazilian Agricultural Research Corporation
Embrapa, Executive Board for Innovation, Business and Technology Transfer
Ministry of Agriculture, Livestock and Food Supply*

*SP Ventures
Homo Ludens Innovation and Knowledge*



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Message from Embrapa

The entrepreneurial state as a facilitator of the agricultural innovation and entrepreneurship ecosystem

The Brazilian agricultural sector is a success story for our country and a global benchmark. For decades, structural initiatives have been implemented with the goal of developing a powerful, resilient sector in our country with significant economic and social impact, supporting land use, sustaining industry, creating jobs, and, above all, providing safe and affordable food for the Brazilian population.

In addition to achieving these objectives, Brazil has reached levels previously unimaginable, becoming one of the largest producers and exporters of agricultural products and maintaining significant trade relations with approximately 200 countries. The creation of Embrapa in the 1970s, supporting the National Agricultural Research System in conjunction with various state organizations and universities, as well as the use of science to establish meaningful public policies, such as agricultural zoning for climate risk and the harvest plan, are examples of this trajectory. A journey that is not limited to looking to the past, but that constantly asks how we can build the future, coordinating efforts at the municipal, state, and federal levels, in both public and private sectors, to create a solid, structured agricultural innovation and entrepreneurship ecosystem with available resources and conducive to the generation of science and new businesses.

Embrapa's participation in Radar Agtech's initiatives, in partnership with Homo Ludens and SP Ventures, is a prime example of the government's efforts to foster a strong agricultural innovation and entrepreneurship ecosystem. This is the foundation for sustained growth, and we see our role as creating enabling conditions, fostering innovation, and acting in a manner that complements the other actors within the ecosystem.

Both as a participant and as an active supporter of the ecosystem's development, Embrapa observes with great satisfaction the continuous evolution of the maturity of Brazil's agricultural innovation and entrepreneurship ecosystem, represented by a growing number of agtechs—which in this latest cycle reached 2,072— and by a substantial number of nearly 400 innovation-promoting environments directly linked to this sector. This maturity is further evidenced by the improved distribution of agtechs and innovation-promoting environments across the country, supporting regional initiatives and reaching production areas, which each year become more evident and potentially effective in the generation and adoption of new technological solutions by Brazilian rural producers.

Reaching new levels of maturity is a significant step in this journey. The emergence of new businesses, the creation of new environments, the strengthening of existing structures, and a more homogeneous territorial distribution are good indicators. To reach higher levels, the challenges are linked to the integration of stakeholders, collaborative actions, and the sharing of resources that are available and distributed across a country of continental dimensions. By reducing isolated initiatives and the so-called “silo” effects, which are still noticeable, we expand the potential to generate even more relevant results for a sector grounded in science and technology.

May Radar Agtech Brasil 2025 provide relevant information to support the ongoing evolution of Brazil's agricultural innovation and entrepreneurship ecosystem, and may this ecosystem gain the same global recognition as we already have for our productive capacity.

Happy reading, everyone!

Silvia Maria Fonseca S. Massruhá
President of Embrapa

Message from SP Ventures

Productivity, Capital, and Technology: The New Cycle in Agriculture

Recent years have been marked by profound transformations in the global economic landscape. High interest rates, geopolitical tensions, reorganization of supply chains, and greater discipline in capital allocation have redefined how investors and companies make decisions. In 2025, Brazilian agribusiness reaffirmed its role as one of the country's most important strategic assets. Even in the face of adverse weather conditions and macroeconomic volatility, the sector continues to demonstrate resilience, adaptability, and, above all, structural growth potential.

Brazilian agribusiness remains at the center of some of the key global agendas: food security, energy transition, sustainability, and production efficiency. Producing more with fewer natural resources is no longer just a competitive advantage; it has become a global necessity. In this scenario, technology, science, and innovation appear as key elements to sustain productivity gains and ensure long-term competitiveness.

At the same time, the agri-innovation ecosystem is undergoing a phase of maturation. Following a period of abundant capital in the global venture capital market, recent years have brought an environment of greater discipline, a focus on fundamentals, and increased selectivity among investors. For the AgFoodTech sector, this shift represents a cyclical transition: less speculative capital and more capital directed toward building solid companies capable of solving real-world challenges in the field.

Radar Agtech continues to play a fundamental role in mapping and analyzing this evolution of the ecosystem. Over the course of its editions, the project has established itself as one of the leading knowledge platforms on innovation in agribusiness, connecting startups, investors, corporations, and research institutions. The expansion of the analyses, increasingly incorporating the perspectives of capital and investors, precisely reflects the progress and sophistication of this market.

At SP Ventures, we remain committed to strengthening this ecosystem. We believe that the next decade in agribusiness will be defined by the convergence of biology, data, artificial intelligence, and new business models capable of simultaneously increasing productivity and sustainability. More than ever, innovation in agribusiness means solving real challenges on a global scale.

Brazil possesses unique conditions to lead this movement: land, science, talented entrepreneurs, and one of the most efficient production systems on the planet. When combined with patient capital and cutting-edge technology, these elements place the country in a privileged position to establish itself as one of the leading global hubs for AgFoodTech innovation.

We remain confident that the coming years will bring extraordinary opportunities for those who build real solutions for the agricultural sector. In environments of greater uncertainty, the greatest advances also emerge. And it is precisely in this space that entrepreneurs, investors, and the agri-innovation ecosystem will continue to transform challenges into growth, productivity, and global impact.

Felipe Guth & Francisco Jardim

SP Ventures

Message from Homo Ludens

Structural Consolidation and Strategic Intelligence for the Next Cycle in Agriculture

The 2025 edition of Radar Agtech Brasil marks a six-year cycle of systematic monitoring of the Brazilian agri-innovation ecosystem. Currently, the sector is in a phase of structural consolidation. Following a period of continuous expansion since 2019, it is entering a new phase characterized by greater technological maturity, capital restructuring, growing regulatory pressures, and a demand for more sophisticated institutional coordination. An integrated analysis of the mapping of 2,075 startups and the survey of 390 agriculture-focused innovation ecosystems, combined with structural indicators from the IBGE, confirms this qualitative transition. While numerical expansion predominated in the early years of the Radar, the current moment is defined by consolidation, institutional discipline, and growing technological sophistication.

The regional distribution of agtechs reveals high concentration in the Southeast and South, accompanied by significant institutional disparities. The Southeast operates under relatively greater pressure, with a high ratio of startups per region, while the South presents a more balanced relationship between the entrepreneurial base and institutional infrastructure, in addition to higher per capita density. The Center-West, despite being the productive heart of Brazilian agriculture, has not yet fully converted its economic weight into proportional technological density. In turn, the Northeast demonstrates institutional infrastructure relatively superior to its current startup base, indicating potential for regional spillover, while the North exhibits significant relative intensity when adjusted for GDP, but with a smaller institutional scale. This heterogeneity requires differentiated coordination and policies sensitive to territorial dynamics.

Qualitative evidence from 2025 indicates a shift in the profile of startup demands. Artificial intelligence is no longer a one-off differentiator but has become part of the structural foundation of business models. The focus is shifting from basic infrastructure to strategic infrastructure, involving market access, integration into production chains, preparation for fundraising, regulatory compliance, and scalability. Resources for R&D and experimentation remain relevant—especially in biotechnology and bio-inputs—but the main bottlenecks center on coordination with capital, large companies, and regulation. Some environments still operate according to traditional incubation logic, while startups demand structures capable of integrating technology, market, and governance in a systemic manner.

On the financial front, a clear reconfiguration of the investment environment is evident. Capital has become more selective and focused on operational efficiency, prioritizing biotechnology, traceability, and digitalization of production, strongly influenced by international regulatory requirements and the climate agenda. Artificial intelligence is establishing itself as cross-cutting infrastructure integrated into applications with a direct impact on productivity and compliance. There is growing convergence between regulatory pressures, investment theses, and technological demands, indicating greater systemic coherence within the ecosystem.

In this scenario, Radar Agtech is also advancing as a digital infrastructure. The Radar Agtech Digital Platform with Generative AI is currently under development, designed to transform the consolidated database into an active tool for intelligence, analysis, and connection among startups, environments, investors, and producers. The platform will enable on-demand strategic reports, support for qualified matchmaking, and the reduction of information asymmetries. Its relevance was recognized through its selection for Sebrae's Catalisa ICT program, focused on transforming scientific knowledge into innovative businesses, and Adesampa's Green Sampa initiative, oriented toward climate innovation and the green economy, reinforcing the convergence between agricultural innovation, digital transformation, and sustainability.

The consolidation of Radar Agtech as a strategic coordination tool is also materializing through in-person and institutional initiatives. The second edition of the Radar Agtech Summit, to be held in 2026, is a concrete example of how the project transforms data into effective coordination among startups, investors, innovation ecosystems, producers, researchers, large companies, and public officials. Organized around three structural pillars—institutional infrastructure, technological and entrepreneurial dynamics, and financial restructuring—the Summit promotes an integrated analysis of the relationships between technology, capital, production, and regulation, fostering greater alignment between institutional offerings, entrepreneurial dynamics, and financing mechanisms.

At the same time, the project is expanding internationally with the development of the Latin America and Caribbean Agtech Radar (Radar Agtech LAC), carried out in partnership with the Inter-American Institute for Cooperation on Agriculture (IICA). The first regional edition will be launched in June 2026 and represents a strategic step toward expanding international comparability, strengthening regional integration, and positioning Brazil as a benchmark in the production of structured intelligence on agricultural innovation.

The next cycle of the ecosystem will depend less on numerical expansion and more on the quality of connections between technology, capital, governance, and production. In this process, Radar Agtech acts not only as a database but as a platform for the continuous production of strategic intelligence and institutional coordination. Its community, which is already organized around an active WhatsApp group and is expected to evolve into more structured formats of interaction, is a relevant relational hub for the circulation of information, connection between actors, and mobilization of the ecosystem. Radar also develops actions and projects in partnership, supporting public and private initiatives and strengthening coordination among regional and national actors. This role is rooted in its own triple-helix DNA, represented by the articulation between public research (Embrapa), entrepreneurial capital (SP Ventures), and applied knowledge organization (Homo Ludens). This combination underpins Radar's ability to integrate data, promote strategic coordination, and contribute to the long-term competitiveness, sustainability, and resilience of Brazilian agriculture.

Luiz Ojima Sakuda
Co-founder and Partner
Homo Ludens Innovation and Knowledge

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1. Introduction

• *Aurélio Favarin, Luiz Sakuda, and Pedro Jábali*

The incorporation of digital, biotechnological, and science-based technologies into agribusiness has been significantly transforming the dynamics of innovation in the agri-food sector. In recent years, Brazil has witnessed the expansion of an entrepreneurial ecosystem focused on developing technological solutions applied to the various stages of agricultural production chains. Startups, research institutions, investors, large companies, and innovation hubs have come together to form an increasingly interconnected network of actors involved in the generation, dissemination, and application of knowledge in the field.

In this context, Radar Agtech Brasil has established itself as an initiative dedicated to monitoring and analyzing the evolution of this ecosystem. The publication seeks to track the emergence and development of startups, innovation hubs, and agribusiness investors; identify patterns of technological innovation; and understand how different institutions and capital flows contribute to the structuring of innovative entrepreneurship in the sector. Throughout its editions, Radar Agtech has become an important reference for researchers, public policymakers, investors, and entrepreneurs interested in the technological transformations that have been shaping Brazilian agribusiness.

The 2025 edition continues this analytical effort by combining two complementary methodological strategies. On the one hand, it carries out a structured mapping of agtechs, investors, and innovation ecosystems related to the agtech ecosystem, allowing for the tracking of the evolution of the database built since 2019 and ensuring comparability over time. On the other hand, a sample survey is conducted among startups and innovation environments, with the aim of delving deeper into organizational, technological, and strategic aspects that are not fully captured by public data. The integration of these approaches expands the capacity to interpret the results and contributes to a more detailed understanding of the companies' stage of development, their financing strategies, and their integration into innovation networks.

Seeking to continuously improve the research instrument, this edition also introduces adjustments to the structure of the questionnaire administered to startups. Some of the modules now operate on a rotating basis, allowing specific topics to be explored with greater depth across different data collection cycles. This strategy preserves the continuity of the core indicators that make up Radar Agtech's historical series while simultaneously expanding the analytical scope of the research without excessively increasing the response burden on participating companies. Another highly relevant point concerns the partnership with Anprotec, which significantly enriched the mapped innovation environments.

The mapping results indicate the consolidation of an expanding ecosystem. In 2025, 2,075 agribusiness startups were identified across 468 Brazilian municipalities. In addition to the growth observed since the study's early editions, data also reveal a gradual process of territorial dissemination of entrepreneurial initiatives. Although the Southeast region concentrates the largest share of companies, a relative advance in other regions of the country is observed, indicating an expansion of the presence of technological solutions in different productive contexts.

Another key element for understanding this dynamic is the role of innovation ecosystems, which reached 390 by 2025. Incubators, accelerators, innovation hubs, and technology parks play significant roles in supporting the creation and growth of technology-based startups. By offering infrastructure, entrepreneurial training, mentoring, and strategic connections with investors and established companies, these environments help reduce barriers to new business development and strengthen coordination among different actors in the innovation system.

By bringing together analyses of startups, innovation environments, and investment dynamics, Radar Agtech Brasil 2025 seeks to provide an integrated view of the current state of the Brazilian agribusiness innovation ecosystem, thereby contributing to an understanding of the factors shaping the development of technological entrepreneurship in the sector.

PART I

Innovation Environments

1. Overview of Innovation Environments and Ecosystems with an Agricultural Focus in Brazil

• *Aurélio Martins Favarin, Daniela Ferraz Bacconi Campeche, Martha Delphino Bambini, and Shalon Silva de Souza Figueiredo*

1.1 Introduction

This chapter aims at analyzing the state of the art of Brazilian innovation environments and ecosystems that have initiatives and programs aimed at the agricultural and food sector. Innovation environments can be characterized as arrangements or players that foster and support the birth and development of innovative ventures, such as technology-based startups.

In this analysis, the following categories of environments were mapped: accelerators, innovation hubs, incubators, and technology parks. Additionally, considering the importance of interactions between players within the country’s different ecosystems, creating conditions for their development, ecosystems with governance were also mapped.

The data collected in 2025 reflects the regional distribution of the identified environments and ecosystems, by category, as well as the results of a detailed survey conducted through an online questionnaire. The definitions of the main concepts presented in this chapter can be found in Table 1.

Innovation environments provide knowledge, infrastructure, services, and connections which are essential to the birth, development, and growth of new technology-based ventures, turning ideas into successful enterprises under various organizational formats and operating models. Several instruments are offered, considering the stages of the startup life cycle (Dias *et al.*, 2023).

These environments are part of innovation ecosystems that bring together science and technology institutions, large companies, and potential markets for technology-based products and services, attracting investors and providing fertile ground for the development of new technology-based businesses.

Table 1. Concepts and Definitions addressed in this chapter

Concepts	Definitions
Agricultural innovation ecosystems	Spaces that bring together infrastructure, institutional and cultural arrangements, and attract entrepreneurs and financial resources. These places enhance the development of the knowledge society.
Governed ecosystems	Also called regional or sectoral innovation ecosystems, especially those with an agricultural vocation, such ecosystems involve synergistic interaction between different players in a given context or segment, creating conditions for their development. In this sense, geographically, ecosystems can be considered on different scales, within neighborhoods, districts, cities, subnational regions, countries, or international communities.

Concepts	Definitions
Innovation Environments	Mechanisms that promote innovative ventures and support the development of technology-based startups, involving innovative businesses based on technological differentials that seek to solve social and environmental problems or challenges. They provide support to turn ideas into successful ventures and include, among others, business incubators, business accelerators, open cooperative workspaces, and open laboratories for product and process prototyping. Some examples are: accelerators, hubs, incubators, and technology parks.
Categories of Innovation Environments	
Accelerators	Mechanisms to support startups or emerging companies that already have a consolidated business model with rapid growth potential. They have connections with entrepreneurs, investors, researchers, businesspeople, business mentors, and investment funds, and offer benefits that may include mentoring, evaluation, training, credit, or investment through funds or venture capital.
Innovation hubs	Physical or virtual environments that promote connection and collaboration between various players in the innovation ecosystem, such as startups, companies, educational and research institutions, investors, and others. These are spaces that stimulate interaction and the development of innovative businesses, favoring networking and connections for strategic partnerships.
Incubators	Organizations that support startups and entrepreneurs in the creation and development of new businesses. They generally provide physical space, shared services, guidance, and training for entrepreneurs and startups in the early stages. Their main objective is to prepare companies for success in the market, providing them with a solid foundation and well-planned business strategies.
Technology Parks	Planned business and technology development complexes that promote a culture of innovation, industrial competitiveness, business training, and synergies in scientific research, technological development, and innovation activities between companies and science and technology institutions.

Adapted from Dias *et al.* (2023) and Sakuda *et al.* (2024).

Business incubation and acceleration programs are seen as promising mechanisms for supporting the creation, development, and maturation of technology-based startups (Bambini, 2021). Incubators contribute mainly in the early stages of a startup's life by supporting entrepreneurs in the processes of generating and developing innovative ideas, structuring the initial steps of their transformation into a business. They generally provide infrastructure, training, and management support at reduced prices, with the support of universities and research centers.

Business acceleration initiatives involve aligning their product and service offerings in a market context, with initial commercial operations, and a traction and scale phase, with customer acquisition and a faster pace of growth (Bambini, 2021). This phase is generally led by private organizations, often associated with investors, who provide the necessary resources for business expansion.

Innovation hubs and technology parks are physical spaces (or virtual spaces, in the case of hubs) with varying levels of complexity and infrastructure. They are places that can host business incubation and acceleration programs and foster synergistic interactions for the de-

velopment of innovative businesses, based on the evolution of different types of knowledge important for business development, as well as networking with institutions that can act as partners.

Due to all these characteristics, innovation environments highlight synergies and complementarities among the players involved and promote the development of regional or sectoral innovation ecosystems, also called ecosystems with governance, as presented in this chapter.

The following section presents an overview of the mapping of innovation environments operating in the agtech segment which are located in each region of the country. Next, the section shows the results of the survey, conducted between October and November 2025, providing a more in-depth view of the performance of innovation environments in the agri-food sector, considering their specific features, infrastructure, and services. Finally, it presents a few cases involving innovation environments focused on the agricultural and food sector, followed by conclusions.

1.2 Mapping of innovation environments: location, typology, and ecosystems with governance

1.2.1 Description of the methodology used

The mapping of data on innovation environments was carried out considering the following criteria:

- (i) having an active profile on social networks in the last 12 months;
- (ii) having an email contact (or another channel) available;
- (iii) having some type of direct involvement with the agtech sector and related cross-cutting areas, such as digital technologies and ESG (Environmental, Social, and Governance) criteria.

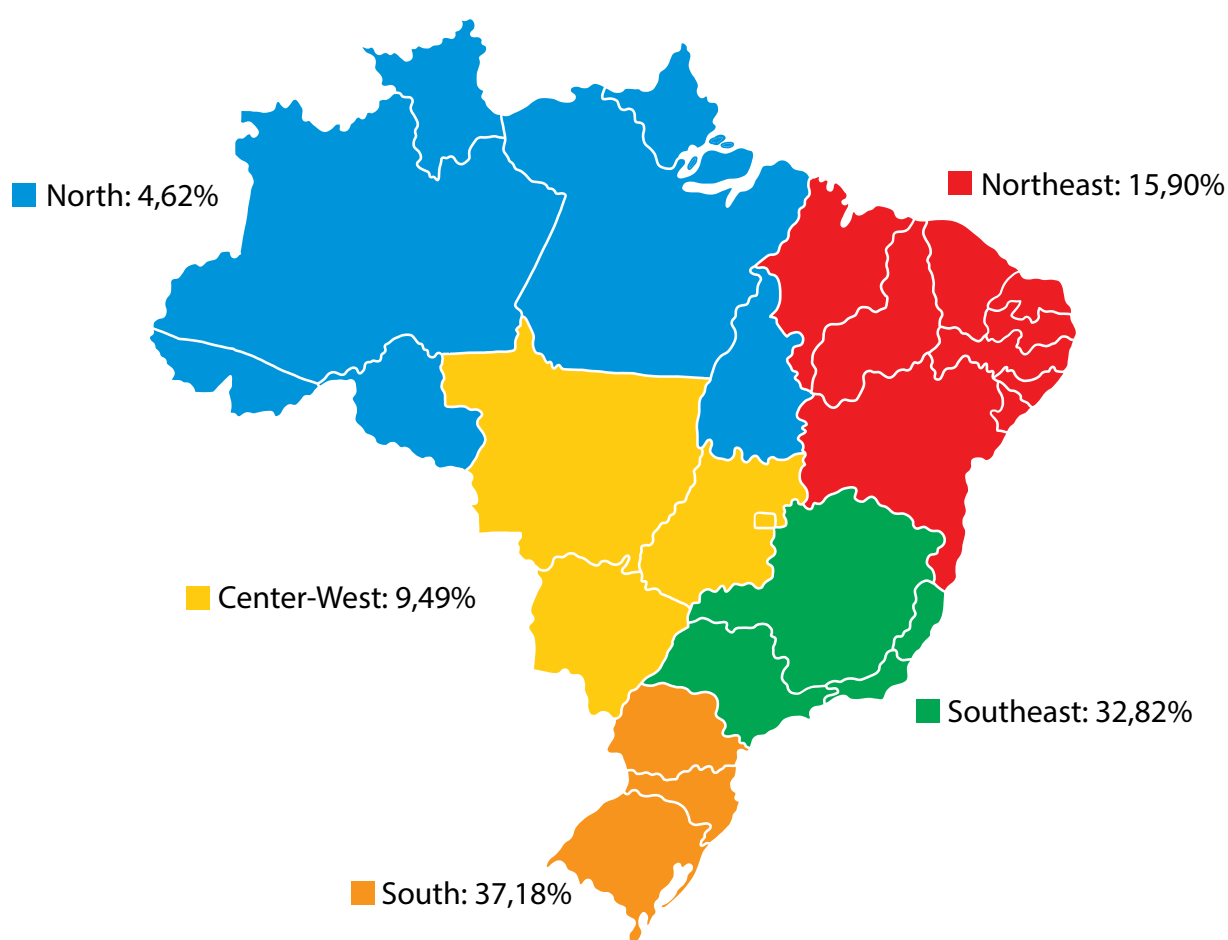
The database was supplemented with data from innovation environments associated with ANPROTEC (National Association of Entities Promoting Innovative Enterprises), which is a partner in the development of this study, following the same criteria.

1.2.2 Descriptive analysis: regional and by category of innovation environment

The analysis of regional data provides a broader understanding of the realities and details of innovation environments located in different regions of Brazil, considering their contribution to strengthening agtech startups and governance of players in the context of the agricultural innovation ecosystem. The percentage distribution of innovation environments by region is shown in Table 1 and Figure 1.

Table 1. Regional distribution of innovation environments mapped in 2025

Categories	%
North	4,62%
Northeast	15,90%
Center-West	9,49%
Southeast	32,82%
South	37,18%
Total	100%

Figure 3. Innovation environments and ecosystems with an agricultural focus by region in Brazil

The quantitative mapping of innovation environments in each region has taken into account the main activity of each innovation environment. A total of 144 incubators, 30 accelerators, 97 technology parks, 54 ecosystems with governance, and 65 hubs were featured in the mapping. Table 2 and Graph 1 show the quantities of categories by Brazilian region.

Table 2. Categories of Innovation Environments present in each region of the country

Categories	North	Northeast	Center-West	Southeast	South	Total
Incubators	9	25	12	37	61	144
Accelerators	0	5	3	12	10	30
Technology parks	1	18	6	27	45	97
Ecosystems with governance	6	10	5	19	14	54
Hubs	2	4	11	33	15	65
Totals	18	62	37	128	145	390

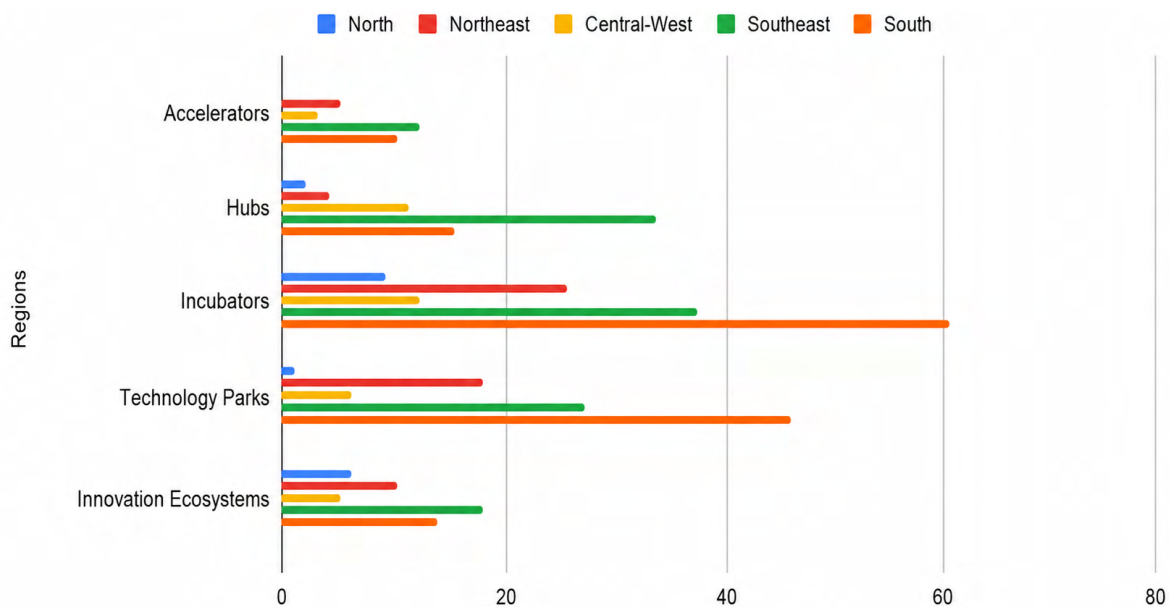
Graph 1 - Distribution of categories by region

Table 3 shows the percentage distribution of the innovation environments mapped.

Table 3. Percentage distribution of the location of innovation environments

Categories	North	Northeast	Center-West	Southeast	South
Incubators	6,25%	17,36%	8,33%	25,69%	42,36%
Accelerators	0,00%	16,67%	10,00%	40,00%	33,33%
Technology parks	1,03%	18,56%	6,19%	27,84%	46,39%
Ecosystems with governance	11,11%	18,52%	9,26%	35,19%	25,93%
Hubs	3,08%	6,15%	16,92%	50,77%	23,08%
Totals	4,62%	15,90%	9,49%	32,82%	37,18%

The Southeast region remains attractive for many segments of entrepreneurship, not just agtech, expanding the possibilities for multidisciplinary interaction, diversity, and dynamism. It is characterized by the presence of several centers that promote generation of agricultural knowledge and technologies, due to the large concentration of universities and research institutes, as well as hosting the largest financial center in the country.

Table 4. Distribution of innovation environments by state in the Southeast region

Southeast		
State	Qt.	%
SP	60	46,88%
MG	41	32,03%
RJ	15	11,72%
ES	12	9,38%
Total	128	100,00%

Despite this concentration, the Southeast region was surpassed by the South region in the number of innovation environments operating in the agricultural segment. The South went from 31.2% in 2024 to 37%, while the Southeast saw a drop in the number of mapped innovation environments related to the agtech segment, going from 36.8% in 2024 to 32.8% in 2025.

Table 5. Distribution of innovation environments by state in the South region

South		
State	Qt.	%
RS	68	46,90%
PR	43	29,66%
SC	34	23,45%
Total	145	100,00%

However, these numbers do not, in themselves, indicate a decline in the agricultural innovation ecosystem in the Southeast; it is understood that the South region has strengthened its position in the agtech segment, while the Southeast region has a lower degree of specialization in innovation environments focused on the agri-food sector.

Among the states in the South, as increasing integration of innovation environments with rural producers is observed in the state of Paraná, mainly through agricultural cooperatives. This point is emphasized by the clear connection between innovation environments that have emerged in recent years and cooperatives, resulting in significant innovation events, such as the Iguassu Valley Summit, and agricultural events with a strong presence of innovation environments, such as the Coopavel Rural Show. The prospect of an increasing convergence between the needs of those at the forefront, such as rural producers and other links in the

ecosystem, and those who develop innovations was already a clear trend in the 2024 edition of Radar Agtech Brasil.

Table 6. Distribution of innovation environments by state in the Northeast region

Northeast		
State	Qt.	%
BA	11	17,74%
AL	5	8,06%
RN	10	16,13%
CE	10	16,13%
SE	2	3,23%
MA	3	4,84%
PE	17	27,42%
PB	4	6,45%
Total	62	100,00%

The Northeast maintains its position as the third largest agrifoodtech ecosystem in Brazil, as presented in the latest editions of Radar. The region has a large number of Scientific and Technological Institutions (ICTs) that create their own incubators. Many undergraduate and graduate students are from the countryside and were born into families involved in agriculture and livestock. These students bring the pain experienced by their families and want to use innovation and technology to solve them.

In this regard, many programs are offered to encourage the creation of new businesses, in partnership with ICT technology incubators. These actions stimulate and strengthen the ecosystem, which is reflected in the number of governance ecosystems and technology parks.

Table 7. Distribution of innovation environments by state in the Center-West region

Center-West		
State	Qt.	%
GO	18	48,65%
MT	7	18,92%
MS	2	5,41%
DF	10	27,03%
Total	37	100,00%

The Center-West region saw a slight drop in the total number of innovation environments, from 43 in 2024 to 37 in 2025. Unlike other regions, this decline is not restricted to specific types of innovation environments or ecosystems with governance.

Despite the decrease in accelerators, from 5 to 3, technology parks, from 7 to 6, ecosystems with governance, from 8 to 5, and hubs, from 14 to 11, there has been an increase, from 2024 to 2025, in the number of incubators, from 9 to 12. Further studies are needed to understand the shifts in the ecosystem, but it is clear that its players remain very active in a region with high representation in Brazilian agricultural production, which may also signal a closer proximity between those who develop technologies and those who are users or customers of startups.

Table 8. Distribution of innovation environments by state in the North region

North		
State	Qt.	%
AM	7	38,89%
PA	4	22,22%
AC	2	11,11%
TO	2	11,11%
RR	1	5,56%
AP	1	5,56%
RO	1	5,56%
Total	18	100,00%

The North region, in total numbers, showed an overall percentage of innovation environments similar to that of 2024. In relation to the categories, the most significant reduction involved ecosystems with governance, perhaps due to a lack of activities and engagement by local ecosystems in the region.

However, despite the decrease, there was significant growth in the number of incubators, which is the type of innovation environment responsible for the initial stages of startup development. In 2024, three incubators were identified, whereas in 2025, there were nine. It is also worth noting a similar movement in the Southern region in 2024 regarding the large number of incubators, generating significant expansion of other types of innovation environments in 2025.

1.3 Detailed study on agro-innovation environments: services, resources, and trends

The results of the online questionnaire applied to innovation environments provide a comprehensive overview of these environments in the agri-food sector, highlighting their main characteristics, segments of activity, services offered, among other aspects.

1.3.1 Research methodology and respondent profile

A survey-type data collection form was widely disseminated and made available on the Internet between October and November 2025 to collect more in-depth data on Brazilian innovation environments that work with the Brazilian agricultural sector.

Thirty-five organizations responded to the form, which was structured around the following sections: organization data, categories and activities, organization services, startup origins, governance, and final questions on talent management, challenges, technology and market trends, areas for improvement in the agtech ecosystem, and, finally, an option for open comments.

Respondents are located in four Brazilian regions (South, Southeast, Center-West, and Northeast) and 11 states (Rio Grande do Sul, Santa Catarina, Paraná, São Paulo, Minas Gerais, Espírito Santo, Rio de Janeiro, Mato Grosso do Sul, Mato Grosso, Bahia, and Rio Grande do Norte). The Southeast region originated the majority of responses, with 57.14% , followed by the South region with 31.43%, and the Northeast and Center-West regions, with 5.71% each.

Among the responses obtained, 40% were from environments in the state of São Paulo. Rio de Janeiro and Paraná each accounted for 14.29% of the responses, followed by Minas Gerais (8.57%) and Espírito Santo (5.71%). The other states, grouped together, accounted for 2.86%, with only one environment per state responding.

The main host cities of the innovation environments participating in the survey are: Piracicaba, with four representatives; São Paulo, with three; and Belo Horizonte, Campinas, Jaboticabal, Londrina, Maringá, Passo Fundo, Ribeirão Preto, Rio de Janeiro, and Vitória, with two innovation environments each.

With regard to the geographical origin of the startups served by these innovation environments, the distribution is as shown in Table 9. It is worth emphasizing that respondents could cite more than one option.

Table 9. Geographic distribution of startups served by innovation environments.

Location of startups served	Quantity	Percentage
Startups in the city/municipality (and surrounding areas)	22	29,33%
Startups in the state/federal unit	18	24,00%
Startups from all over Brazil	20	26,67%
Startups from other countries operating in Brazil	10	13,33%
Startups from other countries with international operations	5	6,67%

Regarding organizational structure, teams, and sources of funding of the participants, 51.4% are private innovation environments, 40% are public, and 8.6% belong to the third sector. In terms of length of activity, 28.6% of respondents have been active for up to 5 years, 34.3% have been active for between 6 and 10 years, and 37% have been active for more than 10 years.

The responses involving the number of employees in innovation environment teams show lean teams: more than 62% of respondents have 1 to 10 employees; 25.7% have 11 to 50; and 11.4% have teams of more than 50 people.

In relation to sources of funding, with more than 40% of mentions, the following stand out: companies/corporations; federal, state, and municipal governments; affiliated startups; development agencies, universities, and research institutions. In addition, 20% of the responding organizations emphasize the role of their own revenue for their activities. Other sources of revenue mentioned were: fees charged for project management; fees charged to startups and associated corporations; network of supporters; and creation of investment funds for startups.

With regard to categories of activity and governance structures, respondent organizations were able to place themselves in more than one category of activity, considering the activities carried out in the context of the innovation environment, namely: business incubators; business accelerators; technology parks; innovation hubs; innovation ecosystems (startup communities and other organizations) or other additional categories.

The following activities were mentioned in the “other” category: pre-seed venture capital; non-profit science and technology institution; and innovation center.

Importantly, while in the survey the responding organizations were able to self-group themselves in more than one category, in the section on mapping innovation environments (2.2), there was a single classification considering only the description in the organization’s profile according to its website and/or social media based on the categories described in Table 1 of this chapter. Table 10 presents the responses obtained.

Table 10. Self-classification of respondents in relation to their category of activity.

Innovation environment category	Quantity	Percentage
Business incubator	15	42,86%
Business accelerator	7	20,00%
Technology Park	10	28,57%
Innovation Hub	16	45,71%
Innovation ecosystem (community of startups and other organizations)	13	37,14%
Other	4	11,11%

With regard to the participation of innovation environments in the governance of regional ecosystems, broader national or international networks, 72% of respondents reported some kind of shift in this direction. These initiatives included:

- a) links to associations such as Anprotec, the National Agricultural Society (SNA), the International Association of Science Parks and Areas of Innovation (Latin IASP), the European Network of Research and Innovation Centres and Hubs Latin America & the Caribbean (ENRICH), the Brazilian Association of Cannabis and Hemp Industries (ABICANN), the Santa Catarina Association of Technology in the Santa Catarina Mountains (ACATE), federations such as the Federation of Industries of the State of Santa Catarina (FIESC), as well as business entities such as trade associations.
- b) participation in regional networks such as the Brazilian Association of Innovation Centres and Hubs (ENRICH), the Paraná Network of Incubators and Accelerators of

Innovative Enterprises (Reinova), the Rio Grande do Sul Network of Innovation Environments (REGINP), São Paulo System of Innovation Environments (SPAI), São Paulo Network of Incubators, São Paulo State Agricultural Innovation Corridor, Brazilian Network of IT APLs (Local Productive Arrangements for Information Technology), Bioceanic Route (strategic logistics corridor linking the Atlantic and Pacific Oceans, connecting Brazil, Paraguay, Argentina, and Chile).

- c) Relationships with municipal councils for science and technology and/or economic development or committees of ministries such as MAPA, as well as with the ELI movement () and SEBRAE (Local Innovation Ecosystem).
- d) integration of activities in the context of local ecosystems, such as AgroValley (Londrina), Campo Grande, Maringá, Viçosatech, Rede Mineira de Inovação (Minas Gerais Innovation Network), IguassuValley (Iguassu Valley), etc.

1.3.2 Data Analysis

Participating innovation environments: performance, services, and connections

In terms of the infrastructure provided by the responding organizations, 32.18% of them provide spaces for startups to set up, including Wi-Fi internet access. Experimental cultivation areas, R&D and prototyping resources, along with specialized laboratories and equipment, are also represented, all with more than 13% of mentions. Other services, with more than 6% of mentions, include: specialized libraries and databases; intellectual property licensing; and service and technology vouchers.

With regard to the support provided by innovation environments in terms of specialized programs and services, responses were more varied. Marketing and sales support tools were the most frequently cited, accounting for around 20% of responses. In turn, support in regulatory and legal matters and access to customer bases and sales channels were mentioned by around 16% of respondents. With more than 10% of responses, pilot project execution services, provision of innovative services or products, and support in obtaining certifications were mentioned.

Innovation environments also work to connect startups with numerous resources in the context of agricultural innovation ecosystems, such as access to capital (whether investors or financial credit) and interactions that allow access to skills, knowledge, and other organizations relevant to the development of a new business. With regard to access to financial capital, the following stand out: support in seeking funding and subsidies (27.03%) and seeking investments and equity (24.32%); access to a network of investors in the sector (18.92%); and support in seeking loans (12.61%). Regarding connection and networking mechanisms, the different categories mentioned in the survey are valued. More than 10% of respondents' mentions refer to participation in industry fairs and events and connections with various players (research organizations, government, innovation environments, S system), with specialized mentoring (agriculture, business, technology etc.), potential client companies and suppliers, as well as technology suppliers.

Regarding participation in ecosystem governance, understood as the synergistic interaction of innovation environments in the context of local/regional innovation ecosystems, 62.86% of respondents said they were active in one or more of these.

Challenges, Trends, and Perceptions

Each year, the survey includes a space in the questions where respondents can openly express their opinions and perceptions. This space is essential for capturing where environments are looking in terms of general challenges and trends in technologies and markets for the institutions themselves and for the ecosystem of which they are a part.

This year, the questionnaire included a question for the environments regarding the **perception of technological and/or market trends and the possible impact on the organization**. In analyzing the open-ended responses, it was noted that respondents expressed themselves in different ways about innovation trends for Brazilian agribusiness, but there was a clear convergence around certain themes: **digitization, biotechnology, and environmental sustainability**. Another common point among the open responses was **Artificial Intelligence (AI)**, emerging as a short-term catalyst, embedded in solutions for the trends mentioned. Next, we show a summary with more details of what was mentioned in the responses.

Digitization and Agriculture 4.0 (AgData)

Several technologies and solutions related to digitization and agriculture 4.0 were presented as trends:

- **Artificial Intelligence (AI) and Generative AI:** The leading technological trend mentioned in the responses, perceived as crucial for task automation, management, decision-making, predictive analysis, monitoring, and corporate content creation.
- **IoT and Remote Sensing:** Use of smart sensors, digital platforms, images, and climate/production data for remote monitoring, agricultural management, and increased operational efficiency.
- **Automation, Robotization, and Machines:** Advances in autonomous tractor components, agricultural robotization, and accessible automation.
- **Connectivity (5G and Digitization):** Expansion of digital platforms and the arrival of 5G to enable automation and digital inclusion in the field.
- **Traceability and Blockchain:** Use of technologies (such as blockchain) to verify good practices, traceability of inputs, and regulatory compliance.

Biotechnology, Bioeconomy, and Bioinputs

Strong focus on science-based innovation for sustainability and new production chains.

- **Bioinputs and Biological products:** Accelerated market growth, driven by the search for more sustainable solutions, reduction of chemical inputs, and use of agro-industrial waste.
- **Genomics, Biotechnology, and Genome Editing (CRISPR):** Intensive use of plant genomics, genetic improvement, biofertilizers, and microbial bioprocesses to develop resistant varieties, new foods, and alternative proteins.

Sustainability, ESG, and Circular Economy

Market trends that transform production and consumption models.

- **Sustainability and Regenerative Agriculture:** Focus on sustainable production models, regenerative economy, circular economy, and use of by-products.
- **Climatechs and Decarbonization:** Technologies and projects focused on energy transition, decarbonization of agriculture, and expansion of bioenergy/biogas/green hydrogen.
- **Carbon Credits and Certifications:** Growing demand for technologies that serve as evidence for ESG (environmental and social) practices and facilitate access to carbon credits.
- **Consumer Trends:** Increase in new foods, alternative proteins, and customization in customer service.

There was also another open question about **the impact of the aforementioned trends on the strategy of innovation environments**. All respondents stated that these trends directly impact the mission and operation of organizations, requiring a transformation in four main pillars:

- **Updating and Training (Hard Skills):** requires constant updating in regulatory science, bioengineering, innovation management, and digital culture. There is a high demand for training in innovation and leadership development for digital transformation.
- **Connection and Coordination (Ecosystem):** reinforces the role of organizations as facilitators and strategic links between startups, universities, large producers, investors, and cooperatives. These organizations *need* to promote synergies between biological sciences and digital technologies and consolidate regional and international business networks.
- **Infrastructure and Support:** generates greater demand for IT infrastructure, quality internet, and intensive use of laboratories (physical-chemical analysis, molecular biology, microbiology) and prototyping. There is a need to offer consulting support on regulatory issues and fundraising.
- **New Value Proposition:** consolidates organizations as a benchmark in applied innovation (especially in sustainability and biotechnology), enabling the attraction of new investments and the internationalization of startups. This positions them as strategic agents in the development and qualification of the innovation ecosystem.

There is a consensus that Brazilian agribusiness is moving towards a new paradigm of sustainable and technological development, in which the boundary between the digital (AI, IoT, automation) and the biological (biotechnology, bio-inputs, genomics) is diminishing, with great synergy. For innovation environments, the challenge is to act as a bridge between technology and purpose, helping to transform scientific and digital knowledge into economic, social, and environmental value.

When asked **what could be improved in the Brazilian agrifoodtech ecosystem**, the responses were predominantly grouped into five themes, presented in order of number of citations:

- 1) Integration and Collaboration;
- 2) Regulatory Environment and Debureaucratization;

- 3) Applied Research and Academic Market Fit;
- 4) Promotion, Investment, and Infrastructure;
- 5) Communication and Agricultural Narrative.

The most frequent theme, **Integration and Collaboration**, shows that the connection between players is still a bottleneck in the ecosystem. In general, respondents feel that players still operate in “silos” and that actions are still needed for the integration and real connection of the triple helix – Government, Academia, Private Initiative. Integration for open innovation was also mentioned, due to the need to connect startups directly to cooperatives and large corporations (there was concern about the “disappearance” of large companies from hubs). This year, respondents mentioned the weak culture of collaboration, in which the ecosystem is seen as fragmented. There was a suggestion to create collaborative governance models to avoid overlapping initiatives.

The second most frequently mentioned area for improvement was the **regulatory environment and reducing bureaucracy**. There is criticism of the constant slow pace of the public sector, which does not keep pace with startups, especially for bio-inputs and biotechnology. There was a suggestion to create experimental environments to validate new technologies, known as regulatory **sandboxes**. The need to align the criteria of regulatory agencies with the new technological bases of current projects was also mentioned.

Also, the theme of **Applied Research and Academic Market Fit** was mentioned as a result of the distance between laboratories and the field, which is still perceived as significant by innovation environments. For them, the challenge is not only to conduct research, but to turn that research into a business, that is, to transform research into business. There was criticism of the fact that partnerships depend on the “individual initiatives” of researchers, with a suggestion to create more fluid institutional channels.

In turn, **funding, investment, and infrastructure** are recurring demands from those who develop and/or support the development of innovative solutions, understanding that the valley of death for startups is part of the ecosystem. However, in this survey, respondents stated that capital is available although it seems poorly distributed or difficult to access for technical validation. Regarding infrastructure, respondents stated that there is an urgent need for testing areas, “living laboratories”, and regionalized technical infrastructure for certification and traceability. There was criticism of the seasonal call for proposals model, suggesting continuous funding for open innovation programs. The need for specific credit for science-based startups, which have a longer maturation cycle, was also pointed out by the respondents.

An interesting and emerging topic in this year’s survey was **Communication and Narrative in Agriculture**. In general, respondents mentioned that the ecosystem lacks a unified narrative showing the world that Brazilian agriculture is technological and environmentally sustainable, overcoming the purely traditional image. Another relevant point mentioned was the lack of centralized dissemination of public notices, lines of research in institutions, and **stakeholders** for partnership, in line with the proposal for regional intelligence platforms.

Table 11 shows the suggestions for improvement for each player in the ecosystem, made by the innovation environments that responded to the survey.

Table 11. Suggestions for improvement by ecosystem player category

Player Category	Main Bottlenecks Identified	Actions and Suggestions for Improvement
Government and Regulatory Bodies	Excessive bureaucracy, slow registration processes, and lack of specific incentives.	Create Regulatory Sandboxes for biotechnology. Ensure agility in the issuance of licenses for bio-inputs . Promoting policies to encourage continuous (less seasonal) flows . Create policies to encourage technological decentralization outside major centers.
ICTs and Universities	Distance between research and the market; contact dependent on individuals.	Institutionalize focal points for innovation to facilitate corporate partnerships. Foster academic entrepreneurship (turn theses into businesses). Expand the scope of research to “ after the farm ” (logistics and agribusiness).
Private Initiative (Companies/ Cooperatives)	Retraction of investments in open innovation and distancing from hubs.	Resume the culture of investment in technological risk . Create intellectual mentoring programs (in addition to financial support). Open production units to serve as testbeds (real-world validation areas).
Innovation Environments (Hubs/ Parks)	Fragmentation of actions and lack of integration between regional networks.	Implement collaborative governance models to avoid overlapping actions. Create Regional Intelligence Platforms (mapping of stakeholders and public notices). Strengthen benchmarking between national parks and hubs.
Ecosystem (General)	Failure in external communication and lack of an “Agro-Technological” narrative.	Build a unified narrative about the technological revolution in Brazilian agriculture. Hold events focused on real collaboration (hands-on) rather than just superficial <i>networking</i> .

The **main challenges** mentioned by respondents were grouped into five **thematic areas**:

- 1) Financial Sustainability and Promotion;
- 2) Human Capital and Culture;
- 3) Market Connection and Corporate Retraction;
- 4) Technological Specificities;
- 5) Governance, Visibility, and Data.

This reflects the operational and strategic challenges of innovation environments: there are not only technological issues, but also aspects that influence the sustainability of the innovation business model itself.

The challenge of survival in innovation environments was pointed out by most environments, in the theme of **Financial Sustainability and Promotion**, mainly involving the

difficulty of maintaining the operations of the innovation environments themselves and financing their projects. Respondents also mentioned the difficulty in balancing social/technological purpose with financial sustainability and reducing dependence on public policies. Regarding infrastructure, there is a strong lack of resources for improving laboratories and prototyping areas, for example. Last but not least, respondents mentioned the difficulty in attracting capital for long-term research (3 to 15 years) and seed capital.

Project execution was mentioned as a challenge by many respondents. The perspective is that **Human Capital and Culture** are also difficulties faced by these environments. In general, organizations suffer from a shortage of qualified people for both management and technical operation of projects and actions. Currently, there is still difficulty in training, engaging, and retaining robust teams that can keep up with the pace of growth of hubs and incubators. There is also difficulty in professionalizing environments with administrative and practical tools for internal management. Regarding the culture of innovation, specifically, the challenge of implementing a mindset of innovation as an engine for regional development and breaking down conservative barriers was pointed out.

The third most frequently cited challenge was demand. There is a clear perception that the **corporate market** (companies and cooperatives) has retreated and is more cautious. This survey pointed out that there was a lower supply of corporate innovation projects and the closure of Corporate Venture Capital (CVC) initiatives by major players (examples: Pulse, Nestlé, Braskem), coupled with a communication failure, which reflected in difficulty, from the players involved, in translating the real needs of rural producers and cooperatives into technological solutions. Due to this reality, another challenge was detected: generating real value in innovation solutions resulting in revenue and tangible returns, fighting the “romanticism” of innovation.

In the agrifoodtech ecosystem, the challenge of **technological specificities** is also a constant. Organizations point out that agriculture does not follow the agile pace of software (IT), requiring different methodologies that fit into crop cycles and external factors, such as inconsistent weather conditions. Thus, there is a need to adapt methodologies to the slower validation time of agrobiotech. The science-market transition was identified as a major difficulty in transforming scientific results and academic research into structured and commercially feasible businesses. The third item in this theme was the cost and slow pace of regulatory processes as a direct impediment to the speed of market entry.

The theme of **Governance, Visibility, and Data** was identified as the challenge of ecosystem management. This refers to the organization's position within the Brazilian agricultural innovation ecosystem. A challenge mentioned by different environments was visibility in the search for representation in the business world and national projection to attract better partners. With regard to data, which is essential for management and strategic decision-making, the difficulty lies in accessing consistent data on the evolution of startups at their origin in order to monitor the success of programs.

1.4 Conclusions

The mapping of innovation environments showed that the South region leads in terms of the total number of environments (37%), surpassing the Southeast (33%). The South has the largest number of business incubators and technology parks mapped.

Although the Southeast region lost its leadership in the total number of mapped environments, it remains a major hub of attraction for business accelerators, with 40% of the total, and innovation hubs, with over 50% of the category. The region also has the largest number of mapped ecosystems with governance.

The North region remained at a similar percentage to that obtained from the 2024 data, emphasizing the growth in the number of business incubators, which indicates a shift to support startups in their early stages of ideation. This process of strengthening and supporting new technology-based businesses is seen as essential to consolidate the agtech entrepreneurship in the region and promote the development of local ecosystems. The Northeast region maintained a percentage similar to that found in the mapping carried out in 2024.

In terms of categories, the mapping shows a predominance of business incubators. This is the most frequent category in all regions, with the exception of the Southeast, where hubs and technology parks predominate. The existence of a large number of Incubators, compared to other categories of innovation environments, reveals the potential for the emergence of new startups in the agtech sector based on cutting-edge technologies, considering the progress in the adoption of new products and services in the agri-food segment.

The results of the online questionnaire applied to innovation environments, compared with data from mapping carried out in previous years, show that the Brazilian agricultural innovation ecosystem has developed, mainly in its regional aspects and dynamics. Thus, we notice the emergence of new innovation environments, without the massive disappearance of existing ones, which demonstrates that institutions are resilient and innovative, seeking to survive even when reporting low availability of financial resources and high demand for technological innovation in the sector.

Integration and collaboration between industries was the most recurring theme regarding the need for improvement in the ecosystem. However, it is the strong integration that has existed over the years, especially when planning and regional development policies are in place, that makes the Brazilian agricultural innovation ecosystem one of the main pillars for the development of technologies that enable the Brazilian agricultural and food sector to grow with environmental and social sustainability.

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2. Embrapa's Insertion in the Agricultural Innovation Ecosystem and Interaction with Agtechs

• *Martha Delphino Bambini*

The Brazilian Agricultural Research Corporation (Embrapa), created in 1973, is a public company linked to the Ministry of Agriculture and Livestock (Mapa). Created to establish a knowledge and technology base for tropical agriculture, Embrapa's mission is to develop Research, Development, and Innovation (RD&I) solutions for sustainable agriculture, for the benefit of Brazilian society.

Embrapa's history is marked by its commitment to Brazilian society and its ongoing dialogue with producers, scientific organizations, and leaders from the government and civil society (Embrapa, 2024). By generating and sharing knowledge and technologies, Embrapa interacts, in a complementary and synergistic way, with various actors in the national and international agricultural innovation ecosystem—producers of all profiles, the scientific community, private companies, industries, government agencies, and civil society—in order to drive innovation, strengthening the agri-food system and its multiple links (Embrapa, 2025).

With regard to the open innovation activities promoted by Embrapa with technology-based agricultural startups, there are two aspects: cooperation and technology licensing actions, and programs for the development and strengthening of startups.

“Open Innovation Projects” can be established with startups both for the collaborative development of new innovation solutions and for the evolution of technologies in Embrapa's portfolio for effective adoption by the productive sector, expanding the reach and impact of the technologies generated by Embrapa (Embrapa, 2026). Priority themes for these projects include: agroecology and socio-productive inclusion, bio efficiency in agriculture, bio revolution, climate, natural resources and ecological transformation, biodiversity economics, green economy, consumer protagonism, sustainable and resilient production systems, and digital transformation in agriculture.

Another mechanism for Embrapa's cooperation with startups is licensing agreements that allow them to commercially exploit assets such as patents, processes, and technical know-how, with or without exclusivity, under specific conditions, usually established in public notices.

Embrapa also hires services provided by technology-based startups. Public Call 01/2025 to encourage entrepreneurship was published by the Center for Science for Development in Digital Agriculture – CCD-AD/Semear Digital¹ in June 2025, which aimed to select companies to prepare proposals for the contracting of innovative technological solutions. The solutions required were: digital platforms for agricultural marketing, modeling and operation of logistics systems optimized for small production chains, and digital solutions focused on packaging, traceability, certification, and end-consumer relations. Activities began in December 2025.

¹ The Semear Digital experience is described in detail in this chapter.

In addition, Embrapa also promotes collaborative actions to develop and foster agtech entrepreneurship through surveys, programs, and innovation environments. Radar Agtech is one such collaborative initiative, which involves mapping and generating qualified information for the agtech segment, developed in partnership with Homo Ludens and SP Ventures.

In collaboration with startups, Embrapa has already developed several programs, such as Ideas for Milk (Embrapa Dairy Cattle), Inova (Embrapa Swine and Poultry), Techstart AgroDigital (Embrapa Digital Agriculture), Bridges for Innovation, Open Innovation Soy, and Avanço Café. More information about these programs can be found on Embrapa's official website, available at: <https://www.embrapa.br/financiamentos-desafios-e-programas-de-inovacao>.

In terms of structuring innovation environments, AgNest stands out, created by Embrapa and its founding partners based on the Farm Lab concept. AgNest is characterized as an open innovation hub for agriculture that provides the conditions to test startup products and services in a real environment (Proofs of Concept) and promote connections with corporations, other startups, investors, farmers, and other partners to boost business and innovation. There are eight themes for experimentation and testing: Artificial Intelligence, IoT (Internet of Things), Robotics and Automation, Support and Decision-Making Software, Sustainable Production Systems, Bio-inputs, Remote Sensing, and Integrated Pest and Disease Management. More information about AgNest and its partners can be found on the hub's official website, available at: <https://www.agnestfarmlab.com/>.

The following sections present experiences developed by Embrapa research centers in the context of the agricultural innovation ecosystem, involving research and the promotion of agtech entrepreneurship.

2.1 Semear Digital: innovation in digital agriculture for socio-productive inclusion

• *Luciana Alvim Santos Romani, Maria Angelica de Andrade Leite, Graziella Galinari*

2.1.1 What is Semear Digital

Semear Digital is a Science Center for Development in Digital Agriculture² funded by the São Paulo Research Foundation (Fapesp), whose mission is to engage in research, development, and innovation (RD&I) in emerging technologies. The main objective is the digital inclusion of small and medium-sized rural producers, in order to achieve gains in productivity and competitiveness, greater economic impact in terms of increased scale, cost reduction, and improved agricultural production efficiency in the various links of the production chains, in a sustainable manner, from an economic, environmental, and social point of view.

2.1.2 Institutions involved

Semear Digital is the result of a consortium between the Brazilian Agricultural Research Corporation (Embrapa), the Telecommunications Research and Development Center (CPQD), the Agronomic Institute (IAC), the Institute of Agricultural Economics (IEA), the National Tele-

² Available at: www.embrapa.br/semear-digital

communications Institute (Inatel), the Luiz de Queiroz School of Agriculture at the University of São Paulo (Esalq/USP), and the Federal University of Lavras (UFLA). The host institution is Embrapa Digital Agriculture.

2.1.3 What motivated the work and what are its objectives

The digital transformation of agriculture opens up a wide range of opportunities, but also poses major scientific, technological, social, economic, and territorial challenges. These challenges are expressed at different geographical scales (national, regional, and local), production systems (vegetable and animal), and edaphoclimatic conditions (soil, climate, relief, and vegetation).

Digital agriculture, with sensors, artificial intelligence, drones, and monitoring systems, is redefining the way food is produced, increasing productivity, sustainability, and resilience in the face of climate change. However, the benefits of this revolution have not yet reached everyone. High costs, lack of connectivity, and absence of adapted solutions limit access to and adoption of new technologies in the field. Semear Digital works precisely to reduce these inequalities, bringing technology, connectivity, and training to those who need it most. More than innovation, this represents opportunity, income, and permanence for new generations in the countryside.

The initiative seeks to facilitate access for settlements, quilombos, family farmers, small and medium-sized producers, technicians, and extension workers to technical content, public policies, and good agricultural practices by implementing connectivity infrastructure and providing training that enables the use of digital platforms, videos, podcasts, and mobile applications. As a result, the project contributes to strengthening sustainable agriculture, improving productivity in the countryside, and reducing inequalities in access to knowledge, bringing scientific research closer to the reality of Brazilian rural communities.

2.1.4 Strategy and operating logic

Research activities are being conducted collaboratively by participating institutions through six thematic areas. Area 1 is dedicated to “Agrotechnological Districts and Socioeconomic Impact Assessment”, coordinated by IEA, with the participation of Esalq/USP, UFLA, and Embrapa Digital Agriculture. Theme 2, dedicated to “Connectivity and Devices”, is led by Inatel and CPQD. Theme 3, dedicated to “Artificial Intelligence and Remote Sensing”, is conducted by Embrapa Digital Agriculture in partnership with Embrapa Environment, Embrapa Southeast Livestock, and IAC. Axis 4, dedicated to “Automation and Precision Agriculture”, is being developed by Embrapa Digital Agriculture, Embrapa Instrumentation, and Esalq/USP. Axis 5, dedicated to “Traceability and Digital Certification”, is being developed in partnership by Embrapa Digital Agriculture, UFLA, and CPQD. Finally, Axis 6 is dedicated to communication and the establishment of partnerships under the leadership of Embrapa Digital Agriculture and Esalq/USP.

The strategy of the Semear Digital Project is to promote its actions through the implementation of Agro-Technological Districts (DAT) and the mobilization of local actors. An Agrotechnological District (DAT) consists of a rural area (settlement, *quilombo*, neighborhood, group of geographically close rural properties, etc.) within a municipality where connectivity

bottlenecks and opportunities for implementing digital solutions associated with training for various production chains are identified, creating models that can be replicated throughout Brazil. DATs do not require the construction of physical areas, as existing infrastructure (rural properties and schools, associations, and cooperatives) is used in the locations to carry out collaborative activities. In addition, DATs are based on the pillars of connectivity, digital technologies (hardware and software), and training in a given region, generally limited to a municipality, which aims to meet the real demands of rural communities.

The project's governance provides for several levels of leadership, consisting of:

- Executive Committee: formed by the participating institutions;
- Responsible for axis: two people from participating institutions;
- Responsible for DAT: one project member;
- Focal points in DATs: agronomist with experience in rural extension.

Multidisciplinary and multi-institutional research, development, and innovation activities have been applied in production environments (farms, smallholdings, etc.) in the ten selected DATs: Alto Alegre (SP), Boa Vista do Tupim (BA), Breves (PA), Caconde (SP), Guia Lopes da Laguna (MS), Ingaí (MG), Jacupiranga (SP), Lagoinha (SP), São Miguel Arcanjo (SP), and Vacaria (RS).

2.1.5 Main results for Embrapa and other institutions involved, as well as for the region and the production chain

- **Sustainable management of açai berry:** In the Marajó Island Sustainable Development Area (Ilha do Marajó - PA), Semear Digital supports minimum impact management in native açai groves, with demonstration units and improvement of Embrapa's Manejatech-Açaí app. The actions strengthen community organization and have the support of the Federal Institute of Pará (IFPA).
- **Integrated and agroforestry systems:** In the municipality of Guia Lopes da Laguna (MS), reference units combining livestock, beekeeping, and native species, such as cumbaru, were implemented in partnership with Rede ILPF. The project also validates traceability technologies in livestock farming.
- **Forest recovery and carbon market:** In the municipalities of Lagoinha and Jacupiranga (SP), the project promotes a collective certification model for generating income with carbon credits from forest preservation on rural properties. This initiative is a partnership with C3 Ambiental.
- **Climate monitoring:** DATs such as São Miguel Arcanjo (SP) and Caconde (SP) receive weather stations for local data collection. In Vacaria (RS), low-cost models for climate and phytosanitary monitoring of fruit growing are being tested.
- **Smart irrigation:** The precision irrigation system installed in São Miguel Arcanjo (SP) monitors soil, plants, and climate in table grape production. In Boa Vista do Tupim (BA), partnerships with Senar promote training for irrigation projects in rural settlements.
- **Honey production:** In Breves (PA), honey production is a productive addition to açai, supported by digital solutions such as Zapbee and InfoBee, from Embrapa. At the DAT in Guia Lopes da Laguna (MS), initiatives are being coordinated for the digital

certification of the product. In Boa Vista do Tupim (BA), actions aim to strengthen local beekeepers through exchanges and partnerships with cooperatives.

- **Pest and disease monitoring:** Digital traps with artificial intelligence and the Internet of Things already monitor the sugarcane borer in Alto Alegre (SP). Other initiatives aim to monitor fruit flies in Vacaria (RS) and black Sigatoka, a fungus that affects banana crops, in Jacupiranga (SP).
- **Rural connectivity:** Semear Digital develops connectivity solutions adapted to the diverse realities of the countryside, with a CPQD network solution, long-range 4G antennas from Elsys, a prototype from Inatel, and infrastructure from the Ministry of Communications' Wi-Fi Brasil program, benefiting 12 communities.
- **Precision aquaculture:** In Caconde (SP) and Jacupiranga (SP), Embrapa's Aquicultura Certa mobile application is being validated, which uses generative artificial intelligence for management and support of tilapia production and water quality monitoring. The next step will be integration with automation and remote monitoring, in partnership with Teletanque (ClaraIdea).
- **Robotics and precision fruit growing:** In Vacaria (RS), the project is developing a robot for imaging and automatic counting of fruit in apple orchards, which will support plant health analysis and harvest automation. In partnership with Jacto, a telemetry device for portable equipment is also being validated.
- **Strengthening licuri extraction:** The licuri fruit of the *Syagrus Coronata* palm tree, with the appearance of a chestnut and the taste and aroma of coconut, is of great socioeconomic and cultural importance to Boa Vista do Tupim (BA). The project's actions are supporting the formalization of women extractivist cooperatives and the generation of added value through mechanization and the expansion of marketing channels. Efforts are also being made to implement the mapping of licuri palm trees using drone images to visualize the canopy (Embrapa's NetFlora Project).
- **Precision and digital coffee farming:** In Caconde (SP), the use of drones and satellites allows for the identification of soil and plant variations, guiding localized management and thereby increasing competitiveness. There is also a focus on optimized irrigation and the traceability and certification of mountain coffee.
- **Remote sensing (satellites and drones):** The use of satellite images and drones, with innovative methodologies, supports crop mapping and environmental diagnostics: • Alto Alegre (SP): sugarcane; • Lagoinha (SP): degraded pastures; • Jacupiranga (SP): bananas and peach palm; • Caconde (SP): mountain coffee.
- **Technologies for dairy farming:** In Lagoinha (SP), the work involves pasture recovery, the use of Embrapa's herd management app, Roda da Reprodução, and the implementation of demonstration units in partnership with the Balde Cheio Program. In Ingaí (MG), the focus is on diagnosing and improving management practices, management, and use of technologies for milk efficiency and quality.
- **Sugarcane technologies:** In Alto Alegre (SP), the IAC developed the Aduba-Cana Semear Digital mobile app for fertilizer and liming recommendations, which consists of applying limestone to correct soil pH, among other functions. The technology aims to help producers, technicians, and researchers make nutritional management decisions based on soil analysis and productivity estimates.

2.1.6 Key learnings

The project structure is horizontal and collaborative, composed of a robust and multi-disciplinary team. Based on the demands identified in the DATs, the work is developed by researchers and technicians in the five areas in a cooperative manner, through the sharing of infrastructure, experimental fields, laboratories, and living labs of the institutions. The validation of the technologies generated in the five areas through the implementation of pilot test environments in the DATs, strategically distributed in different regions of the country, has proven effective in facilitating the adoption of technologies by rural producers.

It is important to note that each DAT has local focal points that ensure coordination with farmers, city halls, cooperatives, and associations, strengthening the direct impact on rural communities. In addition, training actions aimed at bringing knowledge and technology to small and medium-sized rural producers, in partnership with cooperatives, associations, city halls, among other institutions, are also fundamental to promoting digital literacy.

Semear Digital is a network open to collaboration, becoming part of the agricultural innovation ecosystem. Partnerships with research institutions, companies, governments, and social organizations expand the impact and scale of actions and strengthen the local ecosystem.

To learn more about the initiative, visit the website at:

<https://www.semear-digital.cnptia.embrapa.br/>.

2.2 Bioaromas Project: Native natural assets for the cosmetics, aromas, and fragrances industry

- Ana Valéria Vieira de Souza, Daniela Ferraz Bacconi Campeche

2.2.1 What is the Bioaromas Project

The *Bioaromas Project: Natural active ingredients native to the Cerrado and Caatinga biomes of northeastern Brazil for the development of products for the cosmetics, aromas, and fragrances industry* was created to identify aromatic species native to these biomes with potential applicability in the cosmetics, aromas, and fragrances market. This initiative aims to develop the production chain for essential oils from plants native to these biomes, which are still little known and commercialized, but which show promise for the development of products in this sector.



2.2.2 Institutions involved

This line of research with aromatic species native to the Caatinga has been developed by Embrapa Semiárido for over a decade and currently has a partnership with the productive sector in the form of the startup Bio Assets Brasil. The company has an open innovation project with Embrapa Semiárido to jointly develop technological solutions aimed at promoting the bio economy in the Caatinga. Bio Assets participates with technical expertise in the commercialization of essential oils for the cosmetics, aromas, and fragrances industry, in which it works directly with key players who can bring the essences of the Caatinga to perfume shelves. Thus, Embrapa Semiárido and Bio Assets aim to develop a value chain for species selected by the perfume industry.

2.2.3 What motivated the work and what are its objectives

The motivations for carrying out the project were: (i) to enhance the value of the Caatinga Biome, which has always been neglected; (ii) to expand knowledge about native Caatinga species with medicinal and cosmetic potential; (iii) to seize the opportunity to establish a production chain for essential oils from native Caatinga species, thereby contributing to the generation of employment and income for local communities and family farmers in the semi-arid region; (iv) and to contribute to the development of the bio economy in the Caatinga.

The project has the following objectives:

- Identify and select aromatic species native to the Caatinga, aiming at applicability in the cosmetics, aromas, and fragrances market;
- Establish a sustainable production process for these species to obtain raw materials on a commercial scale;
- Establish the production chain for essential oils from species native to the Caatinga, in order to contribute to the development of the bio economy in this biome.

2.2.4 Strategy undertaken to conduct the initiative

The first action of the initiative was bioprospecting in the Caatinga biome, carried out by Embrapa Semiárido. At this stage, essential oils were extracted from the collected species, with an assessment of yield and analysis of chemical composition. After collecting several plants, criteria were established for selecting the most promising species for commercialization, such as essential oil yield and the possibility of establishing cultivation and production systems. At this early stage, the option of extractivism was not considered, taking into account the conditions of the biome, such as leaf loss during the dry season and the vulnerability of certain species.

The initial participation of the partner company Bio Assets occurred in the next phase, with the sharing of its technical expertise and the involvement of its network of collaborators, enabling olfactory evaluations by several perfumers of the material prospected by Embrapa. The company and perfumers then issued their opinion on the most promising species with commercial potential for the cosmetics and fragrance market. To conduct this analysis, market prospecting studies and studies of potential stakeholders were carried out to accelerate the development of products for this sector. This phase has already been completed with the selection and indication of species of interest by the company and the perfume industry.

With this information in hand, Embrapa Semiárido began the agronomic research phase focused on propagation and cultivation for commercial-scale production of raw materials. After the development of this technology, the next step will be to establish the production and commercialization of the material by family farmers and local communities in the Semi-Arid region. This stage should be made possible by Embrapa and Bio Assets, thus establishing the production chain of essential oils from native species of the Caatinga.

2.2.5 Main results for Embrapa and other institutions involved, as well as for the region and the production chain

The main results of Research, Development, and Innovation obtained with the Bioaromas project involve the discovery and selection of extremely valuable endemic plant species by renowned perfumers, which have not yet been studied and are highly promising for the cosmetics, aromas, and fragrances industry, which is in search of new and different raw materials.

The Caatinga has specific characteristics that result in the occurrence of plants that produce unique compounds not found anywhere else on the planet. Thus, the project allows for the generation of knowledge about the Caatinga biome, which has true riches that have not yet been studied and have great economic potential.

The knowledge gained from the development of this project will contribute to the establishment of a value chain for essential oils from plant species native to the Caatinga, which could support the development of the bio economy in the biome and also contribute to the generation of local jobs and income.

In turn, the development of the bio economy in the Caatinga will also contribute to the socioeconomic development of the semi-arid region. The expansion of knowledge about the biome and its potential has the potential to lead to its appreciation at the national and perhaps international level.

2.2.6 Key learnings

The implementation of the Bioaromas project, as well as the results obtained, highlights the importance of Embrapa's partnerships with the productive sector for the realization of initiatives of this nature. This case is an example of the potential value of bringing together different companies for the co-development of technologies, considering Embrapa's mission to enable research, development, and innovation solutions for the sustainability of Brazilian agriculture.

With regard to the implementation of the project's actions, it is important to monitor them closely, considering the magnitude and numerous challenges that arise during the process. Similarly, teamwork and building good relationships with partners are essential.

Partnerships with the private sector to strengthen the bio economy in the Northeast region are fundamental for carrying out open innovation projects, with a focus on obtaining new products with the potential for faster adoption by the target audience. Projects of this type promote the appreciation of the local biome, generating positive social and economic impact, with environmental sustainability.

To learn more about the project, visit the link on the Embrapa Portal, available at: [Native natural assets from the Cerrado and Caatinga biomes for the development of products for the cosmetics, aromas, and fragrances industry - Embrapa Portal.](#)

2.3 InovaBio 2nd edition

- *Carolina Rodrigues Pereira, Maria Isabela Lourenco Barbirato, Martha Delphino Bambini, Shalon Silva de Souza Figueiredo*

2.3.1 What is InovaBio

InovaBio is an open innovation call for proposals, whose objective is the development of technological solutions aimed at the production of biomass, biofuels, bioproducts, and bio-inputs. The first edition took place in 2021, when the call selected 34 proposals from 24 companies for the co-development of technological solutions. The second edition was launched in 2025 as a Public Call to invite startups, companies, and private institutions to submit project proposals aimed at open innovation.

2.3.2 Institutions involved

Embrapa Agroenergia is responsible for the call for proposals. Accredited as an Embrapii Unit () in the areas of Biochemistry and Chemistry of Renewables, it is able to co-finance RD&I projects for open innovation with partner companies that have a CNAE code for industrial activity.

The financing is non-reimbursable and covers one-third of the project's value. Embrapa Agroenergia itself contributes another third of the value in economic compensation, providing state-of-the-art infrastructure and a multidisciplinary and specialized technical staff, and the partner company assumes only the final third of the total value.

2.3.3 Motivations and objectives

The main motivation of InovaBio is to foster agroindustrial innovation in Brazil by establishing technical partnerships with agents in the productive sector. The risks of scientific research are shared, and the contribution of resources accelerates the development and supply of innovative renewable-based solutions to the market, based on the co-creation or co-development of technological solutions with Embrapa Agroenergia.

The selection process considered the following criteria: potential reach, relevance, adherence to topics of interest, impact of the suggested innovation, as well as the opportunity and convenience of the proposals.

2.3.4 Strategy undertaken to conduct the initiative

In line with the Regulatory Framework for Science, Technology, and Innovation (Law 13,243/2016), a public selection process was promoted through the publication of an open innovation call for proposals focused on biomass, biofuels, bioproducts, and bio-inputs. The notice can be found at: <https://www.embrapa.br/agroenergia/inovabio>.

Interested parties had two months to submit their proposals. The first of the three selection stages took place concurrently with the registration period, and the final result was announced just one month after the call closed.

2.3.5 Main results for Embrapa and other institutions involved, as well as for the region and the production chain

Unlike the first edition, which accepted proposals on all topics related to biomass, biofuels, bioproducts, and bio-inputs, the second edition of InovaBio highlighted 10 lines of research in which Embrapa Agroenergia has extensive scientific expertise.

In 2025, the call for proposals received 28 proposals, half of which were submitted by deeptechs and 40% by medium and large companies. In addition, InovaBio was the gateway for 24 companies to initiate relationships with Embrapa. As a result, six proposals were approved, and nine others were able to continue negotiating partnerships for innovation outside the call for proposals.

2.3.6 Key learnings

The second edition of InovaBio proved the efficiency of the public call for proposals format as a facilitator of connections with the market, including established companies and new entrants (deeptechs). It also confirmed the scope and reach of Embrapa's communication, as well as the company's reputation as an agent of innovation.

Nine of the ten lines of research received proposals, with four of them receiving the most interest. Thus, it became clear that Embrapa Agroenergia's research is, in fact, connected to the demands of the productive sector, with infrastructure, technical capacity of the team, and accumulated knowledge being relevant competitive advantages for achieving results.

To learn more, visit the website at: <https://www.embrapa.br/agroenergia/inovabio>.

2.4 Integration into innovation ecosystems at the institutional and operational levels: the UMIPI/Inova Program case

• *Jean Carlos Porto Vilas Boas Souza*



Integration with innovation ecosystems is one of the main challenges faced by science and technology institutions (ICTs) that play a role similar to that of Embrapa. As ecosystems are fluid and composed of multiple interests, there is no one-size-fits-all solution. In addition, effective integration with ecosystems depends on action at two levels. The first level is institutional, which guarantees the ICT access to the innovation ecosystem. The second is operational, which is essential for the intentions of integration between ICTs and ecosystems to be transformed into concrete actions.

A recent experience by Embrapa Swine and Poultry (Embrapa Suínos e Aves) with the Mixed Research and Innovation Unit (UMIPI) of Western Paraná serves as an interesting example of the two levels of integration that an ICT needs to go through when it intends to integrate into an innovation ecosystem. UMIPI Oeste Paranaense was created in 2023 through an agreement between Embrapa, Biopark, and Biopark Educação, based in Toledo (PR). Based on the demands of the innovation ecosystem in western Paraná, the mixed research and innovation unit focused on solutions for pigs, poultry, and fish, with Embrapa Swine and Poultry and Embrapa Fisheries and Aquaculture as the operational managers of the agreement.

The combination of efforts that gave structure and strategy to UMIPI constituted the institutional level of integration between Embrapa and the innovation ecosystem of western Paraná. The first experience of integration at the operational level took place through the 2023/2024 edition of Embrapa Swine and Poultry's Inova Program. Inova was the initial instrument that transformed the intentions of integration into opportunities for innovation described in a public notice. The same notice ordered the availability of financial resources from Biopark Educação and Biopark to finance proposals for innovation projects for Inova from proponents (startups or small, medium, and large established companies) within the ecosystem of western Paraná.

At the end of the application process, seven proposals (from five applicants) linked to the innovation ecosystem of western Paraná were submitted to Inova 2023/2024. All were approved for the stage in which innovation projects were developed in partnership between the team of researchers and analysts from Embrapa Suínos and the technical staff of the applicants. At the end of the development process, only one proposal reached a sufficient level of maturity to receive funding from Biopark and Biopark Educação and begin the development of a project lasting up to three years. The successful bidder was Kindra Indústria, from Toledo (PR), a company that has been on the list of startups supported by Biopark for several years.

Since the beginning of 2025, Embrapa Swine and Poultry and Kindra have been working in partnership to develop equipment that enables the automated pre-classification of pork carcasses in slaughterhouses. The innovation arrangement also includes Biopark Educação and Biopark, which are responsible for the administrative and financial management of the technical cooperation agreement signed between the three parties. The proposed innovation is expected to be a commercial product by early 2027, with the potential to bring about major changes in pork slaughter lines, especially with regard to the popularization of a technological solution currently offered only by companies outside Brazil.

2.4.1 Key learnings

The UMIPI/Inova Program case provides lessons mainly on the conditions under which the operational level of ICT integration in innovation ecosystems should be structured. There are two most significant lessons.

The first concerns the importance of establishing a governance instrument linked to the operational level of integration, a role fulfilled by the public notice of the Inova Program, which provided legal certainty, clarity of purpose, innovation demands connected with the pork and poultry chains, and rules for financing innovation projects. The call for proposals was the indispensable interface through which the intentions for integration between Embrapa and the innovation ecosystem of western Paraná were transformed into innovation actions.

The second lesson relates to the fact that it is essential for ICTs and actors in innovation ecosystems to form an effective alliance of complementarities at the operational level of integration. In the case of UMIPI/Inova Program, Embrapa Swine and Poultry exercised technical and scientific leadership, Biopark and Biopark Educação provided financial and governance leadership, and Kindra led the development of the equipment and its introduction to the market. Even though it seems evident that science and technology institutions and private entities involved in innovation arrangements seek to act in a complementary manner, it is not always easy to find a comfortable role for each actor when operating the integration between ICTs and innovation ecosystems.

2.4.2 Main difficulties

Despite the success of the UMIPI/Inova Program case, the operationalization of the integration of Embrapa Swine and Poultry into the innovation ecosystem of western Paraná did not proceed without difficulties. First, it was necessary to overcome organizational culture barriers so that Embrapa, Biopark, Biopark Educação, and Kindra could work synergistically in building automated pre-classification equipment for pork carcasses in slaughterhouses.

These differences, both in worldview and organizational structure, created obstacles at times to the execution of the activities provided for in the technical cooperation agreement.

Another challenge was in managing the financial resources linked to the development of the innovation project. Biopark and Biopark Educação, financiers of the innovation action linked to the Inova Program, follow procedures that did not allow Embrapa Swine and Poultry to incorporate part of the resources into a research support foundation. Thus, the execution of the Unit's effort in the innovation action, from the point of view of raising financial resources, was hampered. However, this issue did not significantly affect the joint work; it only serves as a reminder that ICTs need to be aware that they may have to relax some of their bureaucratic procedures when integrating into innovation ecosystems.

2.5 Final considerations

Embrapa strategically positions itself as a preferred and strategic partner for the development, validation, and availability of new technologies and innovative solutions for the agri-food segment, establishing various actions focused on open innovation, such as the experiences presented in this chapter.

An important guideline for these actions is to expand the reach and adoption of technological solutions developed by Embrapa for agricultural sustainability through partnerships with the private sector, including startups, companies of various sizes, agribusinesses, and processors.

Other relationship fronts are also essential, focusing on partnerships with associations and cooperatives of family and non-family farmers and technical assistance and public and private rural extension. With regard to generating value for the various production chains and territories, the importance of relationships with national and local government agencies, as well as regional and sectoral representations, stands out.

In this sense, in accordance with its mission, Embrapa has been interacting in a complementary and synergistic manner with the Brazilian agricultural innovation ecosystem in order to build a promising future for the agricultural sector in an inclusive and aggregating manner.

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3. Government actions to strengthen agricultural innovation ecosystems

• *Aurélio Martins Favarin*

The current debate on economic development and innovation has emphasized the importance of the state as an active agent in structural transformation. Based on the contributions of Mariana Mazzucato (2013), it has been possible to develop the view that the government is not limited to correcting market failures, but can act as a strategic investor, taking on high risks and directing technological efforts in the early stages of great uncertainty.

This understanding is in line with authors linked to the National Innovation Systems approach, such as Christopher Freeman (1987) and Bengt-Åke Lundvall (1992), who argue that innovative capacity depends on the interaction between scientific institutions, productive structure, and public policies. Technological performance, in this form, is not only the result of isolated business decisions, but of coordinated institutional arrangements.

Under the Triple Helix theory, formulated by Henry Etzkowitz and Loet Leydesdorff (1995; 2000), the government is one of the essential vertices of the innovation dynamic. Alongside universities and companies, the state contributes both with funding and with the creation of regulatory frameworks and institutional instruments that favor the circulation of knowledge and the formation of new ventures.

The territorial dimension of innovation also highlights the relevance of public action. Philip Cooke (1992; 2001) emphasizes that successful regional ecosystems emerge when local policies strengthen collaborative networks, technological infrastructure, and mechanisms to support entrepreneurship. In this context, the state acts as a coordinator of regional assets and a reducer of systemic uncertainties.

In Brazil, institutions such as the Financing Agency for Studies and Projects, created in 1967, and the National Bank for Economic and Social Development (BNDES), founded in 1952, illustrate the materialization of the entrepreneurial state in supporting innovation. Through targeted credit, economic subsidies, and participation in investment funds, these organizations have contributed with consolidating strategic sectors and strengthening the national innovation ecosystem.

This chapter presents two examples of entrepreneurial state actions, as they foster the development of agricultural innovation ecosystems. The first, carried out by the Ministry of Agriculture and Livestock (MAPA), has a federal perspective, and the second, developed by the Espírito Santo Department of Agriculture, presents the steps being taken to enable the evolution of the ecosystem's maturity on a state scale.

3.1 National Program for Open Innovation in Agriculture, MAPA Conecta

- *César Simas Teles*

MAPA Conecta is the new structural program of the Ministry of Agriculture and Livestock (MAPA) for promoting and strengthening agricultural innovation in Brazil. It stems from the recognition that, more than 50 years ago, the country decided to build an innovative agriculture based on science and research, moving away from simply adapting technologies from Europe and the United States to develop solutions tailored to its tropical conditions. With this research and innovation effort, marked by the creation of Embrapa, Brazil has become a world leader in the production of food, fibers, and biofuels.

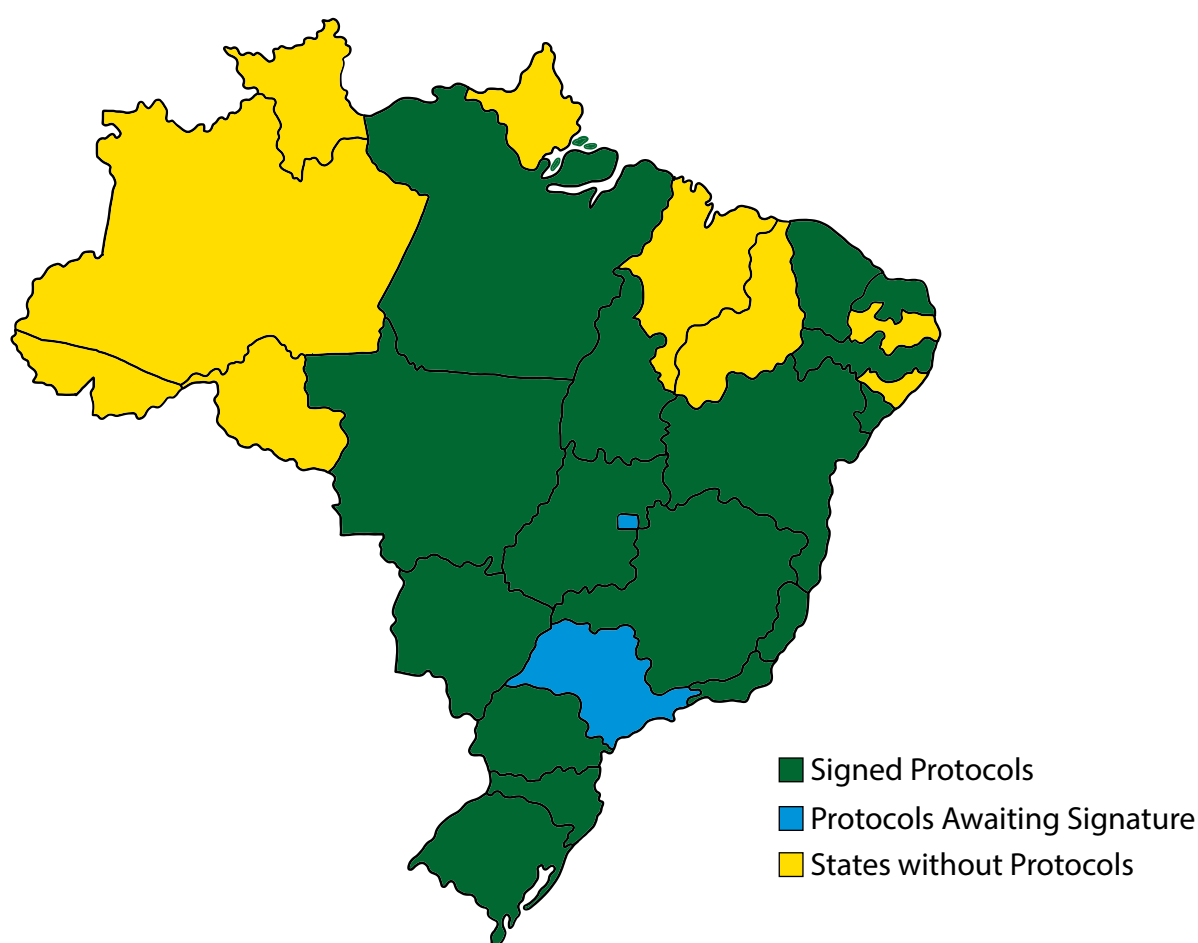
The program, launched through MAPA Ordinance No. 839/2025, is based on one observation: despite the strength of Brazilian agriculture and of our quality innovation environments, research institutions, and universities, the country still does not exploit its full potential in terms of innovation as a strategic asset, both in the domestic market and in its international projection. MAPA Conecta seeks to transform this potential into structured public policy, bringing together stakeholders, reducing regional disparities, and raising the profile of Brazilian technological solutions.

The MAPA Secretariat for Rural Development (SDR), through the Department of Agricultural Innovation (DIAGRO), has structured the program around two lines of action, detailed below: strengthening the state governance of agricultural innovation and developing the agricultural innovation platform Mapa Conecta.

A. Strengthening state governance of agricultural innovation

The first axis of the MAPA Conecta Program is focused on a strategy developed in the territory: strengthening the governance of agricultural innovation in the states. The premise is simple and powerful: there is no robust innovation ecosystem without coordinated governance, with effective participation from the government, educational and research institutions, the private sector, rural producers, innovation environments, and Agtechs.

To this end, MAPA Conecta establishes a path of cooperation and partnership with the states, which begins with the signing of a Memorandum of Understanding between MAPA and the state government, already formalized in 16 Brazilian states. This protocol serves as a political-institutional milestone, through which the state and MAPA commit to structuring the governance of agricultural innovation in a joint and continuous manner, as well as serving as a unifying element for the other actors in the state agricultural innovation ecosystem.



Based on this legal instrument for cooperation, the program proposes three main milestones:

1. Establishment of the State Agricultural Innovation Management Committee

The committee should be broad and representative, involving: government agencies; research institutions and universities; innovation environments (hubs, parks, incubators); agtechs and innovative private companies; rural producer entities and sector federations; , and other actors committed to the innovation agenda. The more diverse and representative the composition, the greater the chance of synergies, complementarities, and concrete solutions for agtechs and producers.

2. Preparation of the State Diagnosis of Agricultural Innovation

Once the Management Committee has been established, it is responsible for devising a methodology to identify bottlenecks and challenges, innovation potential and assets, structures and institutions dedicated to agricultural innovation (such as innovation hubs, incubators), demands from producers and the main production chains in the state.

Each state seeks the best way to prepare the diagnosis. There are states in which the diagnosis is being prepared by production chain (fruit growing, livestock, forestry sector, etc.), while others have opted for a geographical division. Finally, there is a possibility of a division based on themes, such as teaching and research, infrastructure, financing, etc.

3. Development of the State Action Plan for Agricultural Innovation

The diagnosis is the starting point for the development of the State Action Plan for Agricultural Innovation. It guides the establishment of priorities, optimizes the use of resources, and guides public policies aimed at agricultural innovation.

The action plan defines: goals; priority structural projects; actions to strengthen agtechs; strategies to bring solutions to farmers and domestic and foreign markets; actions to attract and/or retain innovative companies; and incentive and financing policies for research.

Agricultural Innovation Consultants

To mobilize ecosystem actors and assist in the implementation of these three major milestones, MAPA has assigned agricultural innovation consultants in 16 states (BA, CE, ES, GO, MG, MS, MT, PA, PE, PR, RJ, RN, RS, SC, SP, TO) and also in the Federal District. These consultants play a central role in mobilizing and convincing state secretariats (Agriculture, Science and Technology, Development, etc.), as well as in coordinating state institutions and actors.

Since the allocation of these consultants and the engagement of the Federal Superintendences of Agriculture, there has been a jump in the number of protocols signed with states and in the number of partners engaged. Currently, the project includes dozens of research and teaching institutions, innovation environments, private entities, and government agencies that have formally joined the MAPA Conecta network, covering a significant portion of Brazil's agricultural GDP today.

B. Electronic Platform for Agricultural Innovation – MAPA Conecta

The second major component of the program is the Electronic Platform for Agricultural Innovation – MAPA Conecta, developed in partnership with Serpro. While component A operates in the field, organizing state governance, component B provides the digital infrastructure to connect these ecosystems and project Brazilian agricultural innovation solutions at the national and international levels.

The platform succeeds and expands on a previous initiative, AgroHub, which essentially functioned as an information repository on the MAPA portal. Recurring feedbacks mentioned lack of interaction, difficulty in updating, and low integration with ecosystem actors. Thus, MAPA Conecta emerged precisely to overcome these limitations, taking on a more active role in connecting, giving visibility to innovation environments, and generating business.

After internal workshops at MAPA and listening to different actors, such as ministry departments, external partners, innovation environments, agtechs, and investors, the program signed a Technical Cooperation Agreement with Serpro, which enabled the development of the new platform. The beta version was launched in October 2025 and, in just a few weeks,

already had more than a hundred registered profiles, including agtechs, investors, and a significant number of innovation environments.

The platform organizes profiles into three main blocks:

- I. Agtechs:** startups and innovative companies that develop technological solutions for agriculture and livestock, regardless of their segment;
- II. Investors:** funds, corporations, financial institutions, and other actors seeking investment opportunities in innovative companies in the agricultural sector;
- III. Innovation Environments:** hubs, technology parks, incubators, universities, research institutes, and other actors that structure the ecosystem were initially added to this profile.

The platform aims to be an international reference in agricultural innovation, according to certain premises:

- To be the starting point for those interested in agricultural innovation, whether they are Agtechs, investors, farmers, or research institutions;
- To serve as a showcase for Brazilian solutions, allowing technologies developed in one state to gain scale in other states and countries.

The first version of the platform, launched on October 9, 2025, included registration for agtechs, investors, and innovation environments, giving national visibility to registered profiles.

Platform updates will include: a mobile version; multilingual versions (at least in English and Spanish, with the possibility of adding other languages); certification mechanisms between profiles (for example, hubs certifying the agtechs that are part of their network); dissemination of public notices and calls, automatically connecting opportunities to relevant profiles already registered; digital tools and the use of closed artificial intelligence, helping to navigate product and establishment registration processes with MAPA; and a personalized workspace for users, with news, events, opportunities, and self-diagnostic tools for innovation maturity.

By integrating territorial governance, digital infrastructure, and a broad network of public and private partners, MAPA Conecta has established itself as a strategic tool for organizing, driving, and scaling agricultural innovation in Brazil. More than a program, it is a networking platform that brings together states, research institutions, innovation environments, agtechs, investors, and rural producers around a common agenda: transforming knowledge into concrete solutions for the field. The results of this innovation will translate into direct gains for the country, with greater sustainability, productivity, and competitiveness, job and income generation, strengthened food security, reduced regional inequalities, and a more prominent role for Brazil in the international agricultural innovation scene.

3.2 Structuring the Espírito Santo Agricultural Innovation Ecosystem

• *Guilhermo Recla, Enio Bergoli da Costa and Michel Tesch Simon*

The structuring of the Espírito Santo Agricultural Innovation Ecosystem results from an evolutionary process of institutional coordination, strategic vision building, and maturation of innovation agendas developed throughout 2025, under the coordination of the Espírito Santo State Secretariat of Agriculture, Supply, Aquaculture, and Fisheries (SEAG/ES). This process is directly aligned with the Strategic Plan for the Development of Agriculture in Espírito Santo – PEDEAG 4 (2023–2032), which adopts innovability as a structuring axis for strengthening the competitiveness, sustainability, and economic complexity of agriculture in Espírito Santo.

The initial discussions began with coordination between SEAG/ES and the Ministry of Agriculture and Livestock (MAPA), in the context of drafting a Memorandum of Understanding focused on innovation in the state's agricultural sector. Based on this demand, SEAG assumed the coordination of the process in the state, with the objective of integrating public and private institutions and structuring a government program capable of generating concrete results for the business environment of Espírito Santo's agricultural sector through technological, organizational, and institutional innovation.

The work schedules with the institutions that make up the Ecosystem began on February 16, 2025. From that date onwards, situational diagnoses were carried out with strategic actors in the agricultural, scientific, technological, and innovation systems, with the aim of understanding the stage of maturity of innovation in Espírito Santo's agriculture, identifying structural bottlenecks, mapping competencies, and recognizing opportunities for integrated action. This approach reinforces the central guidelines of PEDEAG 4, especially with regard to systemic coordination, institutional strengthening, and innovation as a vector for territorial development.

In March 2025, a Memorandum of Understanding was formally signed between MAPA and SEAG/ES, focusing on conducting a situational diagnosis of innovation in Espírito Santo's agriculture sector and developing a structured action plan aligned with national and state strategic guidelines.

Throughout this process, it was identified the need to broaden the scope of analysis through national *benchmarking* actions, highlighting the institutional approach with the Brazilian Agricultural Research Corporation (Embrapa), especially with the team responsible for Radar Agtech, the main national survey on startups and the agribusiness innovation environment. This interaction helped strengthen the Ecosystem's adherence to national trends and actions for agricultural innovation.

As a result, it became clear that the breadth and complexity of the agreed-upon deliverables went beyond the scope of a single project, requiring a medium-term government program. Thus, the Program for Structuring the Agribusiness Innovation Ecosystem in Espírito Santo was established, with a 36-month implementation horizon (2025–2028). The Program was unanimously approved by the Funcitec Steering Committee in June 2025, with an estimated budget of R\$ 6.5 million.

The Program is directly connected to PEDEAG 4 by integrating innovation, sustainability, competitiveness, and territorial development. The goals are:

- to carry out three mappings of the agricultural innovation ecosystem in the states of Espírito Santo and Rio Grande do Sul;
- to train 1,000 people in innovation;
- to accelerate at least fifteen agribusiness startups in Espírito Santo;
- to support the transformation of five agricultural inventions into businesses;
- to internalize innovation and implement rural property addressing;
- to promote four agricultural innovation events;
- to present a status report on the agribusiness innovation ecosystem in Espírito Santo.

The goal of internalizing innovation associated with rural property addressing stands out, an initiative aligned with the PEDEAG 4 axes related to modernization of public management, digital transformation of rural areas, productive inclusion, and strengthening of territorial competitiveness. Rural addressing is a structural basis for policies on innovation, logistics, traceability, connectivity, and access to public services.

In the field of governance, the process resulted in the establishment of the Management Committee for the Agro Capixaba Innovation Ecosystem (CGEIA-ES), through SEAG Ordinance No. 033-R, dated September 17, 2025, with the formal appointment of its members by SEAG Ordinance No. 074-S, dated September 26, 2025. The Committee gathers, in a systemic and collaborative manner, representatives from the Federal Government (MAPA/SFA-ES), the State Government (SEAG, SECTI, and FAPES), research, teaching, and extension institutions (Incapar, UFES, Ifes, FAESA, and UVV), the productive and business sectors (FAES, FINDES, Sebrae-ES, and Senar-ES), cooperatives (OCB-ES, Coaabriel, and Nater Coop), as well as representatives from the innovation environment and organized civil society.

The Program is currently in the process of consolidating its operational architecture, with the definition of strategic actors and the detailing of the actions necessary to carry out the established goals. This is a decisive step to ensure institutional alignment, strategic coherence, and efficiency in the application of public resources, consolidating the Espírito Santo Agricultural Innovation Ecosystem as a structuring and permanent instrument of public policy aimed at strengthening innovation, sustainability, competitiveness, and territorial development of Espírito Santo agriculture in the medium and long term.

3.3 Conclusions

The content and case studies presented in this chapter show that strengthening agricultural innovation ecosystems relies on strategic and coordinated actions by the state, which plays a structural role in organizing governance, setting priority agendas, and reducing the uncertainties inherent in innovation processes. Coordination between public institutions, the productive sector, innovation environments, and rural producers is the key for transforming scientific knowledge into solutions applied in the field.

The case of MAPA Conecta demonstrates how the combination of territorial governance and digital infrastructure can expand the scale and effectiveness of public innovation policies. By structuring state committees, preparing diagnoses and action plans, and simultaneously

developing a national platform for connecting agtechs, investors, and innovation environments, the program lays the foundations for an articulated and integrated network capable of giving international visibility to Brazilian solutions and reducing regional asymmetries.

At the state level, the experience of Espírito Santo reinforces the importance of alignment between strategic planning, institutional coordination, and budget forecasting. The creation of a multi-year program with clear goals and formalized governance demonstrates a mature understanding that innovation ecosystems are not consolidated through isolated actions, but through continuous policies, equipped with resources, monitoring mechanisms, and multisectoral participation.

Both initiatives show that contemporary agricultural innovation requires integration between technological, organizational, and territorial dimensions. Internalizing innovation, training people, stimulating startups, and performing digitization of production and administrative processes point to an agenda that articulates competitiveness, sustainability, and productive inclusion, expanding the economic and social impacts of the agricultural sector.

Therefore, strengthening agricultural innovation ecosystems in Brazil is strongly linked to the development of stable, results-oriented public policies. By integrating a national strategic vision with territorial implementation, the experiences presented point to a promising path for increasing productivity, reducing regional inequalities, and positioning the country as a global leader in agricultural innovation.

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PART II

Startups

1. Method for Mapping and Surveying Agricultural Startups (Agtechs)

• *Luiz Ojima Sakuda*

1.1 Introduction

Since 2022, Radar Agtech 2025 has adopted a data triangulation approach, operationalized through two complementary fronts: (i) mapping (ecosystem extension) and (ii) surveying (profile depth). This structure seeks to mitigate informational gaps typical of public data by cross-referencing them with perceptions stated by the entrepreneurs themselves.

This chapter describes the methodology used to obtain and analyze the data, with the following details:

- Regarding the Mapping: (1) collection process for the agtech mapping database; (2) taxonomy; (3) classification and validation of agtechs; and (4) main changes in data collection compared to 2024.
- Regarding the Survey: (1) collection process; (2) validation of responses; (3) profile of respondents; and (4) methodological evolution and changes in the survey collection instrument (2024–2025).

1.2 Methodological distinctions: census, mapping, and survey

A mapping of agtechs has different characteristics from other studies, such as censuses and surveys, which have complementary objectives.

A census seeks to understand a population based on data collected from the population itself. It uses instruments such as questionnaires and depends on the availability of research subjects to respond to them. As it does not work with sampling (it aims to cover the entire population), it requires a high budget and a long collection time, except in very small populations.

Mapping, on the other hand, works with publicly available information and therefore does not depend on the willingness of companies to respond, nor does it require authorization to use the information identified, as it is public. On the other hand, mapping tends not to include specific and detailed data that can only be provided directly by organizations.

The term survey refers to research that mainly uses quantitative instruments to describe a population in greater depth, without claiming to be a census. It is a common approach that complements mapping and censuses.

1.3 Mapping: process of collecting and building the database

This section describes the methodology for building the database of startups operating in the agricultural sector and agtech investments, as well as the inclusion/exclusion criteria and data fields included in each database.

1.3.1 Agtech database

The Radar Agtech 2024 agtech database was built from the updating and qualification of databases collected in previous studies, which involved the following activities:

1. Listing and status of activity or inactivity of agtechs present in Radar, based on public virtual identifiers:
 - active website;
 - social media with updates;
 - CNPJ status.
2. Use of IBGE population estimates as input (as described in the base text).
3. Update (after step 1) of descriptive data for each startup and its area of activity.
4. Expansion of the database (identification of new agtechs), through:
 - professional contacts and systematic monitoring of websites and news published by actors in the ecosystem (government agricultural research agencies, state and federal research institutes, sources of research/innovation/entrepreneurship funding, hubs, incubators, accelerators, and investors), carried out by Embrapa, SP Ventures, and Homo Ludens;
 - analysis and comparison with other agtech reports published in Brazil;
 - voluntary registration of startups on the Radar Agtech website (survey form);
 - dissemination by the organizers' press office to the media.
5. For newly identified agtechs, a new qualification stage will be carried out, verifying activity or inactivity with the same public identifiers: active website, social media with updates, and CNPJ status.
6. Consolidation of information, involving: merging data from different sources on the same company; exclusion of duplicate data; and exclusion of agtechs not validated based on digital identifiers.

At the end of the process, according to inclusion and exclusion criteria, 2,075 agtechs were validated.

1.3.2 Inclusion and exclusion criteria

As a mapping initiative, Radar Agtech relies on public and open information to conduct the study.

The main criterion for inclusion in the database is an active CNPJ (Corporate Taxpayer ID). Startups in the process of formalization that are not were not included, even if they were selected in support programs and have an active digital presence (website and/or social media).

Thus, the following were agtechs excluded:

- with a canceled or invalid CNPJ;
- that have different names but the same CNPJ;
- without a CNPJ identification number;
- foreign companies operating in Brazil without a local CNPJ.

In addition, startups whose market is not related to the agricultural sector chain were not included, even if they appear in other studies and directories. The agricultural sector is understood to encompass agri-food and non-agri-food chains, including fibers and textiles, bioenergy and biofuels, wood and cellulose, and bio-based chemicals/pharmaceuticals.

Diverging from the Legal Framework for Startups (Complementary Law No. 182/2021), which establishes a limit of 10 years, the study adopted a criterion of up to 25 years since founding, based on the nature of the agricultural sector, whose cycles of technological development, biological validation, and market adoption tend to be longer than in other sectors of the digital economy. However, the Legal Framework's revenue criterion (revenue below R\$ 16 million) was not considered in the study, as it was not possible to collect public revenue information for all the agtechs mapped.

Agtech companies acquired by larger companies were also excluded from the survey, regardless of whether or not they continued as autonomous companies within the acquiring group.

1.3.3 Taxonomy (segments and categories)

Since 2019, the analysis of agtech's insertion in the production chain has used the traditional agribusiness approach to analyze the production system from suppliers to the final consumer. This perspective considers segments upstream ("before") and downstream ("after") of the production activity. Within each segment, non-exclusive categories complement the classification.

Minor adjustments were made to the taxonomy used by Radar Agtech Brasil 2020/2021 in relation to the 2019 edition, as presented in that edition; therefore, it was not possible to compare the behavior of all categories between 2019 and 2020/2021 longitudinally.

As the 2025 edition maintained the taxonomy of the 2020/2021, 2022, 2023, and 2024 editions, it is possible to make comparisons both regionally and by segment (before/within/after) and by category of activity.

For this edition, there was demand for the inclusion of "deeptech" as a new category. Thus, in order to address the issue, a specific question on the use of Artificial Intelligence and Machine Learning (AI/ML) was included in the survey, generating insights on the topic.

The taxonomy will incorporate minor adjustments for the Radar Agtech Latin America and Caribbean (Agtech Radar LAC), which is being developed in partnership with IICA.

Table 1. *Description of the categories before the farm in Radar Agtech.*

Category	Description
Laboratory analysis	Startups that market and/or develop new methods for laboratory analysis of nutrient levels, soil composition, and plant and animal development.
Credit, barter, insurance, carbon credits, and fiduciary analysis	Startups that provide financial services such as credit, barter, securitization, and analysis and marketing of carbon credits for rural producers, as well as fiduciary analysis of rural properties.
Fertilizers, inoculants, and plant nutrition	Startups that market and/or develop new fertilizers, inoculants, and nutrients to improve plant development, growth, and immune systems. improve plant development, growth, and immune systems.
Genomics and Animal Reproduction	Startups working with applied genomics to increase the productivity, weight gain, and health of farm animals and to increase the efficiency of the insemination process, using genetic testing, genotyping, among other techniques.
Agribusiness Input Marketplace	Startups that develop and provide online platforms for the commercialization of production inputs, equipment, and services for agricultural production.
Animal Nutrition and Health	Startups that market and/or develop new foods, drugs, and care to improve the development, weight gain, and immune system of animals.
Seeds, Seedlings, and Plant Genomics	Startups that market and/or develop disruptive methods, processes, and technologies in the variety of seeds and seedlings, as well as in the methods of multiplication, germination, and distribution thereof. Also included in this category are startups that commercialize and/or develop plant genetic improvement, develop technology for the scalable production of biological substances, and define new uses for these biological substances.

Table 2. *Description of categories inside the farm in Radar Agtech.*

Category	Description
Beekeeping and Pollination	Startups that develop bee breeding technologies, such as special foods and data-based management , pollination services, platforms to facilitate connections between producers and beekeepers, as well as honey producers and sellers and honey-derived products.
Connectivity and Telecommunications	Startups that market and/or develop equipment and systems to bring and ensure connectivity within the farm.
Content, Education, Social Media	Startups that develop and provide online platforms for the dissemination of content, information, and best practices in agriculture, agronomy, and livestock farming, and provide consulting services with the aim of empower, technify, and bring rural producers closer together.

Continued ►

Category	Description
Biological Control and Integrated Pest Management	Startups that market and/or develop biochemical and biological variants (macroscopic or microscopic) aimed at pest control. and diseases, as well as startups that develop technologies for population control and optimization of input use, through agronomic intelligence, for effective and efficient pest and disease control.
Drones, Machinery, and Equipment	Startups that develop and provide aerial vehicles, machinery, and equipment for use on farms.
Shared Economy	Startups that provide equipment and machinery for rent and promote their sharing among rural producers.
Agricultural waste management	Startups that market and/or develop equipment, methods, and processes to improve waste management on farms.
Internet of Things for Agriculture: pest detection, soil, climate, and irrigation	Startups that develop and provide equipment and sensors capable of communicating with each other.
Meteorology, Irrigation, and Water Management	Startups that develop and provide equipment, methods, and processes to improve the predictability of rainfall indices, as well as bring better management and efficiency to the irrigation process, in addition to better efficiency in farm water management.
Integrated platform for systems, solutions, and data	Startups that offer integrated solutions for monitoring agronomic and management variables or traceability of the production chain.
Remote Sensing, Diagnosis, and Image Monitoring	Startups that develop and provide online platforms that help rural producers control, understand, and delimit their farms using images, radars, and algorithms to identify patterns.
Rural Property Management System	Startups that develop and provide online platforms to assist rural producers with management, organization, and decision-making.
Telemetry and Automation	Startups that market and/or develop equipment and algorithms for capturing, consolidating, and automating processes.

Table 3. *Description of categories after the farm in Radar Agtech.*

Category	Description
Innovative foods and new food trends	Startups that develop and provide foods with better nutritional values, use substitute ingredients and new uses for existing ingredients.
Storage, Infrastructure, and Logistics	Startups that develop and provide new processes, methods, and technologies for storing and transporting commodities and food.

Continued ►

Category	Description
Biodiversity and Sustainability	Startups that develop and provide new sustainable processes, methods, and technologies for the protection and/or responsible use of biodiversity.
Bioenergy and Renewable Energy	Startups that develop and provide new processes, methods, and technologies for the production of bioenergy and/or renewable energy.
Cloud kitchens and ghost kitchens	Startups that provide shared kitchens for the production of meals for delivery.
Food Industry and Processing 4.0	Startups that develop and provide new processes, methods, and technologies to increase efficiency in the use of inputs, energy, water, etc. in the food sector.
Marketplaces and platforms for trading and selling agricultural products	Startups that develop and provide online platforms for the commercialization of commodities and products produced by agribusiness on a large scale with a focus on internationalization.
Online grocery stores	Startups that develop and provide online platforms for the sale of unprocessed products and food, with the possibility of monthly subscriptions focused on the end consumer.
Urban planting: plant factories and new forms of planting	Startups that develop and provide new processes, methods, and technologies for crop production in urban or indoor areas.
Online restaurants and meal kits	Startups that develop and provide online platforms for the sale of products (meals, snacks, sweets) and prepared foods that are ready to eat or just need to be heated, with the possibility of monthly subscriptions, focused on the end consumer.
Food safety and traceability	Startups that develop and provide technologies that increase food quality and shelf life of food, as well as assist in the traceability of ingredients used in companies operating in the production chain.
Autonomous store management system and food services	Startups that develop and provide processes, methods, and technologies for store automation, as well as for retail management assistance.
Packaging, Environment, and Recycling Systems	Startups that develop and provide new processes, methods, and technologies for packaging in order to mitigate negative impacts on the environment and facilitate recycling.

1.4 Classification and validation of agtechs (mapping)

The survey questionnaire asked about the main category of agtech and its secondary categories. The main category indicated by the respondent was considered when it existed.

To ensure the reliability of the taxonomic classification, a peer validation protocol was adopted: when there was no self-classification by the startup, two researchers classified it independently; discrepancies were arbitrated by a third senior reviewer, ensuring consistency of the database.

1.5 Survey: collection, instrument, and validation

1.5.1 Dissemination and fieldwork

The survey was disseminated in the following ways: through a press release led by Embrapa's communications department; through Radar Agtech's social media and producers; by emails sent directly to agtechs; in innovation/entrepreneurship/agribusiness groups and communities; by individual communication and at events/meetings with team participation; and by organizations (especially innovation environments and federal and state public agencies) that passed on the dissemination to their communities.

The form was available in October and November 2025 on the QuestionPro platform, with a consent form for the processing of personal data.

1.5.2 Collection tool: structure in four blocks and main variables

The form's architecture was preserved in four blocks: I) Company Data; (II) Agtech categories and activities; (III) Relationship with the innovation ecosystem; and (IV) Final questions. The following section, describes the main variables collected in each block, according to the instrument.

Block I — Company Data

- Identification: name, trade name, CNPJ (Corporate Taxpayer ID), year of foundation.
- Digital presence: website, LinkedIn.
- Location: city and state of headquarters.
- Contacts: phone number, email, and respondent details (name/position/email/LinkedIn/cell phone).
- Preference for receiving communications from Radar.

Block II — Categories and activities

- Main category (complete Radar list) and secondary categories (optional).
- Use of AI/ML, with explicit option for "deep tech specializing in AI/ML" and other levels of use (core product, internal processes, generative AI, etc.).
- Chains/activities (list of animals and crops, with "others" field).
- Stage of development (pre-operational, MVP, scaling, established).
- Revenue ranges (base year 2024).
- Perceived performance over the last 3 years (declining/stable/growing).
- Number of employees.

Block III — Relationship with the innovation ecosystem

- Participation in ecosystems/environments/networks/programs (yes/no; which ones).
- Assessment, on a scale of 1 to 5, of the importance of ecosystem resources, organized into three dimensions:
 - infrastructure and spaces (e.g., experimental areas, *coworking*, laboratories, R&D, databases, software, etc.);

- specialized programs and services (e.g., prototyping, pilot projects, regulatory support, certifications, sales channels, corporate/government procurement, marketing and sales, investment, loans, funding, etc.);
- connections and *networking* (e.g., events, mentoring, online communities, connections with customers/suppliers/partners/research institutions).
- Private financing: list of sources (founders/family, private calls for proposals, accelerators, venture builders, loans, crowdfunding, angel investors, venture capital, etc.) and field for specification.
- Public financing: list of sources (public calls for proposals, incubators, non-reimbursable research funds, tax incentives, etc.) and field for specification.

Block IV — Final questions

- Module structured in three dimensions (items on a scale of agreement):
 1. Vulnerability (market risks, inequalities, environmental risks, cyber/technological risks, infrastructure);
 2. Readiness (financial capacity and access to instruments, technological preparedness, regulatory alignment, infrastructure/digital systems);
 3. Innovation capacity (technological development/adaptation, business models and collaboration, new processes and traceability, alignment with sustainability/SDGs/ESG and consumer trends).
- Open questions: business challenges; trends (short term – 6 months; medium to long term – 3 to 5 years); improvements in the ecosystem; comments/suggestions to the Radar team.

1.5.3 Validation of responses

Duplicate responses and responses from organizations that did not meet the mapping validation criteria were not considered.

1.6 Respondent profile and representativeness implications

The responses collected indicate diversity in terms of stage of development, number of employees, and areas of production; agtechs serve multiple agricultural and livestock chains, often combining different crops and production systems.

In terms of activity by segment, the most cited was Inside the Farm (60.6%), followed by Before the Farm (26.5%) and After the Farm (12.9%). This characteristic differs from the general profile of the agtechs mapped and the profile of respondents in 2024, 2023, and 2022, with a higher proportional participation of the segments Before the Farm in 2025.

Comparison with previous years (respondents):

- Inside the Farm (IN): 2024 (54.0%), 2023 (58.1%), 2022 (59.7%)
- Before the Farm (BF): 2024 (16.4%), 2023 (21.9%), 2022 (24.3%)
- After the Farm (AF): 2024 (29.6%), 2023 (19.0%), 2022 (15.9%)

Table 4. Agtech activity by segment (2025 survey vs. 2025 mapping)

Segment	Agtechs	% Survey	% Mapping
Before	45	26.5	18.2
Inside	103	60.6	41.5
After	22	12.9	40.5

In general, the survey tends to overrepresent categories associated with digital technologies applied directly to agricultural production, while the mapping shows a greater relative weight of categories linked to after the farm stages (food, processing, logistics, and new consumption models).

Table Legend:

- Lev = Startups in the Survey
- % Lev = Percentage in the Survey
- Map = Startups in the Mapping
- % Map = Percentage in the Mapping
- Lev/Map = Survey/Mapping Ratio (*relative proportion*)
- Dif. P.P. = Difference in percentage points ($\% Lev - \% Map$)
- Dif. % = Relative difference (%) ($\% Lev - \% Map$) / $\% Map$

Table 5. Agtech activity by category (2025 survey vs. 2025 mapping)

Segment and Category	Agtechs	Lev	% Lev	Map	% Map	Lev/Map	Dif. PP	Diff. %
BF Laboratory analysis.	5	5	2.9	47	2.3	10.6	0.6	28
BF Credit, barter, insurance, carbon credits, and fiduciary analysis.	11	11	6.5	103	5.0	10.7	1.5	31
BF Fertilizers, Inoculants, and Plant Nutrition.	15	15	8.8	82	4.0	18.3	4.8	123
BF Genomics and Animal Reproduction.	2	2	1.2	25	1.2	8.0	0.0	0
BF Marketplace for Agribusiness Inputs.	5	5	2.9	38	1.8%	13.2	1.1	58
BF Animal Nutrition and Health.	4	4	2.4	37	1.8	10.8	0.6	35
BF Seeds, Seedlings, and Plant Genomics.	3	3	1.8	46	2.2	6.5	-0.4%	-19
IN Beekeeping and Pollination.	1	1	0.6	13	0.6	7.7	0.0	-4

Continued ►

Segment and Category	Agtechs	Lev	% Lev	Map	% Map	Lev/Map	Dif. PP	Diff. %
IN Connectivity and Telecommunications.	4	4	2.4	14	0.7	28.6	1.7	256
IN Content, Education, Social Media.	5	5	2.9	78	3.8	6.4	-0.9	-23
IN Biological Control and Integrated Pest Management.	12	12	7.1	46	2.2	26.1	4.9	220
IN Drones, Machinery, and Equipment.	9	9	5.3	103	5.0	8.7	0.3	7
IN Shared economy.	2	2	1.2	14	0.7	14.3	0.5	78
IN Agricultural waste management.	3	3	1.8	13	0.6	23.1	1.2	187
IN Internet of Things for Agriculture: pest detection, soil, climate, and irrigation.	6	6	3.5	6	2.9	10.0	0.6	21
IN Meteorology, Irrigation, and Water Management.	5	5	2.9	45	2.2	11.1	0.7	34
IN Integrated platform for systems, solutions, and data.	14	14	8.2	156	7.5	9.0	0.7	9
IN Remote Sensing, Diagnosis, and Image Monitoring.	16	16	9.4	100	4.8	16.0	4.6	95
IN Rural Property Management System.	17	17	10.0	165	8.0	10.3	2.0	26
IN Telemetry and Automation.	9	9	5.3	42	2.0	21.4	3.3	162
AF Innovative foods and new food trends.	4	4	2.4	312	15.0	1.3	-12.6%	-84
AF Storage, Infrastructure, and Logistics.	4	4	2.4	57	2.7	7.0	-0.3	-13
AF Biodiversity and Sustainability.	2	2	1.2	82	4.0	2.4	-2.8	-70
AF Bioenergy and Renewable Energy.	1	1	0.6	34	1.6	2.9	-1.0	-63
AF Cloud kitchens and ghost kitchens	0	0	0	4	0.2	0.0	-0.2	-100

Continued ►

Segment and Category	Agtechs	Lev	% Lev	Map	% Map	Lev/ Map	Dif. PP	Diff. %
AF Food industry and processing 4.0	0	0	0	34	1.6	0.0	-1.6	-100
AF Marketplaces and platforms for trading and selling agricultural products.	3	3	1.8	102	4.9	2.9	-3.1%	-63
AF Online grocery store	0	0	0	62	3.0	0.0	-3.0	-100
AF Urban planting: plant factory and new forms of planting.	1	1	0.6	15	0.7	6.7	-0.1%	-17
AF Online Restaurants and Meal Kits	0	0	0	42	2.0	0.0	-2.0	-100
AF Food safety and traceability.	4	4	2.4	30	1.4	13.3	1.0	66
AF Autonomous store management system and food services	0	0	0	47	2.3	0.0	-2.3%	-100
AF Packaging Systems, Environment, and Recycling.	3	3	1.8	27	1.3	11.1	0.5	38
		170		2075		8.2		

1.7 Categories with the highest relative participation in the survey and explanatory hypotheses

The following are the categories with proportionally greater participation in the survey than in the mapping.

Inside the farm, especially:

- Rural Property Management System (10.0% vs. 8%);
- Remote Sensing, Diagnosis, and Image Monitoring (9.4% vs. 5%);
- Telemetry and Automation (5.3% vs. 2%);
- Biological Control and Integrated Pest Management (7.1% vs. 2%);
- Connectivity and Telecommunications (2.4% vs. 1%).

Before the Farm, with emphasis on:

- Fertilizers, Inoculants, and Plant Nutrition (8.8% vs. 4%);
- Credit, barter, insurance, carbon credits, and fiduciary analysis (6.5% vs. 5%).

Several hypotheses explain these figures:

- Categories that are more intensive in digital technology tend to be more familiar with online tools, increasing the likelihood of response;
- Solutions closer to the “technological core” and primary production have historically been more engaged with innovation networks and programs;
- Startups in earlier stages or in expansion tend to perceive greater value in participating to increase visibility.

On the other hand, the mapping shows substantially higher participation from categories in the “After the Farm” segment, notably innovative foods, marketplaces, biodiversity/sustainability, and bioenergy, in addition to categories with no responses in the survey (Industry 4.0, online grocery, online restaurants, cloud cooking, autonomous store systems). The results can be explained by a few factors: some of these companies identify themselves less as “agtech” and more as foodtech/cleantech/retailtech, reducing their propensity to respond; more mature or end-consumer-oriented companies may be less engaged in institutional research; and absence may reflect operational priorities and a lower perception of direct return.

1.8 Integrated interpretation: mapping vs. survey

The interpretation of the results must consider the inherent distinctions between the two fronts. While mapping offers a “structural census” based on public secondary data, the survey is subject to self-selection bias. There is greater engagement in the “Inside” and “Before” categories and a lower response rate in “After,” possibly due to competing sector identities (foodtech/retailtech) distanced from the core “agro” sector. Thus, the survey should be read as an in-depth portrait of the highly connected ecosystem, while mapping ensures a systemic view and representativeness of the chain.

1.9 Methodological evolution and changes to the instrument (2024–2025)

The fundamental architecture of the form has been preserved in four thematic blocks. However, to balance the maintenance of historical series and the expansion of the investigative scope, the 2025 edition introduced the logic of rotating modules: themes outside the exhaustive focus maintain anchor questions (longitudinal comparability), making room for seasonal modules and questions about the current situation.

Main updates compared to 2024:

- Blocks I and II (Profile and Performance): inclusion of variables on AI/ML integration and new indicators on development stage and organizational performance; synthesis of the “Talent and Diversity” module, focusing on human capital (number of employees).
- Block III (Innovation Ecosystem): replacement of “use and intention to use” with a scale of perceived importance, focusing on infrastructure, specialized services, and networking density.

- Block IV (Final Questions): implementation of a module focused on the diagnosis of vulnerability, technological readiness, and innovative capacity.

1.10 Final considerations

The methodology of Radar Agtech 2025 reflects refinement and adaptation to the complexity of the Brazilian agricultural innovation ecosystem. By combining mapping based on public data with a survey of companies, a database of 2,075 validated agtechs and a survey with 170 responses has been consolidated. This triangulation seeks to ensure a systemic view throughout the entire chain (“before,” “inside,” and “after” the farm), while simultaneously allowing for the capture of emerging trends such as AI/ML integration and challenges associated with technological readiness and innovative capacity.

2. Mapping and Profile of Agtech Startups in Brazil in 2025

- *Luiz Ojima Sakuda, Aurélio Vinicius Borsato, Elias E. Bernardo da Silva, Ana Rita Scozzafave, Cauê Silva Camargo, Bento Alves da Costa Filho.*

This chapter presents an integrated analysis of the Brazilian agtech ecosystem based on the triangulation methodology adopted by Radar Agtech 2025, which combines two complementary approaches: structural mapping of the startup universe and a sample survey of companies. The mapping, based on validated public data and objective inclusion and exclusion criteria, provides a comprehensive view of the extent of the ecosystem throughout the production chain—before, inside, and after the farm. The survey, in turn, delves into dimensions not captured by registration data, allowing for the examination of organizational, strategic, and technological aspects based on the entrepreneurs' own statements. The methodological details are presented in a separate chapter; in this chapter, we focus on the analytical interpretation of the results.

The sample of 170 agtech respondents allows for a more granular analysis of topics such as stage of development, business model, sources of financing, insertion in innovation environments, adoption of digital technologies—including artificial intelligence and automation—and perceptions of structural challenges and emerging trends. By articulating objective indicators with strategic assessments by founders, this chapter seeks to identify patterns of business maturity, regional asymmetries, bottlenecks of scale, and vectors of technological transformation in Brazilian agriculture.

The incorporation of specific modules on vulnerability, technological readiness, and innovative capacity broadens the analytical scope, situating agtechs as actors within a complex system characterized by climate risks, infrastructure constraints, regulatory requirements, sustainability pressures, and increasing technological sophistication. A joint reading of the mapping and survey allows us to distinguish structural trends in the ecosystem, captured in the complete database, from deeper organizational dynamics observed among companies with a higher degree of institutional engagement.

Throughout the following sections, whenever possible, the results are presented in comparison with previous editions of Radar, preserving the longitudinal consistency of the taxonomy and indicators. The central objective is to describe the profile of agtechs, as well as to offer consistent analytical support to public policy makers, investors, innovation environments, research institutions, and entrepreneurs, contributing to the strengthening of a more integrated, resilient, and economically, socially, and environmentally impact-oriented innovation system in agriculture.

2.1 Overview of Agtechs Mapped in 2025

The mapping carried out by Radar Agtech 2025 identified a broad and diverse set of startups operating throughout the Brazilian agri-food chain. The consolidated base reflects both the entry of new companies and the exit of initiatives that no longer meet the inclusion criteria adopted in this edition, highlighting the dynamic nature of the ecosystem.

The historical evolution since 2019 indicates consistent growth in the number of agtechs mapped, although at a different pace than that observed in the early years of the study. This behavior suggests a gradual process of ecosystem maturation, with greater selectivity, strengthening of business models, and an increase in the mortality rate of less structured initiatives.

In 2025, the distribution of agtechs in the three major segments of the chain is expected to remain unchanged:

- **Before the farm**, with solutions focused on inputs, financial services, genomics, nutrition, and laboratory analysis;
- **Inside the Farm**, focusing on digital, biological, and mechanical technologies applied to agricultural production;
- **After the farm**, covering logistics, processing, food, traceability, sustainability, and new marketing models.

This distribution restates the growing complexity of the Brazilian agtech ecosystem, which goes beyond primary production and increasingly integrates industrial, logistical, and consumption stages.

2.2 Geographical Analysis of Agtechs

2.2.1 Distribution by region

The regional distribution of agtechs in 2025 maintains the historical trajectory observed since the first edition of Radar Agtech Brasil, with a strong concentration in the Southeast and South regions. In absolute terms, the Southeast encompasses 1,146 startups (55.2%), while the South has 491 (23.7%), together accounting for almost 79% of the national total (2,075). These numbers reflect structural factors already identified in previous studies of the Radar, such as the higher density of universities, scientific and technological institutions, innovation environments, investors, and anchor corporations, as well as more robust consumer markets and more robust logistics and digital infrastructure. Even so, there has been a gradual decrease in the relative share of the Southeast over the historical series (from 65.7% in 2019 to 55.2% in 2025), indicating a consistent trend toward territorial redistribution of the ecosystem.

At the same time, there is a process of regional decentralization, with proportional growth in the North, Northeast, and Center-West regions (Table 1). In 2025, the North will account for 7.6% of agtechs (157 startups), surpassing the Northeast (6.5%) and approaching the Center-West (7.1%). Compared to 2019, when the North and Northeast together accounted for only 5.0% of the total, there has been a significant expansion in their share. This movement is associated with the internalization of public innovation policies, the coordinated action of decentralized units of Embrapa and other Science, Technology, and Innovation Institutions (ICTs), the strengthening of regional innovation environments, and the growing digitization of local production chains, especially in areas such as bioeconomics, precision agriculture, traceability, and solutions for climate adaptation. The pattern observed suggests an ecosystem that, although still concentrated, has greater territorial capillarity and geographic diversification compared to the first editions of the mapping.

Table 1. *Regional distribution of agtechs (2019–2025)*

Region	2019	2020/21	2022	2023	2024	2025 (n)	2025 (%)
Southeast	738	983	1.046	1.112	1.137	1.146	55,2%
South	261	397	436	508	499	491	23,7%
Center-West	70	94	106	114	121	147	7,1%
Northeast	39	72	89	103	116	134	6,5%
North	17	28	26	116	99	157	7,6%
Total	1.125	1.574	1.703	1.953	1.972	2.075	100%

An analysis of the regional concentration of agtechs based on the indicator of startups per 100,000 inhabitants reveals significant differences in the density of the agricultural innovation ecosystem. The South has the highest relative concentration, with 1.57 agtechs per 100,000 inhabitants, followed by the Southeast, with 1.29, both above the national average (0.97). Although the Southeast has the highest absolute number of startups (1,146), the relative indicator shows that the South has greater proportional specialization, suggesting strong links between the productive base, human capital, innovation environments, and institutional networks.

In contrast, the Center-West (0.85) and North (0.84) regions have densities close to and slightly below the national average, indicating a consistent presence but still with potential for expansion, especially in the Center-West, given the economic relevance of agriculture in the region. The Northeast, with 0.23 agtechs per 100,000 inhabitants, has the lowest relative density, signaling opportunities for strengthening the regional ecosystem. The data indicate that the distribution of agtechs does not automatically follow population size, but rather reflects the maturity of regional innovation systems and their ability to generate, attract, and scale ag-focused technology ventures.

Table 2. *Regional concentration of agtechs in Radar 2025*

Region	Agtechs	Population	Agtech/100,000
South	491	31.310.809	1,57
Southeast	1.146	88.825.643	1,29
Center-West	147	17.238.818	0,85
North	157	18.801.282	0,84
Northeast	134	57.244.485	0,23
<i>Brazil</i>	<i>2.075</i>	<i>213.421.037</i>	<i>0,97</i>

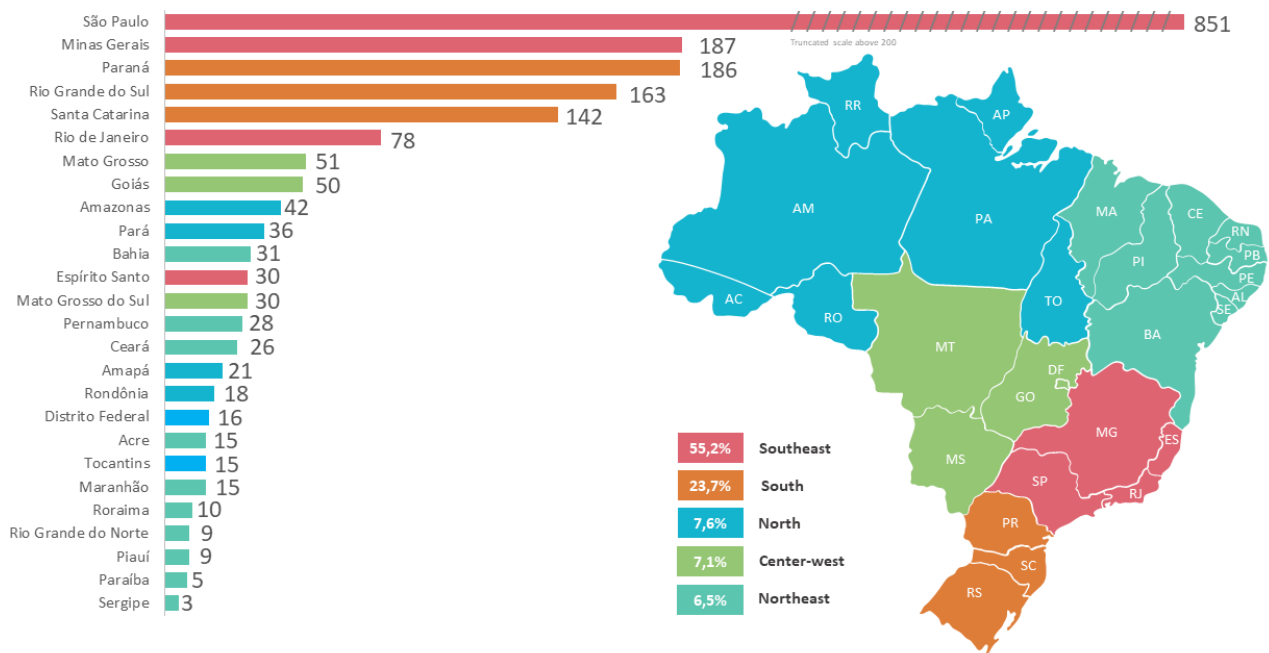
2.3 Distribution by Federal Units

When broken down by Federal Units, some states maintain their leading position in terms of absolute number of agtechs, notably São Paulo, followed by states in the South and

Southeast. These states are home to structured agri-food innovation hubs and have a higher density of startups per municipality.

At the same time, states that have traditionally been less represented in the mapping are now showing consistent growth, signaling the emergence of new hubs and the expansion of the territorial base of innovation in Brazilian agriculture.

DISTRIBUTION OF AGTECHS BY REGION AND FEDERATIVE UNIT



The segmentation of the Federal Units (FUs) by population range allows for a more accurate interpretation of the agtech density indicator (per 100,000 inhabitants). Among the states with less than 5 million inhabitants, Amapá (0.8 million; 2.6), Acre (0.9 million; 1.7), and Roraima (0.7 million; 1.4) stand out, all above the national average (1.0), in addition to Mato Grosso (3.9 million; 1.3). This group also includes Rondônia (1.8 million; 1.0), Mato Grosso do Sul (2.9 million; 1.0), Amazonas (4.3 million; 1.0), Tocantins (1.6 million; 0.9), the Federal District (3.0 million; 0.5), Sergipe (2.3 million; 0.2), Paraíba (4.2 million; 0.2), and Alagoas (3.2 million; 0.1). In several of these cases, the high relative density is associated with a small population base, but it may also reflect productive specializations and local innovation networks.

Among the FUs with a population of 5 to 10 million inhabitants are Santa Catarina (8.2 million; 1.7), Goiás (7.4 million; 0.7), Pará (8.7 million; 0.4), Pernambuco (9.6 million; 0.3), Ceará (9.3 million; 0.3), Piauí (3.4 million; 0.3), and Rio Grande do Norte (3.5 million; 0.3) — noting that the latter two are close to the lower population threshold. Among the states with more than 10 million inhabitants, São Paulo (46.1 million; 1.8), Paraná (11.9 million; 1.6), and Rio Grande do Sul (11.2 million; 1.5) stand out, all above the national average, while Minas Gerais (21.4 million; 0.9), Rio de Janeiro (17.2 million; 0.5), and Bahia (14.9 million; 0.2) have proportionally lower densities. The general pattern indicates that the relative concentration of agtechs does not linearly follow population size, but is more strongly associated with the maturity of regional innovation ecosystems and the integration between the productive base, technological infrastructure, and entrepreneurial capital.

2.3.1 Southeast — 1,146 agtechs (55.2%)

In the Southeast region, which hosts 1,146 agtechs in 2025 (55.2% of the national total), the state of São Paulo will maintain its historical leadership, with 851 startups (41.0% of the Brazilian total). Although it still accounts for the largest share of the national ecosystem, São Paulo has shown relative stability in absolute terms since 2023, accompanied by a slight proportional reduction over the historical series, which reinforces the trend of regional deconcentration. Minas Gerais has cemented its position as the second main hub in the Southeast, reaching 187 agtechs (9.0%), with consistent growth since 2019. Rio de Janeiro (78; 3.8%) and Espírito Santo (30; 1.4%) maintain a more modest but stable share, indicating the continued presence of technology-based initiatives, albeit on a smaller scale.

The trajectory of the Southeast between 2019 and 2025 shows two simultaneous movements: (i) absolute expansion in the number of startups, from 739 to 1,146 reflecting the maturing of the ecosystem; and (ii) a gradual reduction in its relative share of the national total, due to the more rapid growth of other regions. In addition, the region is home to larger and more developed startups, which also illustrates a more mature ecosystem. Institutional density and the presence of research universities, Embrapa units, technology parks, venture capital funds, and agribusiness corporations continue to sustain the centrality of the Southeast. However, the relative loss of share, especially in São Paulo, suggests greater territorial capillarization of agri-food innovation, with the progressive strengthening of hubs outside the traditional axis (Table 2).

Table 3. *Distribution of startups – Southeast Region*

Federal Unit (FU)	2019	2020/21	2022	2023	2024	2025 (n)	2025 (%)
São Paulo	590	757	800	845	857	851	41,00%
Minas Gerais	99	143	154	169	174	187	9,00%
Rio de Janeiro	41	63	69	71	78	78	3,80%
Espírito Santo	9	20	22	27	28	30	1,40%
TOTAL REGION	739	983	1.045	1.112	1.137	1.146	55,20%

2.3.2 South — 491 agtechs (23.7%)

The South region hosts 491 agtechs in 2025, corresponding to 23.7% of the national total, remaining the second main hub of the Brazilian ecosystem. Paraná leads regionally, with 186 startups (9.0% of the national total), showing consistent growth throughout the historical series, albeit with slight recent fluctuations. Rio Grande do Sul, which experienced strong expansion between 2022 and 2023, reaching 194 startups in that year, shows a decrease to 163 in 2025 (7.9%), suggesting a process of adjustment or reclassification of the base. Santa Catarina, in turn, maintains an upward trajectory, reaching the mark of 142 agtechs (6.8%), becoming the third largest state in the region.

The evolution of the South between 2019 and 2023 was marked by significant expansion (from 261 to 508 startups), followed by a slight decline and stabilization in 2024 and 2025 (Table

3). This behavior may reflect greater methodological rigor in the validation of startups, business strengthening dynamics, or migration of companies between categories and regions. Structurally, the region benefits from a strong cooperative tradition, the presence of universities and agricultural research institutions, robust innovation environments, and organized production chains, mainly in grains, animal protein, and agribusiness. Although it has seen a marginal reduction in relative participation over time, the South remains one of the main drivers of agricultural innovation in the country, with a solid institutional base and significant sectoral diversity.

Table 4. *Distribution of startups – South Region*

Federal Unit (FU)	2019	2020/21	2022	2023	2024	2025 (n)	2025 (%)
Paraná	102	151	176	182	176	186	9,00%
Rio Grande do Sul	89	124	133	194	189	163	7,90%
Santa Catarina	70	122	128	132	134	142	6,80%
TOTAL REGION	261	397	437	508	499	491	23,70%

2.3.3 North – 157 agtechs (7.6%)

In 2025, the North region reaches a total of 157 agtechs (7.6% of the national total), cementing the expansion that began more intensely in 2023 (Table 4). In 2019, the region had only 17 startups, showing significant absolute growth over the historical series. Amazonas leads regionally, with 42 agtechs (2.0%), followed by Pará (36; 1.7%) and Amapá (21; 1.0%) in the Amazon region. Rondônia (18; 0.9%), Acre (15; 0.7%), Tocantins (15; 0.7%), and Roraima (10; 0.5%) complete the regional picture, indicating the presence of initiatives in all states, albeit with different levels of density.

The jump observed between 2022 and 2023, when the regional total rose from 28 to 116 agtechs, represents a turning point in the territorial dynamics of the ecosystem, associated with the greater visibility of the Amazonian bioeconomy, the strengthening of regional innovation policies, the actions of ICTs and local innovation environments, and the growing mobilization around sustainability, traceability, and socio-biodiversity chain agendas. North is established as a region with a share close to that of the Center-West and higher than that of the Northeast in 2025, which signals a significant geographical reconfiguration of the Brazilian agricultural ecosystem, with greater capillarity and integration of territories historically less represented in national mapping.

Table 5. *Distribution of startups – North Region*

Federal Unit (FU)	2019	2020/21	2022	2023	2024	2025 (n)	2025 (%)
Amazonas	4	4	4	23	25	42	2,00%
Pará	6	15	15	29	31	36	1,70%

Continued ►

Federal Unit (FU)	2019	2020/21	2022	2023	2024	2025 (n)	2025 (%)
Amapá	0	1	1	15	15	21	1,00%
Rondônia	2	0	0	7	6	18	0,90%
Acre	0	0	0	16	14	15	0,70%
Tocantins	4	8	8	19	22	15	0,70%
Roraima	1	0	0	7	8	10	0,50%
TOTAL REGION	17	28	28	116	121	157	7,60%

2.3.4 Center-West — 147 agtechs (7.1%)

The Center-West region will have a total of 147 agtechs in 2025, corresponding to 7.1% of the national total, positioning itself as one of the emerging hubs of the agribusiness ecosystem (Table 5). Mato Grosso leads the region with 51 startups (2.5%), reflecting the state's centrality in the grain and animal protein chains and its growing articulation with technological solutions aimed at large-scale production. Goiás follows suit, with 50 agtechs (2.4%), maintaining a trajectory of continuous growth since 2019. Mato Grosso do Sul has 30 startups (1.4%), while the Federal District has 16 (0.8%), showing slight fluctuations over the historical series.

Between 2019 and 2025, the Center-West more than doubled its number of agtechs (from 70 to 147), indicating a progressive strengthening of innovation in a strategic region for Brazilian agribusiness. This expansion is linked to proximity to large producers and cooperatives, the activities of ICTs and decentralized Embrapa units, the emergence of regional hubs, and the advancement of the digitization of production chains. Recent growth, especially between 2024 and 2025, emphasizes the role of the Center-West as a territory for experimentation and large-scale technological adoption, in line with demands for productive efficiency, sustainability, and data-driven management.

Table 6. *Distribution of startups – Center-West Region*

Federal Unit (FU)	2019	2020/21	2022	2023	2024	2025 (n)	2025 (%)
Mato Grosso	18	30	36	39	37	51	2,50%
Goiás	22	30	32	35	35	50	2,40%
Mato Grosso do Sul	17	17	15	21	21	30	1,40%
Distrito Federal	13	17	21	19	23	16	0,80%
TOTAL REGION	70	94	104	114	116	147	7,10%

2.3.5 Northeast — 134 agtechs (6.5%)

The Northeast Region accounts for 134 agtechs in 2025, which corresponds to 6.5% of the national total, maintaining a relatively stable share in the Brazilian ecosystem over the last few years. The historical trajectory indicates consistent growth since 2019 (37 startups), with gradual expansion until 2023, a slight decline in 2024, and renewed acceleration in 2025. Bahia

remains the regional leader (31; 1.5%), followed by Pernambuco (28; 1.3%) and Ceará (26; 1.3%), states that concentrate most of the initiatives and have more structured innovation ecosystems. Maranhão (15; 0.7%) stands out for its recent growth, while Piauí, Rio Grande do Norte, Paraíba, Sergipe, and Alagoas still have a reduced presence, but are becoming more robust.

Although it represents a smaller share of the national total, the Northeast brings together strategic production chains—such as irrigated fruit growing, grains in the MATOPIBA region, livestock, and family farming—that offer ample space for digital solutions, especially in water management, climate adaptation, and technological inclusion of small and medium-sized producers. The regional challenge is to increase the density of the ecosystem, strengthen connections with innovation environments, and attract investments capable of accelerating the scale of local startups, defining the region as a relevant hub of innovation adapted to the agroclimatic specificities of the semi-arid region and emerging agricultural frontiers.

Table 7. *Distribution of startups – Northeast Region*

Federal Unit (FU)	2019	2020/ 21	2022	2023	2024	2025 (n)	2025 (%)
Bahia	12	25	34	33	28	31	1,50%
Pernambuco	8	11	17	20	23	28	1,30%
Ceará	7	13	17	20	17	26	1,30%
Maranhão	0	1	1	14	15	15	0,70%
Piauí	2	4	5	4	3	9	0,40%
Rio Grande do Norte	3	9	6	5	6	9	0,40%
Paraíba	4	7	7	5	5	8	0,40%
Sergipe	1	2	2	2	2	5	0,20%
Alagoas	0	0	0	0	0	3	0,10%
TOTAL REGION	37	72	89	103	99	134	6,50%

2.4 Distribution by municipality

The distribution of agtechs by municipality in 2025 reveals a high concentration in a small number of cities, while showing a wide territorial dispersion of the ecosystem in the country (Table 7). The municipality of São Paulo stands out significantly, concentrating 345 startups (16.6% of the national total). Next are Curitiba-PR (66; 3.2%), Ribeirão Preto-SP (62; 3.0%), Rio de Janeiro-RJ (57; 2.7%), and Piracicaba-SP (52; 2.5%), as well as Belo Horizonte-MG (48; 2.3%), Florianópolis-SC (48; 2.3%), and Porto Alegre-RS (47; 2.3%). Also among the main hubs are Campinas-SP (41; 2.0%), Manaus-AM (33; 1.6%), São José dos Campos-SP (30; 1.4%), Londrina-PR (28; 1.3%), São Carlos-SP (28; 1.3%), Goiânia-GO (27; 1.3%), Uberlândia-MG (25; 1.2%), and Campo Grande-MS (21; 1.0%). Most of these are capitals and medium-sized cities strongly associated with innovation ecosystems, universities, research centers, technology parks, and agricultural production hubs.

Despite the concentration in major urban centers, the mapping identifies agtechs distributed across 468 Brazilian municipalities, indicating that innovation in agriculture is present across a broad and heterogeneous territorial base. This pattern suggests the coexistence of strong urban hubs, which concentrate a greater density and diversity of startups, as well as access to capital and specialized services, with an extensive network of smaller municipalities, usually directly linked to rural production or local productive arrangements. The combination of concentration in structured hubs and territorial capillarity emphasizes the national character of the Brazilian agricultural innovation ecosystem, which expands beyond large centers and dialogues with different productive realities.

Table 8. *Distribution by Municipality*

Municipality-State	Agtechs	%
Brasil	2075	100%
São Paulo-SP	345	16,6%
Curitiba-PR	66	3,2%
Ribeirão Preto-SP	62	3,0%
Rio de Janeiro-RJ	57	2,7%
Piracicaba-SP	52	2,5%
Belo Horizonte-MG	48	2,3%
Florianópolis-SC	48	2,3%
Porto Alegre-RS	47	2,3%
Campinas-SP	41	2,0%
Manaus-AM	33	1,6%
São José dos Campos-SP	30	1,4%
Londrina-PR	28	1,3%
São Carlos-SP	28	1,3%
Goiânia-GO	27	1,3%
Uberlândia-MG	25	1,2%
Campo Grande-MS	21	1,0%

2.5 Concentration of Agtechs by Population Size of Municipalities

The analysis of the concentration of agtechs by municipality, using the indicator of startups per 100,000 inhabitants, allows us to assess the degree of relative specialization of the agricultural innovation ecosystem at different urban scales. By segmenting municipalities by population ranges (above 1 million inhabitants, between 500,000 and 1 million, between 200,000 and 500,000, and below 200,000 inhabitants), it is noted that entrepreneurial density

is not directly associated with demographic size, but rather with the articulation between the agricultural production base, scientific and technological infrastructure, and local innovation environments.

Data suggests that, although large cities concentrate a significant volume of agtechs in absolute terms, the highest relative densities are often observed in medium and small municipalities, especially those with a strong presence of universities, research centers, and structured agroindustrial chains. This pattern underlines a process of qualified internalization of the agtech ecosystem in Brazil, in which specialized hubs play a strategic role in the generation, validation, and dissemination of technological innovation in agriculture.

2.5.1 Concentration in municipalities with more than 1 million inhabitants

Considering only municipalities with more than 1 million inhabitants and a density above the national average (1.0 agtech per 100,000 inhabitants), nine municipalities are identified, hosting 641 agtechs in an aggregate population of 25,521,075 inhabitants, resulting in an average density of 2.51 agtechs per 100,000 inhabitants, more than double of the Brazilian average. This group includes Curitiba (Paraná; 3.6), Campinas (São Paulo; 3.5), Porto Alegre (Rio Grande do Sul; 3.4), São Paulo (São Paulo; 2.9), Belo Horizonte (Minas Gerais; 2.0), Goiânia (Goiás; 1.8), Manaus (AM; 1.4), Belém (PA; 1.2), and Recife (PE; 1.1), showing that some of the large urban centers have consistent relative specialization in the agricultural innovation ecosystem.

On the other hand, among the municipalities with more than 1 million inhabitants and a density below the national average are São Luís (MA; 0.9), Rio de Janeiro (RJ; 0.8), Salvador (BA; 0.6), Fortaleza (CE; 0.5), Brasília (DF; 0.5), and Guarulhos (SP; 0.2). These data indicate that demographic size and economic relevance do not automatically translate into a higher proportional concentration of agtechs, emphasizing that relative density depends, above all, on the articulation between the agricultural production base, scientific and technological infrastructure, and local innovation environments.

Table 9. Concentration of Agtechs in Municipalities with more than 1 million inhabitants

Municipality	State	Agtechs	Population	Agtech/100,000
Curitiba	PR	66	1.830.795	3,6
Campinas	SP	41	1.187.974	3,5
Porto Alegre	RS	47	1.388.794	3,4
São Paulo	SP	345	11.904.961	2,9
Belo Horizonte	MG	48	2.415.872	2,0
Goiânia	GO	27	1.503.256	1,8
Manaus	AM	33	2.303.732	1,4
Belém	PA	17	1.397.315	1,2
Recife	PE	17	1.588.376	1,1

Continued ►

Municipality	State	Agtechs	Population	Agtech/100,000
São Luís	MA	10	1.089.215	0,9
Rio de Janeiro	RJ	57	6.730.729	0,8
Salvador	BA	16	2.564.204	0,6
Fortaleza	CE	14	2.578.483	0,5
Brasília	DF	16	2.996.899	0,5
Guarulhos	SP	3	1.349.100	0,2
Total		757	42.829.705,00	1,8

2.5.2 Concentration in municipalities with 500,000 to 1 million inhabitants

The 15 municipalities with a concentration higher than the national average in the range of 500,000 to 1 million inhabitants account for 295 agtechs, distributed among a total population of 10,057,904 inhabitants, resulting in an average density of 2.9 agtechs per 100,000 inhabitants. This measure confirms that medium-sized cities with strong productive insertion and scientific infrastructure have relevant proportional specialization in the agricultural innovation ecosystem.

There is a high concentration in the cities of Ribeirão Preto (SP; 8.47) and Florianópolis (SC; 8.17), followed by Londrina (PR; 4.82), São José dos Campos (SP; 4.13), and Uberlândia (MG; 3.28). Above the national average in terms of the index are São José do Rio Preto (SP; 2.38), Campo Grande (MS; 2.18), Cuiabá (MT; 1.88), Joinville (SC; 1.81), as well as Porto Velho (RO; 1.55), Vila Velha (ES; 1.18), Niterói (RJ; 1.16), Osasco (SP; 1.05), Sorocaba (SP; 1.05), and Santo André (SP; 1.02). The set shows that the density of agtechs is not restricted to capitals or larger metropolises, but is distributed in intermediate urban centers with strong innovation ecosystems and connections to agroindustrial chains.

Table 10. Concentration of Agtechs in selected municipalities with 500,000 to 1 million inhabitants

Municipality	State	Agtechs	Population	Agtech/100,000
Ribeirão Preto	SP	62	731.639	8,47
Florianópolis	SC	48	587.486	8,17
Londrina	PR	28	581.382	4,82
São José dos Campos	SP	30	727.078	4,13
Uberlândia	MG	25	761.835	3,28
São José do Rio Preto	SP	12	504.166	2,38
Campo Grande	MS	21	962.883	2,18
Cuiabá	MT	13	691.875	1,88
Joinville	SC	12	664.541	1,81

Continued ►

Municipality	State	Agtechs	Population	Agtech/100,000
Porto Velho	RO	8	517.709	1,55
Vila Velha	ES	6	506.779	1,18
Niterói	RJ	6	516.787	1,16
Osasco	SP	8	759.524	1,05
Sorocaba	SP	8	762.172	1,05
Santo André	SP	8	782.048	1,02
Total		295	10.057.904	2,9

2.5.3 Concentration in municipalities with 200,000 to 500,000 inhabitants

The selected municipalities with 200,000 to 500,000 inhabitants account for 243 agtechs, distributed among a total population of 5,913,164 inhabitants, resulting in an average density of 4.1 agtechs per 100,000 inhabitants, a level significantly higher than the national average (1.0). Based on this data, the is evident importance of medium-sized cities as spaces of high relative specialization in the agricultural innovation ecosystem .

Among the 19 municipalities in this range, with a density equal to or greater than 2 agtechs per 100,000 inhabitants, Piracicaba (SP; 11.8) and São Carlos (SP; 10.5) stand out as technological hubs structured around universities and research centers. Next are Santa Maria (RS; 6.0) and Chapecó (SC; 5.3), associated with relevant agroindustrial chains. Barueri (SP; 3.9), Macapá (AP; 3.9), Rio Branco (AC; 3.3), and Vitória (ES; 3.2), indicating that the high relative density is not limited to the South-Southeast axis, but is distributed across different regions of the country, reflecting the qualified interiorization and territorial diversity of the agtech ecosystem.

With a density between 2.0 and 3.0 agtechs per 100,000 inhabitants are Maringá (PR; 3.0), Palmas (TO; 2.7), Indaiatuba (SP; 2.6), Presidente Prudente (SP; 2.6), Cascavel (PR; 2.4), Passo Fundo (RS; 2.3), Rondonópolis (MT; 2.3), Criciúma (SC; 2.2), Marília (SP; 2.0), Americana (SP; 2.0), and Araraquara (SP; 2.0).

Another 23 municipalities with between 200,000 and 500,000 inhabitants have a concentration of between 1 and 2 agtechs per 100,000 inhabitants, above the national average, totaling 102 agtechs. On the other hand, 33 municipalities in the same range have a concentration below the national average, with a total of 54 agtechs, once again showing that population size alone is not a determining factor for the density of innovation in agriculture. The pattern observed underpins the process of qualified internalization of the agtech ecosystem, in which medium-sized cities with a strong agroindustrial vocation and the presence of educational and research institutions play a strategic role in the generation and dissemination of technological innovation in Brazilian agriculture.

Table 11. Concentration of Agtechs in Selected Municipalities with 200,000 to 500,000 inhabitants

Municipality	State	Agtechs	Population	Agtech/100,000
Piracicaba	SP	52	440.835	11,8
São Carlos	SP	28	266.427	10,5
Santa Maria	RS	17	282.395	6,0
Chapecó	SC	15	282.648	5,3
Barueri	SP	13	333.737	3,9
Macapá	AP	19	489.676	3,9
Rio Branco	AC	13	389.001	3,3
Vitória	ES	11	343.378	3,2
Maringá	PR	13	429.660	3,0
Palmas	TO	9	328.499	2,7
Indaiatuba	SP	7	269.657	2,6
Presidente Prudente	SP	6	234.706	2,6
Cascavel	PR	9	368.195	2,4
Passo Fundo	RS	5	214.811	2,3
Rondonópolis	MT	6	263.708	2,3
Criciúma	SC	5	227.438	2,2
Marília	SP	5	247.348	2,0
Americana	SP	5	247.571	2,0
Araraquara	SP	5	253.474	2,0
Total		243	5.913.164	4,1

2.5.4 Concentration in municipalities with fewer than 200,000 inhabitants

In the group of municipalities with fewer than 200,000 inhabitants and six or more agtechs, there are a total of 116 startups distributed across 14 municipalities, with a combined population of 1,899,386 inhabitants and an average density of 6.1 agtechs per 100,000 inhabitants, more than six times higher than the national average (1.0). The cities of Viçosa (MG; 16.3) and Jaboticabal (SP; 13.6) stand out, followed by Lajeado (RS; 9.3), Nova Lima (MG; 7.4), and Pato Branco (PR; 7.2), showing strong relative specialization in small cities.

This pattern confirms the relevance of municipalities with a robust academic and agroindustrial base, where the proximity between universities, research centers, and technology-intensive production chains favors high entrepreneurial density. The concentration observed suggests that innovation in Brazilian agriculture is significantly concentrated in the interior, with highly specialized hubs that operate as centers of technological generation and diffusion for their respective regions.

Table 12. Concentration in municipalities with fewer than 200,000 inhabitants

Municipality	State	Agtechs	Population	Agtech/100,000
Viçosa	MG	13	79.517	16,3
Jaboticabal	SP	10	73.473	13,6
Lajeado	RS	9	96.879	9,3
Nova Lima	MG	9	120.959	7,4
Pato Branco	PR	7	97.821	7,2
Lavras	MG	7	110.682	6,3
Santana de Parnaíba	SP	10	163.787	6,1
Lages	SC	10	172.458	5,8
Pinhais	PR	7	131.255	5,3
Toledo	PR	8	160.701	5,0
Botucatu	SP	7	151.053	4,6
São Caetano do Sul	SP	7	172.693	4,1
Patos de Minas	MG	6	169.173	3,5
Rio Grande	RS	6	198.935	3,0
Total		116	1.899.386	6,1

2.6 Analysis of Agtechs by Category

The classification of agtechs by category—identified by the acronyms BF (Before the Farm), IN (Inside the Farm), and AF (After the Farm)—provides a more precise picture of how innovation is distributed across the agricultural supply chain. In 2025, the total of 2,075 mapped startups reveals the predominance of categories associated with the production and post-production stages. The AF category—Innovative Foods and New Food Trends—leads the overall ranking, with 312 agtechs (15.0%), indicating strong momentum in value creation and new product development. Next, IN – Rural Property Management System (165; 8.0%) and IN – Integrating Platform for Systems, Solutions, and Data (156; 7.5%) stand out, showing that digitization, data-driven management, and technological integration in the field (Table 13) are key.

Among the other categories with the highest representation are BF – Credit, Barter, Insurance, Carbon Credits, and Fiduciary Analysis (103; 5.0%) and IN – Drones, Machinery, and Equipment (103; 5.0%), as well as AF – Marketplaces and Platforms for the trading and sale of agricultural products (102; 4.9%) and IN – Remote Sensing, Diagnostics, and Image Monitoring (100; 4.8%). Taken together, these categories demonstrate a balance between solutions focused on production efficiency, financial management, and marketing, as well as a significant presence of initiatives related to sustainability, connectivity, traceability, and new consumption models. The detailed analyses by segment and category, presented in the fol-

lowing sections, allow for a deeper understanding of the specific dynamics that structure the Brazilian agribusiness innovation ecosystem.

Table 13. *Analysis of Agtechs by Category*

Category	Agtechs	%
AF- Innovative foods and new food trends	312	15,0%
IN- Rural Property Management System	165	8,0%
IN- Integrated platform for systems, solutions, and data	156	7,5%
BF- Credit, barter, insurance, carbon credits, and fiduciary analysis	103	5,0%
IN- Drones, Machinery, and Equipment	103	5,0%
AF- Marketplaces and Platforms for Trading and Selling Agricultural Products	102	4,9%
IN- Remote Sensing, Diagnosis, and Image Monitoring	100	4,8%
BF- Fertilizers, Inoculants, and Plant Nutrition	82	4,0%
AF- Biodiversity and Sustainability	82	4,0%
IN- Content, Education, Social Media	78	3,8%
AF- Online Grocery	62	3,0%
IN- Internet of Things for Agriculture: pest detection, soil, climate, and irrigation	60	2,9%
AF- Storage, Infrastructure, and Logistics	57	2,7%
BF - Laboratory Analysis	47	2,3%
AF- Autonomous Store Management System and Food Services	47	2,3%
BF - Seeds, Seedlings, and Plant Genomics	46	2,2%
IN- Biological Control and Integrated Pest Management	46	2,2%
IN- Meteorology, Irrigation, and Water Management	45	2,2%
IN- Telemetry and Automation	42	2,0%
AF- Online Restaurants and Meal Kits	42	2,0%
BF - Agribusiness Inputs Marketplace	38	1,8%
BF - Animal Nutrition and Health	37	1,8%
AF- Bioenergy and Renewable Energy	34	1,6%
AF- Food Industry and Processing 4.0	34	1,6%
AF- Food Safety and Traceability	30	1,4%
AF- Packaging Systems, Environment, and Recycling	27	1,3%
BF - Genomics and Animal Reproduction	25	1,2%

Continued ►

Category	Agtechs	%
AF- Urban Farming: Plant Factories and New Farming Methods	15	0,7%
IN- Connectivity and Telecommunications	14	0,7%
IN- Sharing Economy	14	0,7%
IN- Beekeeping and Pollination	13	0,6%
IN- Agricultural Waste Management	13	0,6%
AF- Cloud Kitchens and Ghost Kitchens	4	0,2%
Total	2075	100%

2.7 Before the Farm (BF)

The Before the Farm segment totals 382 agtechs in 2025, accounting for 18.4% of the national total, maintaining a trend of continuous growth since 2022 (Table 14). This trend indicates a strengthening of solutions focused on production preparation, with an emphasis on financing, inputs, genetics, and specialized technical services. The Credit, barter, insurance, carbon credits, and fiduciary analysis category leads the segment, with 103 startups (4.96%), reflecting the growing financial complexity of the agricultural sector, as well as the expansion of instruments linked to risk management and the carbon agenda. Next, Fertilizers, inoculants, and plant nutrition stand out, with 82 agtechs (3.95%), underscoring the centrality of production efficiency and sustainable intensification.

Other categories show consistent growth, such as Seeds, seedlings, and plant genomics (46; 2.22%) and Animal nutrition and health (37; 1.78%), associated with technological advances in genetic improvement and nutritional management. Laboratory analysis accounts for 47 startups (2.27%), maintaining relative stability, while the agricultural input marketplace totals 38 (1.83%), indicating the strengthening of digital intermediation models. Genomics and animal reproduction, with 25 agtechs (1.20%), remains a specialized yet strategic niche. Through a detailed analysis of the categories, it is possible to understand the diversification of pre-production solutions, which combine technological innovation, financial services, and efficiency in the use of inputs.

Table 14. *Before the Farm*

Category	2022	2023	2024	2025	% 2025
Credit, barter, insurance, carbon credits, and fiduciary analysis	61	85	97	103	4,96%
Fertilizers, Inoculants, and Plant Nutrition	53	73	84	82	3,95%
Seeds, Seedlings, and Plant Genomics	26	36	45	46	2,22%
Animal Nutrition and Health	27	42	44	37	1,78%
Laboratory Analysis	36	37	39	47	2,27%

Continued ►

Category	2022	2023	2024	2025	% 2025
Agricultural Supplies Marketplace	18	36	35	38	1,83%
Genomics and Animal Reproduction	21	22	22	25	1,20%
TOTAL BEFORE THE FARM	242	331	366	382	4,96%

2.8 Inside the Farm (IN)

The segment inside the farm comprises 852 agtechs in 2025, accounting for 40.9% of the national total, remaining the primary driver of innovation in agriculture (Table 15). The most prominent categories focus on management and data integration solutions. Rural Property Management System lead with 165 startups (8.0%), followed by Integrated platform for systems, solutions, and data, with 156 (7.5%). These numbers indicate the strengthening of digitalization in production management and interoperability among different technologies in the field. Next, Drones, machinery, and equipment (103; 5.0%) and Remote Sensing, Diagnosis, and Image Monitoring (100; 4.8%) stand out, underlining the expansion of precision technologies and automated data collection.

Growth is also observed in categories related to knowledge dissemination and technological infrastructure, such as Content, education, and social media (78; 3.8%) and Internet of Things sensors and devices (60; 2.9%). Biological control and integrated pest management (46; 2.2%) corroborates the trend toward solutions aligned with sustainable production. Telemetry and automation (42; 2.0%) and Meteorology, irrigation, and water management (45; 2.2%) maintain a significant presence, while Connectivity and telecommunications (14; 0.7%) and Agricultural waste management (13; 0.6%) indicate niches in the process of becoming more robust. Taken together, these findings reveal an ecosystem in which inside the farm innovation is strongly driven by data, automation, and operational efficiency, integrating digital technology with production processes.

Table 15. *Inside the Farm*

Category	2022	2023	2024	2025	% 2025
Rural Property Management System	173	170	157	165	8,0%
Integrated platform for systems, solutions, and data	122	146	144	156	7,5%
Drones, Machinery, and Equipment	78	98	110	103	5,0%
Remote Sensing, Diagnosis, and Image Monitoring	76	84	88	100	4,8%
Content, Education, and Social Media	51	79	81	78	3,8%
IoT Sensors and Devices	40	58	58	60	2,9%
Biological Control and Integrated Pest Management	36	45	48	46	2,2%
Telemetry and Automation	42	37	38	42	2,0%
Meteorology, Irrigation, and Water Management	38	40	38	45	2,2%

Continued ►

Category	2022	2023	2024	2025	% 2025
Agricultural Waste Management	22	18	17	13	0,6%
Connectivity and Telecommunications	9	16	17	14	0,7%
Beekeeping and Pollination	3	10	11	13	0,6%
Sharing Economy	15	14	11	14	0,7%
TOTAL INSIDE THE FARM	705	815	818	852	40,9%

2.9 After the Farm (AF)

The after the farm segment comprises 848 agtechs in 2025, accounting for 40.9% of the national total, maintaining a share equivalent to that of the inside the farm segment and underscoring the importance of value-added, marketing, and consumption stages in the agribusiness ecosystem (Table 16). The category of innovative foods and new food trends remains largely dominant, with 312 startups (15.0%), indicating dynamism in higher-value-added products, new proteins, functional foods, and solutions aligned with changes in consumption patterns. Next, Marketplaces and platforms for trading and selling agricultural products (102; 4.9%) stand out, strengthening digital models of commercial intermediation, as do Biodiversity and sustainability (82; 4.0%), reflecting the growing incorporation of environmental agendas and the sustainable use of resources.

Other categories show moderate and stable growth, such as Storage, Infrastructure, and Logistics (57; 2.7%) and Online Grocery (62; 3.0%), associated with the efficiency of distribution chains. Service marketplaces and retail management (47; 2.3%) and Online restaurants and meal kits (42; 2.0%) indicate integration between agriculture, retail, and food service in digital models. Food Industry and Processing 4.0 (34; 1.6%) and Bioenergy and Renewable Energy (34; 1.6%) underscore technological advances in industrial transformation and energy diversification. Packaging and recycling (27; 1.3%) and Food safety and traceability (30; 1.4%) corroborate the industry's focus on efficiency and transparency, while Urban farming (15; 0.7%) and Cloud kitchen (4; 0.2%) remain specific niches. Analysis of this data reveals that after the farm innovation combines new products, commercial digitization, and solutions focused on sustainability and systemic efficiency.

Table 16. *After the Farm*

Category	2022	2023	2024	2025	% 2025
Innovative Foods and New Food Trends	281	275	277	312	15,0%
Marketplaces and platforms for trading and selling agricultural products	124	94	103	102	4,9%
Biodiversity and Sustainability	37	84	83	82	4,0%
Warehousing, Infrastructure, and Logistics	73	64	68	57	2,7%

Continued ►

Category	2022	2023	2024	2025	% 2025
Online Grocery Store	48	49	51	62	3,0%
Services Marketplace and Retail Management	40	44	44	47	2,3%
Online Restaurants and Meal Kits	39	43	40	42	2,0%
Food Industry and Processing 4.0	25	34	36	34	1,6%
Bioenergy and Renewable Energy	26	34	35	34	1,6%
Packaging and Recycling	24	29	27	27	1,3%
Food Safety and Traceability	13	17	21	30	1,4%
Urban Gardening and New Forms of Gardening	21	18	19	15	0,7%
Cloud Kitchen and Ghost Kitchen	5	3	3	4	0,2%
TOTAL AFTER THE FARM	756	788	807	848	40,9%

2.10 Relationships between Geographic Analysis and Categories

The joint analysis of categories by region and state deepens our understanding of the territorial organization of the agricultural innovation ecosystem, allowing us to identify where agtechs are concentrated, as well as the types of solutions in which each territory has greater relative specialization. By comparing each state's share of the total number of agtechs with its specific share in each category, it is possible to observe positive or negative deviations that indicate different technological, productive, or institutional vocations. This approach shows that the Brazilian ecosystem is not structured solely by the absolute volume of startups, but by regionally distributed patterns of functional specialization, revealing complementarities between territories and different roles played by the states along the agricultural chain.

2.11 Categories and Regions/States

A comparison between the participation of the Federal Units in the total for each category and their participation in the overall total for agtechs allows us to identify clear patterns of territorial specialization in the agricultural innovation ecosystem. São Paulo, which accounts for 41.0% of agtechs in the overall total, has a significantly higher share in several categories, such as Remote Sensing, Diagnosis, and Image Monitoring (45.0%), Integrated platform for systems, solutions, and data (35.3%), Credit, barter, insurance, carbon credits, and fiduciary analysis (42.7%), and Innovative foods and new food trends (42.0%), indicating strong relative specialization in cross-cutting digital solutions and market-oriented business models. In contrast, their participation in categories such as Rural Property Management System (27.3%) is substantially lower than their overall participation, suggesting greater territorial dispersion of this type of solution.

In the South, there is relative specialization in categories related to agricultural production and operations. Rio Grande do Sul, which accounts for 7.9% of agtechs in the overall

total, accounts for 11.5% of rural property management system solutions, 9.0% of innovative foods, and 17.5% of drone, machinery, and equipment solutions, highlighting its above-average role in these categories compared to the national average. Santa Catarina, with 6.8% of the total, has a high share in drones, machinery, and equipment (13.6%) and remote sensing (9.0%), indicating relative specialization in technological solutions applied to agriculture and related industries.

In the Center-West, which accounts for 7.1% of the total, some states show a high degree of functional specialization. Mato Grosso, responsible for 2.5% of agtechs in the national total, concentrates 6.1% of rural property management system solutions and 4.5% of integrator platforms, proportions significantly higher than its overall share, reflecting alignment with management demands and scale of production in agriculture. Goiás, with 2.4% of the overall total, accounts for 4.2% of management system solutions and 4.9% of credit and financial services solutions, also above the national average.

In the North and Northeast regions, despite their smaller share of the overall total (7.6% and 6.5%, respectively), there are notable specializations in specific categories. In Pará, which accounts for only 1.7% of agtechs in the national total, innovative foods and new food trends represent 5.4% of the total category, more than triple its overall share, highlighting relative specialization associated with regional chains and value-added strategies in agriculture. Similarly, Amazonas, with 2.0% of the overall total, accounts for 3.2% of agtechs in Innovative Foods, in addition to having a significant share in the category Rural Property Management Systems (3.0%), pointing to a profile that differs from the national average.

In summary, an analysis of the deviations between overall share and share by category shows that the Brazilian agtech ecosystem is organized by absolute concentration and by territorial specialization, in which certain states play disproportionately important roles in specific categories. Thus, specialization contributes to the functional diversity of the ecosystem and reinforces the complementarity between regions in the development of solutions for agriculture in Brazil.

2.12 Categories at the municipal level

An analysis of the distribution of agtech categories at the municipal level shows that, in addition to regional and state concentration, there is a consistent pattern of functional specialization in specific cities, which play a disproportionate role within certain categories in the national agricultural ecosystem. In several categories, a few municipalities account for a significant share of the national total, indicating the formation of specialized urban hubs.

In the category BF– Laboratory analysis (47 agtechs), there is strong territorial dispersion, with low municipal concentration. No city exceeds 10% of the category, and Manaus (4 agtechs; 8.5%), Curitiba (3; 6.4%), Ribeirão Preto (3; 6.4%), and São Carlos (3; 6.4%) stand out, suggesting that this type of solution is relatively distributed and associated with different productive and institutional contexts.

In BF– Credit, barter, insurance, carbon credits, and fiduciary analysis (103 agtechs), the municipal concentration is more evident. São Paulo alone accounts for 23 agtechs (22.3%), followed by Belo Horizonte (5; 4.9%), Campinas (4; 3.9%), Piracicaba (4; 3.9%), Ribeirão Preto

(4; 3.9%), and Florianópolis (4; 3.9%), forming a restricted group of cities with notable specialization in financial and fiduciary solutions applied to agriculture.

In the category BF– Fertilizers, inoculants, and plant nutrition (82 agtechs), there is again relative dispersion, but with some notable hubs. São Paulo has 7 agtechs (8.5%), while Brasília (3; 3.7%), Florianópolis (3; 3.7%), Goiânia (3; 3.7%), Campinas (2; 2.4%), and Curitiba (2; 2.4%) indicate a presence associated with research centers, public policies, and structured production chains.

The category IN– Integrating platform for systems, solutions, and data (156 agtechs) has one of the highest levels of municipal concentration. São Paulo has 27 agtechs, corresponding to 17.3% of the total for the category, followed by Curitiba (9; 5.8%), Londrina (8; 5.1%), Florianópolis (6; 3.8%), Santa Maria (6; 3.8%), and Ribeirão Preto (3; 1.9%). This pattern highlights the centrality of cities with a strong technological base and capacity for digital integration in agriculture.

In IN – Remote sensing, diagnosis, and monitoring by images (100 agtech companies), the formation of highly specialized hubs stands out. São José dos Campos and Uberlândia each concentrate 8 (8.0%) agtech companies, percentages significantly higher than expected for municipalities of their relative size. São Paulo (12; 12.0%), Ribeirão Preto (4; 4.0%), Florianópolis (4; 4.0%), and Curitiba (3; 3.0%) complete the set of cities with the highest density in this category, indicating specialization associated with skills in technology, engineering, and data analysis.

In the after the farm segment, municipal concentration is even more pronounced. In AF – Innovative foods and new food trends (312 agtechs), São Paulo concentrates 60 agtechs, equivalent to 19.2% of the category, followed by Rio de Janeiro (11; 3.5%), Curitiba (7; 2.2%), Macapá (7; 2.2%), Florianópolis (5; 1.6%), and Manaus (5; 1.6%). Although dispersed across more than a hundred municipalities, this category is marked by centralization in large urban centers and regional capitals.

In AF – Marketplaces and trading and sales platforms (102 agtechs), São Paulo again leads with 24 agtechs (23.5%), followed by Ribeirão Preto (5; 4.9%), Curitiba (5; 4.9%), Porto Alegre (3; 2.9%), Recife (3; 2.9%), and Rio de Janeiro (3; 2.9%), highlighting urban specialization in digital models of agricultural intermediation.

Overall, the analysis by Category/City shows that the Brazilian agtech ecosystem is structured based on a combination of high functional concentration in certain municipalities, which act as specialized hubs by category, and broad territorial capillarity, with dozens of cities participating in a marginal but complementary way. This configuration corroborates the importance of large urban centers as hubs for technological and market integration, while recognizing the role of medium-sized and specialized cities in generating specific solutions for agriculture.

2.13 Further insights from the Agtech Survey

In addition to mapping based on public data, Radar Agtech 2025 conducted a survey of agtechs to deepen understanding of their profile, activities, business models, financing, and relationship with the innovation ecosystem. A total of 170 valid responses were considered, equivalent to 8.2% of the agtechs mapped. The form was structured containing the following

sections: company data, agtech categories and activities, relationship with the innovation ecosystem, and final questions. It should be noted that not all questions were mandatory, so the total number of responses for some items may be less than 170.

The comparison between the survey and mapping results shows significant differences in the distribution of agtechs by category, mainly associated with the profile of the responding companies and the characteristics of the collection instruments. In general, the survey shows a greater relative participation of categories linked to digital technologies applied directly to agricultural production, such as rural property management, remote sensing, automation, and biological control, while the mapping captures more comprehensively categories located in the stages after the farm in the agricultural chain, including food, processing, logistics, and new marketing models. These differences do not indicate inconsistencies, but reinforce the complementary nature of the two instruments, and the survey results should be interpreted in light of their sample nature and the broader scope of the mapping.

2.14 Activities in the chains

In 2025, soybeans and corn remain the main crops served by the agtechs in the survey, with 98 (57.6%) and 93 (54.7%) mentions, respectively (Table 12). Sugarcane (78; 45.9%) and coffee (72; 42.4%) remain among the four most cited crops, with a reversal of position between third and fourth place in relation to 2024. Next are cotton (68; 40.0%), cattle (65; 38.2%), horticulture (64; 37.6%), and wheat (64; 37.6%), as well as rice and oranges (57; 33.5% each). Among fruits, oranges and bananas remain the most recurrent, although with a change in order compared to 2024 and 2023. The data set indicates strong adherence by agtechs to the main Brazilian agricultural production chains, especially grains and animal proteins, while showing significant diversification in horticulture, forestry (46; 27.1%), and cassava (35; 20.6%).

The aggregate categories — other grains (66; 38.8%), other fruits (61; 35.9%), other vegetables (50; 29.4%), and other animals (25; 14.7%) — reveal a wide range of activities and complementary specializations. In other grains, beans, sorghum, barley, and oats predominate; in other fruits, grapes, mangoes, strawberries, and açai berry stand out, in addition to several crops with specific mentions; in other vegetables, tomatoes and specific vegetables appear, as well as forage plants, cover crops, and forest species; and in other animals, horses, sheep, and goats concentrate the main additional occurrences. There is also a residual set of responses not directly associated with specific production chains, involving topics such as waste management, inputs, biological control, and generic references to multiple crops. Thus, although large chains concentrate a greater number of solutions, the agtech ecosystem presents capillarity and diversity compatible with the productive heterogeneity of Brazilian agriculture.

Table 17. Activity of agtechs in the Radar Agtech 2025 survey

Activity	Agtechs	%
Soy	98	57,6%
Corn	93	54,7%
Sugarcane	78	45,9%
Coffee	72	42,4%
Cotton	68	40,0%
Cattle (Bulls and Cows)	65	38,2%
Horticulture	64	37,6%
Wheat	64	37,6%
Rice	57	33,5%
Oranges	57	33,5%
Forestry (Forests)	46	27,1%
Banana	37	21,8%
Cassava	35	20,6%
Swine	32	18,8%
Fish	30	17,6%
Poultry	26	15,3%
Other grains	66	38,8%
Other Fruits	61	35,9%
Other Vegetables	50	29,4%
Other Animals	25	14,7%

2.15 Stage of Agtech Companies in the Survey

This section presents an integrated analysis of the economic profile and stage of development of the agtech companies participating in the survey, combining information on annual revenue, perceived overall performance, and level of business maturity. By articulating these three axes, we seek to understand the current financial situation of companies, as well as their growth trajectories, structural challenges, and dynamics of gaining strength in the agro-focused innovation ecosystem, providing a more comprehensive reading of the degree of maturity of the mapped agtechs.

The distribution by annual revenue range shows the strong predominance of agtechs in the early stages of revenue generation (Table 13). More than half of the responding companies (53.1%; n=51) report annual revenues of up to R\$ 81,000, indicating a high concentration of businesses in the market validation or incipient traction phase. The intermediate ranges, between R\$ 180,100 and R\$ 3.6 million, have relatively dispersed percentages, each with a

share of less than 10%, suggesting heterogeneous growth trajectories. Agtechs with revenues above R\$ 16 million represent a residual portion of the total (5.2%; n=5), which corroborates the predominant profile of small companies in the survey, with few cases already positioned at higher levels of economic scale.

Table 18. Stage of Agtechs

Annual revenue range	Agtechs	%
Up to R\$ 81,000	51	53.1
From R\$ 81,100 to R\$ 130,000	3	3.1
From R\$ 130,100 to R\$ 180,000	3	3.1
From R\$ 180,100 to R\$ 360,000	8	8.3
From R\$ 360,100 to R\$ 720,000	7	7.3
From R\$ 720,100 to R\$ 1.8 million	5	5.2
From R\$ 1.81 million to R\$ 3.6 million	7	7.3
From R\$ 3.61 million to R\$ 4.8 million	2	2.1
From R\$ 4.81 million to R\$ 16 million	5	5.2
From R\$ 16.1 million to R\$ 30 million	3	3.1
From R\$ 90.1 million to R\$ 300 million	2	2.1
Total	96	100.0

The overall performance data (Table 14) indicate a predominantly positive scenario for the agtech respondents, with a large majority stating that they are on a growth or improvement trajectory in key areas (73%; n=73). This result suggests significant dynamism in the ecosystem, even in a context marked by capital constraints and increasing selectivity on the part of investors and customers. Even so, a significant portion of companies (24%; n=24) report stability, with little or no growth, which may reflect strengthening strategies, market limitations, or specific stages of the development cycle. Only 3% (n=3) indicate decline or below-expected performance, pointing out that, although there are challenges, cases of significant deterioration remain in the minority in the analyzed group.

Table 19. Overall Performance

Overall performance	Agtechs	%
Growing or improving in key areas	73	73%
Stable with little to no growth	24	24%
Decline or below-expected performance	3	3%
Total	100	100%

The distribution of agtechs by stage of development (Table 15) indicates the predominance of companies in the scaling phase (51.0%), suggesting that most have already passed the initial stages of design and validation and are in the process of operational and commercial expansion. However, joint analysis with revenue data reveals that this condition does not generally translate into high revenues, as most companies remain concentrated in low revenue ranges. Agtechs in the Minimum Viable Product (MVP) stage (testing market hypotheses and validating the value proposition) represent 29.0% of the sample, reflecting the significant presence of initiatives still focused on product and market validation, while the pre-operational (9.0%) and established (11.0%) stages comprise minority groups, indicating both the existence of projects still in their infancy and a limited set of companies with greater organizational maturity in the ecosystem analyzed.

Table 20. *Stage of agtechs in the Radar Agtech 2025 survey*

Stage	Agtechs	%
Pre-operational	9	9,0%
MVP	29	29,0%
Established	11	11,0%
Scaling	51	51,0%
Total	100	100

Together, the results demonstrate an ecosystem characterized by high dynamism and positive prospects, albeit marked by a strong concentration of companies in the early stages of revenue and intermediate stages of development. The coexistence of largely favorable perceptions of performance with relatively low revenue levels suggests that many agtechs are in the process of market building, gradual expansion, and strategic adjustments, in which growth does not immediately translate into economic scale. Based on this picture, it is clear that policies, promotion instruments, and support mechanisms that take into account the specificities of these stages of maturity are important, contributing to the transformation of promising trajectories into more consistent economic results in the medium and long term.

2.16 Insertion into the innovation ecosystem

The participation of agtechs in ecosystems, environments, networks, and/or innovation and entrepreneurship programs remained high in 2024 (Table 16). Considering 167 valid responses, 80.8% of agtechs reported participating in some type of ecosystem or structured innovation initiative, while 19.2% stated that they were not involved in these environments. Compared to the 2023 edition, there was a moderate increase in the proportion of companies that reported participation, from 77% in 2023 to 80.8% in 2024.

However, this growth should be interpreted with caution. In 2023, the question referred specifically to the company's participation in a local innovation ecosystem, allowing for responses mentioning local productive arrangements (APLs) and/or innovation hubs. In 2024, the wording of the question was expanded to explicitly incorporate innovation and/or entre-

preneurship environments, networks, and programs, which tends to capture a broader spectrum of initiatives and forms of participation, increasing the likelihood of a positive response.

It is also important to consider the potential sample bias, since the survey was widely disseminated by actors in the innovation ecosystem itself, such as environments, networks, and programs that support entrepreneurship. This context may favor the participation of agtechs already connected to these structures, contributing to the increase in the percentage observed in 2024.

Thus, although the data indicate strong integration of agtechs into innovation ecosystems, the comparison between the percentages for 2023 and 2024 should take into account methodological differences in the formulation of the question, as well as the context of data collection. These caveats do not compromise the relevance of the results, but reinforce the need for caution in longitudinal comparative analyses and greater standardization of collection instruments in future editions of the survey.

Table 21. *Agtech participation in the ecosystem*

Participation	Agtechs	% in 2024	% in 2023
Yes	135	80,8%	77%
No	32	19,2%	23%
Total	167	100%	100%

The number of mentions reveals a strong relational concentration in a few actors, notably Cocriagro, SNASH, Sebrae (in its different fronts), PIT/Agropolo Vale (SJC), Cubo Itaú, PwC Agtech Innovation, and APTA Hub (Table 17). These actors appear repeatedly as central nodes in the ecosystem, combining incubation, acceleration, market connection, access to public policies, and institutional coordination functions.

The diversity of technology parks, university incubators, and regional programs mentioned also indicates significant territorial capillarity, albeit with asymmetry in visibility between the hubs. It is important to note that the count reflects the recurrence of mentions, not the number of unique agtechs linked to each actor, and should be interpreted as an indicator of perceived centrality in the ecosystem.

Table 22. Mentions

Ecosystem / Program / Environment	Mentions
Cocriagro (Hub/Agro Valley Londrina)	14
SNASH / Snash Hub	10
Sebrae / Sebrae for Startups / Speed Agro / Capital Empreendedor / Catalisa ICT	10
PIT – São José dos Campos Technological Innovation Park / Agropolo Vale	9
Itaú Cube	7
PwC Agtech Innovation	6
APTA Hub / AptaHub	6
Agtech Garage	4
EsalqTec / ESALQTec (USP/ESALQ)	4
Ventiur	3
Candy Valley	3
Itaipu Parquetec / PTI	3
InovAtiva / InovAtiva de Impacto	3
Angels of Brazil	3
ACATE / Miditec / StartupSC	3

Other actors mentioned (1–2 mentions each, grouped):

- University parks and incubators: tecnoPARQ (UFV), Centev/UFV, InovaTec UFSM, Incamp/Inova Unicamp, CIETEC/USP, Inova UFPB, UTFPR Incubator (SPRINT), UCDB Incubator, UNESP Incubator, UNIFEI Incubator, Sorocaba Technology Park, São José do Rio Preto Technology Park, TecnoPUC, Tecnova RS, TecnoUCS, UPF Park, Orion Park, Midilages.
- Regional hubs and districts: Cerrado Hub, Goiás Rio Verde Hub, MG Agro Hub, UberHub, ZebuValley, CNA Hub, AgriHub, Espaço Impulso (Coopavel), DIBB Belém, Manaus Tech Hub, Hub Norte.
- International/thematic programs and networks: EIT Food, Plug and Play, Santander X, Google for Startups, NVIDIA Inception, Microsoft Founders Hub, AWS, Climate Launchpad, Global Shell Startup Engine, Qualcomm, Oracle, UN Habitat.
- Others: Biominas, Quintessa, Distrito, Endeavor, Green Sampa, Inova Cerrado, Centelha (several editions), StartupNE/PI, ALI, Rede de Mulheres do Agro, Aliança da Soja Sustentável, 100 Open Startups.

When analyzed together with the results from 2024, the data from this edition shows continuity in the core group of actors, which indicates structural stability in the agri-innovation ecosystem. The main difference between the two periods is not the emergence of new dominant hubs, but rather the way in which the insertion of agtechs into the ecosystem is described and captured methodologically.

In 2024, the count was based on literal mentions, and in 2025, we performed institutional aggregation, which further highlighted Sebrae's leading role. Although its initiatives already appeared in a relevant way in 2024, they were treated in a more dispersed manner, often classified as programs. In the aggregated reading for 2025, when considering initiatives such as Sebrae for Startups, Speed Agro, Capital Empreendedor, Catalisa ICT, ALI, and SebraeLAB together, Sebrae stands out as one of the most central players in the ecosystem, reflecting its national capillarity and diversity of instruments to support agtechs.

In addition, the most recent data indicate an expansion and diversification of agtech connections, with greater visibility of university technology parks, regional hubs, international programs, and thematic initiatives, reinforcing the perception of a more widespread and multifaceted ecosystem. This movement was already noticeable in 2024, but intensified in 2025, accompanying both the maturation of startups and the expansion of the ecosystem itself.

It should be noted, however, that this result may be subject to sampling bias. The survey was widely publicized by actors in the innovation ecosystem itself, including environments, networks, and programs that support entrepreneurship, which tends to increase the likelihood of responses from companies already involved in or connected to these structures. Thus, the high participation rate observed may not fully reflect the total universe of existing agtechs, especially those less connected to formal innovation environments or located outside the main hubs and institutional networks.

2.17 Private Financing

The analysis of private financing sources (Table 18) used by agtechs reveals a pattern of structural continuity, combined with relevant adjustments in the relative composition of sources over the 2023–2025 period. In 2025, considering valid responses, equity capital from founders, family, friends, and other individuals remains the main source of financing, mentioned by 69.3% of agtechs. This result is consistent with data from 2024 (67.4%) and 2023 (71.8%), which corroborates the centrality of bootstrapping as the predominant strategy in the ecosystem, especially among startups in the early or intermediate stages of establishment. Bootstrapping consists of starting and developing a company using its own resources or revenue generated by the business itself, without initially relying on external capital. This approach preserves the autonomy of the founders, but can limit the speed of growth compared to investor-funded models.

Loans remain relatively stable throughout the period, cited by 15.3% of agtechs in 2025, a percentage very close to that observed in 2024 (15.6%) and higher than that recorded in 2023 (12.8%). This behavior suggests a cautious but recurring use of traditional credit instruments, possibly associated with specific working capital needs or specific investments.

With regard to venture capital, there is a slight increase in 2025, with 14.1% of agtechs reporting access to this type of resource, compared to 11.3% in 2024, although still below the 15.4% level observed in 2023. Angel investment, on the other hand, shows the opposite trend: after a sharp drop from 2023 (22.1%) to 2024 (14.9%), it remains at 14.1% in 2025, indicating a possible stabilization at a lower level than previously observed.

National accelerators stand out as one of the fastest-growing sources in the recent period, rising from 9.9% in 2024 to 13.5% in 2025, although still below the level recorded in 2023

(17.4%). The result suggests a gradual revaluation of acceleration programs as a mechanism for financial and strategic support, especially in a context of greater selectivity of traditional venture capital.

There has also been a consistent expansion in private technology calls for proposals, both those not specific to agriculture (10.4% in 2025, compared to 8.5% in 2024) and those specifically aimed at the agricultural sector (9.8% in 2025, compared to 5.7% in 2024). This growth indicates the greater relevance of private funding instruments geared toward technological innovation, possibly associated with open innovation strategies and partnerships with large companies.

Other private sources, such as domestic companies (6.7%), international companies (4.3%), international accelerators (4.9%), venture builders (3.1%), and virtual collaborative financing (crowdfunding) (4.3%), remain more limited in their participation, but relatively stable over the period analyzed. The “other private sources” category shows significant growth in 2025 (6.1%), more than doubling compared to 2024 (2.8%), which may reflect greater diversity in financial arrangements or hybrid fundraising strategies.

Finally, it is worth noting the proportion of agtechs that reported not having used any source of private financing, which remains at a significant level (15.3% in 2025), close to that observed in 2024 (16.3%) and higher than that recorded in 2023 (12.0%). This data reinforces the existence of a significant contingent of companies operating with limited resources or in very early stages, in addition to highlighting possible difficulties in accessing private capital in a context of greater investor selectivity.

In summary, the comparison between 2023, 2024, and 2025 reveals an agtech ecosystem that is heavily dependent on equity capital, with gradual diversification of private sources, relative growth in private calls for proposals and accelerators, and signs of a readjustment in traditional venture capital. These results directly correlate with data on revenue, stage of development, and perceived performance, indicating that the growth trajectory of Brazilian agtechs continues to be marked by incremental expansion, high heterogeneity, and strong dependence on support mechanisms that are not exclusively financial.

Table 23. *Private sources of financing for agtechs in the Radar Agtech 2025 survey*

Source of private financing	Responses	%	% in 2024	% in 2023
Founders, family, friends, and other individuals	113	69,3%	67,4%	71,8%
Loans	25	15,3%	15,6%	12,8%
Venture Capital	23	14,1%	11,3%	15,4%
Angel Investing	23	14,1%	14,9%	22,1%
National accelerator	22	13,5%	9,9%	17,4%
Private technology calls for proposals (not specific to agriculture)	17	10,4%	8,5%	9,2%
Private technology calls for proposals for agriculture	16	9,8%	5,7%	7,2%
National company	11	6,7%	6,4%	7,7%

Continued ►

Source of private financing	Responses	%	% in 2024	% in 2023
Other private sources	10	6,1%	2,8%	5,6%
Private impact business notices	9	5,5%	6,4%	5,6%
International accelerator	8	4,9%	1,4%	3,1%
International company	7	4,3%	4,3%	4,6%
Virtual collaborative financing (crowdfunding)	7	4,3%	2,8%	4,6%
Venture Builder	5	3,1%	2,8%	4,1%
Private calls for proposals in other areas	2	1,2%	2,1%	1,0%
No private sources	25	15,3%	16,3%	12,0%

Analysis of the open-ended responses regarding private sources of financing confirms that the Brazilian agtech ecosystem is heavily supported by the founders' own resources, mentioned in approximately 58 responses, as partner capital, bootstrapping, self-financing, or reinvestment of profits. Next are angel investors, family offices, and family & friends networks, cited in 34 responses, often associated with small and medium-sized initial contributions. Among the explicit mentions are organizations and networks such as Anjos do Brasil, as well as investors identified by geographic location. Accelerators, with or without equity participation, appear in approximately 18 responses, reflecting their role as a hybrid source of financial resources, mentoring, and access to networks (such as BiotechTown, Ace Startups, StartNEU, and corporate acceleration programs mentioned by respondents).

At a second level of recurrence are venture capital funds, mentioned in 14 responses, including explicit citations of DOMOVC, KPTL, SP Ventures, SLC Ventures, and Algar Ventures, in addition to unnamed funds. Companies, customers, and corporate partners, present in 11 responses, appear in the form of commercial contracts as well as strategic or corporate venture partnerships, with direct mentions of organizations such as BASF, BayWa, Agrivalle, and agroindustrial cooperatives. Banks and private credit instruments were cited in 10 responses, including explicit references to Banco Itaú, Sicoob, and lines such as Pronampe, indicating complementary use of traditional credit in financing operations.

More specifically, crowdfunding and equity crowdfunding were mentioned, mainly through the Captable platform (5 responses), in addition to private equity and venture builders (4 responses), awards, private competitions, and scholarships (responses), and private, local, or international philanthropy (3 responses). There were also about 7 responses classified as "none," "confidential," or "unspecified." The consolidation of the aggregated categories and nominal citations reveals a pattern of fragmented, incremental, and strongly relational financing, in which multiple sources are combined over time, with a clear predominance of equity and informal capital and still restricted access to more structured private instruments.

An analysis of the public funding sources used by agtechs reveals significant changes in the composition and intensity of use of these instruments over the period 2023–2025, although the proportion of companies that do not access public resources remains high. In 2025, considering 157 valid responses, 51.6% of agtechs reported not having used any public source

of financing, a percentage close to that observed in 2024 (52.7%) and lower than that recorded in 2023 (54.9%). Therefore, it is clear that there has been a gradual but limited reduction in the number of companies totally excluded from public funding instruments.

Among the sources actually used, there is consistent growth in non-reimbursable research funds, which reach 23.6% of agtechs in 2025, compared to 17.6% in 2024 and 18.5% in 2023. This movement reinforces the central role of research, development, and innovation (R&D&I) instruments as the main avenue of access for agtechs to public policies, especially for companies with greater technological intensity.

2.18 Public Financing

Public calls for proposals for agricultural technology also show significant expansion, rising from 7.2% in 2023 to 10.7% in 2024 and 15.3% in 2025 (Table 19). A similar trend is observed in public calls for impact businesses, which grew from 7.7% in 2023 to 9.2% in 2024 and 14.0% in 2025. These data suggest greater alignment between the profile of agtechs and thematic public instruments, geared toward both sectoral innovation and socio-environmental impact agendas. Conversely, public calls for proposals for technology not specific to agriculture show a relative decline, falling from 26.7% in 2023 to 25.2% in 2024 and 22.9% in 2025, which may indicate a gradual replacement by more focused instruments, aligned with the specificities of the agricultural sector.

Other modalities remain more limited, although they show growth. The use of business incubators rose from 4.6% in 2023 to 6.4% in 2025, while public venture capital advanced from 0.8% in 2024 to 3.8% in 2025, signaling a greater, albeit limited, presence of public instruments with an investment logic. Tax incentives for innovation remain low but stable (3.2% in 2025), reflecting recurring difficulties in accessing or adapting these mechanisms to the profile of startups.

Finally, there is a significant drop in the use of public loans, which fell from 7.2% in 2023 to 6.1% in 2024 and 2.5% in 2025, indicating lower attractiveness or greater selectivity of these instruments in a context of rising credit costs. The categories “public notices from other areas” (3.2%) and “other public sources” (0.6%) remained residual, reinforcing the concentration of public financing in instruments directly associated with innovation.

The results point to a gradual repositioning of public promotion policies, with a greater focus on non-reimbursable, sectoral, and impact-oriented instruments, while agtechs continue to rely heavily on private and proprietary sources. This configuration is consistent with data on stage of development, revenue, and use of advanced technologies, suggesting that public funding acts in a complementary and selective manner, rather than as a structural basis for financing the ecosystem.

Table 24. *Public sources of financing for agtech companies in the sample*

Public Source	n	%	% in 2024	% in 2023
Non-reimbursable research funds	37	23,6%	17,6%	18,5%
Public technology calls for proposals (not specific to agriculture)	36	22,9%	25,2%	26,7%
Public tenders for technology for agriculture	24	15,3%	10,7%	7,2%
Public notices for impact businesses	22	14,0%	9,2%	7,7%
Business incubator	10	6,4%	3,8%	4,6%
Venture capital	6	3,8%	0,8%	2,1%
Public tenders in other areas	5	3,2%	5,3%	4,6%
Tax incentives (e.g., laws supporting innovation)	5	3,2%	1,5%	1,5%
Loans	4	2,5%	6,1%	7,2%
No public source	81	51,6%	52,7%	54,9%
Other public sources	1	0,6%	2,3%	3,1%
Respondents	157	100,0%		

The analysis of open-ended responses regarding public funding sources, based on 75 valid responses from agtechs that reported having accessed at least one public funding instrument, reveals the structural centrality of State Research Support Foundations (FAPs) in financing the ecosystem. FAPs were mentioned in 42 responses, with FAPESP standing out with 16 mentions, predominantly associated with the PIPE Program (PIPE Phase 1, PIPE Phase 2, and Indirect PIPE), which is the most cited individual instrument among all public sources. FAPEMIG appears in 9 mentions, linked to programs such as Compete Minas, technological scaling calls, and joint initiatives with Sebrae. FAPESC registers 6 mentions, mainly through Tecnova SC and the Nascer Program, while FAPEMAT appears in 4 mentions, associated with Tecnova III and Inova Amazônia – Tração. Other FAPs were also mentioned, such as FACEPE (four mentions, especially the Compet program), FAPEG (five mentions, with Aceleracampo and Trilhas da Inovação), FAPEAP and FAPEMA (two mentions each), FAPERJ (3 mentions), and FAPESQ-PB (2 mentions), highlighting the broad territorial coverage of state funding.

At the federal level, FINEP stands out as the most frequently mentioned agency, with 29 mentions associated with different types of support, including economic subsidies, FINEP Agriculture 4.0, Indirect PIPE, Innovative Women, cooperative financing, and larger-scale projects in partnership with anchor companies. CNPq appears in 22 mentions, mainly through the RHAE (Calls 2021, 2024, and 2025) and MAIDAI () programs, technological bonuses, and scholarships linked to the placement of researchers in companies. Sebrae is mentioned in 25 responses, acting transversally through programs such as Catalisa ICT (14 mentions), Inova Amazônia (6 mentions), Inova Cerrado (4 mentions), StartupNE (3 mentions), and regional actions coordinated with FAPs. The Centelha Program, mentioned in 21 responses, is one of the most ramified instruments in the ecosystem, appearing in multiple state editions (Centelha SP, RS, BA, PB, MT, among others) and often combined with other mechanisms, such as

PIPE, Tecnova, and Catalisa, reinforcing its role as a structuring gateway for technology-based startups.

Other public sources have a lower incidence but contribute to understanding the diversity and complexity of the promotion system. Instruments for technological cooperation and industrial scaling, such as EMBRAPPI and SENAI, account for 11 mentions, generally associated with advanced prototyping projects, industrial validation, and integration with production chains. CAPES scholarships appear in 6 responses, especially in deeptechs with strong academic ties and long-term projects. Tax incentives, such as the Lei do Bem (Good Law), were mentioned in 4 responses, indicating that use of this instrument is still limited. There are also references to incubators and public technology parks (six mentions, such as Green Sampa and environments linked to the CERTI/CELTA Foundation), public banks and multilateral organizations (five mentions, including the IDB, World Bank, Itaipu Binacional, and state governments), and international public programs, such as France 2030 (four mentions).

Thus, the data indicate that public financing of Brazilian agtechs is fragmented, incremental, and heavily based on non-reimbursable instruments, requiring a high capacity for institutional coordination on the part of companies and acting in a manner complementary to private financing, rather than as its structural basis.

2.19 Perception on Services

Issues related to innovation ecosystem resources were assessed using a five-point Likert scale, where 1 corresponds to “Not important,” 2 to “Not very important,” 3 to “Moderately important,” 4 to “Very important,” and 5 to “Priority.” This structure allows us to distinguish gradual levels of relevance attributed by startups to different types of infrastructure, services, and connections, highlighting not only items considered relevant and but also those perceived as strategic for the development and scalability of technological solutions in agriculture.

Analysis of the results indicates that, in the Infrastructure and Spaces block, startups give higher priority to resources directly associated with applied innovation and experimentation, with emphasis on Resources for R&D and Prototyping, which account for 79.1% of responses on scales 4 and 5, with 47.3% classified as priority (Table 20). Also noteworthy are Laboratories and Specialized Equipment (68.5%) and Spaces for Companies to Set Up, with Adequate Connectivity (65.9%). These results suggest that infrastructure is perceived as more relevant when it enables testing, technological validation, and solution development, as opposed to physical or informational structures considered more generic.

Table 25. Infrastructure and Spaces

Infrastructure and Spaces	1	2	3	4	5	Total	1	2	3	4	5
Resources for R&D and Prototyping	10	4	13	41	61	129	7,8%	3,1%	10,1%	31,8%	47,3%
Service and technology vouchers	8	11	27	36	46	128	6,3%	8,6%	21,1%	28,1%	35,9%
Spaces for companies to set up (, including coworking) with high-speed internet and Wi-Fi networks	9	14	21	41	44	129	7,0%	10,9%	16,3%	31,8%	34,1%
Experimental cultivation areas	19	15	22	33	39	128	14,8%	11,7%	17,2%	25,8%	30,5%
Specialized software (proprietary software, data analysis, modeling, development platform, etc.)	10	16	21	44	39	130	7,7%	12,3%	16,2%	33,8%	30,0%
Intellectual Property Licensing	13	9	24	46	37	129	10,1%	7,0%	18,6%	35,7%	28,7%
Specialized laboratories and equipment	18	4	18	52	35	127	14,2%	3,1%	14,2%	40,9%	27,6%
Specialized libraries and databases (scientific bibliography, patents, market data, climate data, and market information, etc.)	8	11	32	44	34	129	6,2%	8,5%	24,8%	34,1%	26,4%
1 "Not important," 2 "Slightly important," 3 "Moderately important," 4 "Very important," and 5 "Priority"											

In the set of Specialized Programs and Services, there is an even greater concentration of responses on the higher importance scales, especially in items related to market access and financial resources (Table 21). Access to customer base and sales channels has the highest priority level in the entire block, with 88.1% of responses on scales 4 and 5, 71.4% of which are at maximum priority. Next are Support for seeking funding and subsidies (82.0%), Pilot

project execution (82.1%), and Support for seeking investments (81.4%). In contrast, financial mechanisms such as loans (55.9%) and crowdfunding (52.8%) are relatively less important, indicating that startups value instruments that are more aligned with market traction and business scalability.

Table 26. Specialized Programs and Services

Specialized programs and services	1	2	3	4	5	Total	1	2	3	4	5
Access to customer base and sales channels	1	5	9	21	90	126	0,8%	4,0%	7,1%	16,7%	71,4%
Support for seeking funding and subsidies	2	5	16	32	73	128	1,6%	3,9%	12,5%	25,0%	57,0%
Support for investment search	2	9	13	35	70	129	1,6%	7,0%	10,1%	27,1%	54,3%
Pilot project implementation	6	7	10	40	65	128	4,7%	5,5%	7,8%	31,3%	50,8%
Support in regulatory and legal matters (e.g., intellectual property)	4	5	15	48	56	128	3,1%	3,9%	11,7%	37,5%	43,8%
Product development program, co-development of the solution, rapid prototyping	7	10	15	41	53	126	5,6%	7,9%	11,9%	32,5%	42,1%
Marketing and sales support	3	5	17	50	54	129	2,3%	3,9%	13,2%	38,8%	41,9%
Provision of innovative services or products	6	5	31	38	48	128	4,7%	3,9%	24,2%	29,7%	37,5%
Support in obtaining certifications	7	8	19	47	47	128	5,5%	6,3%	14,8%	36,7%	36,7%
Corporate or government purchasing (within or outside open innovation programs)	7	8	29	41	43	128	5,5%	6,3%	22,7%	32,0%	33,6%

Continued ►

Specialized programs and services	1	2	3	4	5	Total	1	2	3	4	5
Support for crowdfunding	9	15	36	32	35	127	7,1%	11,8%	28,3%	25,2%	27,6%
Support in seeking loans	9	19	28	38	33	127	7,1%	15,0%	22,0%	29,9%	26,0%
1 "Not important," 2 "Slightly important," 3 "Moderately important," 4 "Very important," and 5 "Priority"											

Finally, the Connections and Networking block presents the highest priority levels among all categories analyzed, highlighting the centrality of relationship networks for the development of startups (Table 22). Connections with potential customer companies and suppliers reached 96.2% of responses on scales 4 and 5, followed by Connections with institutional partners (90.8%) and Connection events (87.8%). These results corroborate the perception that the value of the innovation ecosystem for startups is strongly associated with their ability to articulate concrete strategic relationships, especially those oriented toward generating business, partnerships, and market opportunities, while more diffuse formats, such as online communities (52.7%), are perceived as less of a priority.

Table 27. Connections and Networking

Connections and networking	1	2	3	4	5	Total	1	2	3	4	5
Connections with potential client companies and suppliers	0	0	5	23	103	131	0,0%	0,0%	3,8%	17,6%	78,6%
Connections with potential partners (research organizations, government, innovation environments, S system, etc.)	2	2	8	37	82	131	1,5%	1,5%	6,1%	28,2%	62,6%
Networking events (business rounds, meetups, themed workshops, fairs, etc.)	1	4	11	41	74	131	0,8%	3,1%	8,4%	31,3%	56,5%
Participation in trade shows and industry events	1	4	14	42	70	131	0,8%	3,1%	10,7%	32,1%	53,4%

Continued ►

Connections and networking	1	2	3	4	5	Total	1	2	3	4	5
Specialized mentoring (agriculture, business, technology, etc.)	2	6	18	48	57	131	1,5%	4,6%	13,7%	36,6%	43,5%
Connections with research institutions	6	4	18	47	55	130	4,6%	3,1%	13,8%	36,2%	42,3%
Connections with technology suppliers	3	10	21	44	53	131	2,3%	7,6%	16,0%	33,6%	40,5%
Online communities (forums, discussion groups)	5	16	41	36	33	131	3,8%	12,2%	31,3%	27,5%	25,2%
1 "Not important," 2 "Slightly important," 3 "Moderately important," 4 "Very important," and 5 "Priority"											

2.20 Talent and diversity

The distribution of agtechs by number of employees, considering 90 valid responses, shows the predominance of lean organizational structures in the ecosystem analyzed (Table 23). More than half of the companies (56.7%) have up to five people, which reflects a profile strongly associated with startups in the early stages of development, with a high degree of centrality in the founding teams and recurrent use of external partnerships or outsourced services.

A second relevant group is composed of agtechs with 6 to 10 people, which represent 21.1% of the sample, indicating companies that have already begun more formal organizational structuring processes, while still maintaining small teams. The intermediate ranges, between 11 and 20 people (7.8%) and 21 to 50 people (6.7%), account for a smaller proportion of companies, suggesting that the transition to larger teams occurs gradually and selectively.

Agtechs with more robust structures are in the minority: only 4.4% of respondents have between 51 and 100 people, and 3.3% reported having more than 100 people. Data underlines the characterization of an ecosystem mainly formed by small startups, which is consistent with the observed revenue levels and the predominance of companies classified as being in the MVP or early stage, in which organizational growth tends to follow economic strengthening in a non-linear manner.

Table 28. *Distribution by Number of People*

People	Agtechs	%
Up to 5	51	56,7%
6 to 10	19	21,1%
11 to 20	7	7,8%
21 to 50	6	6,7%
51 to 100	4	4,4%
Above 100	3	3,3%
Total	90	100,0%

The analysis regarding the existence and maturity of Diversity and Inclusion (D&I) programs in agtechs, considering 99 valid responses, indicates that most companies are still in the early stages of structuring this topic (Table 24). More than half of the agtech respondents (52.5%) stated that they have specific actions and initiatives, but without the formalization of a structured program, which suggests that approaches are still fragmented, often dependent on individual or circumstantial initiatives.

In addition, 31.3% of agtechs stated that they did not have any initiatives related to D&I, demonstrating that a significant portion of the ecosystem has not yet explicitly incorporated the topic into its organizational agenda. In contrast, only 6.1% of companies indicated that they have an existing program, but one that needs improvement, while 10.1% stated that they have a mature program connected to organizational policies, constituting a minority group with greater institutionalization of the topic.

Table 29. *Infrastructure and Spaces*

D&I Programs	Agtechs	%
The organization has no initiatives in this regard.	31	31,3%
There are actions and initiatives, but no structured program.	52	52,5%
The program exists, but it needs improvement.	6	6,1%
The program is mature and connected to organizational policies.	10	10,1%
Total	99	100%

The results point to an ecosystem in which diversity and inclusion practices are still mostly in their infancy or informal, with few cases of full integration into organizational strategies. This pattern is consistent with the predominant profile of small companies and lean structures, but it also signals a significant opportunity for evolution, especially as agtechs advance in organizational maturity, expand their teams, and strengthen their internal governance processes.

2.21 Artificial Intelligence and Machine Learning

The classification of the use of Artificial Intelligence (AI) and Machine Learning (ML) by agtechs was organized into six categories of technological intensity and centrality: (A) We do not use it; (B) We use generative AI exclusively (e.g., ChatGPT, Gemini, Mistral, DeepSeek); (C) We use generative AI jointly with other AI/ML applications; (D) We use AI/ML in internal processes or business operations; (E) We use AI/ML as a central part of the product and/or service offered; and (F) We are a deeptech company specializing in AI/ML. The CORE category aggregates companies in which AI/ML is a central element of the value proposition (categories E and F), allowing us to identify the most AI-intensive technological core within the ecosystem.

Analysis of AI/ML adoption by category shows that the most advanced use—corresponding to groups E (AI/ML as a central part of the product/service) and F (deep tech specializing in AI/ML)—is mainly concentrated in data-driven and automation-oriented technological solutions (Table 25). In Remote Sensing, Diagnosis, and Image Monitoring, 12 of 16 respondents are in E+F, representing 75.0% of the category. Similarly high percentages are observed in Drones, Machinery, and Equipment (6 of 9; 66.7%) and Internet of Things for Agriculture (4 out of 6; 66.7%), as well as Telemetry and Automation (5 out of 9; 55.6%) and Integrated Platform for Systems, Solutions, and Data (8 out of 14; 57.1%). These results indicate that the categories most directly associated with the collection, integration, and analysis of data in the field show greater technological intensity and greater centrality of AI in the value proposition.

Among the categories with the highest absolute number of respondents, the Rural Property Management System registers 7 out of 17 companies in E+F (41.2%), while Credit, exchange, insurance, carbon credits, and fiduciary analysis registers 4 out of 11 (36.4%). In the after the farm segment, Biodiversity and Sustainability stand out, with 2 out of 2 respondents in E+F (100%, albeit on a small scale), and Food Safety and Traceability, with 2 out of 4 (50.0%). These data suggest that, in addition to production technologies, solutions focused on sustainability, traceability, and financial services are also incorporating AI in a structural way.

In contrast, categories linked to traditional inputs and services have a lower incidence of E+F. Fertilizers, Inoculants, and Plant Nutrition register 1 out of 15 companies (6.7%) in this range, while Biological Control and Integrated Pest Management register 1 out of 12 (8.3%). The general pattern indicates that advanced AI/ML incorporation is more frequent in categories that are intensive in data, systemic integration, and automation, while segments associated with physical inputs or conventional technical services tend to have a lower proportion of deep tech or AI solutions at the core of the product.

Table 30. *AI/ML adoption by category*

Category	A	B	C	D	E	F	Grand Total
Inside - Remote Sensing, Diagnostics, and Image Monitoring.				4	6	6	16
Inside - Rural Property Management System.	1	2	2	5	4	3	17
Inside - Integrating platform for systems, solutions, and data.		1	4	1	4	4	14
Before - Credit, exchange, insurance, carbon credits, and fiduciary analysis.	1		4	2	4		11
Inside - Telemetry and Automation.				4	5		9
Inside - Drones, Machines, and Equipment.	2			1	3	3	9
Inside - Internet of Things for Agriculture: pest detection, soil, climate, and irrigation.			1	1	3	1	6
Before - Fertilizers, Inoculants, and Plant Nutrition.	4	6	1	3	1		15
Inside - Biological Control and Integrated Pest Management.	5	2	2	2	1		12
Inside - Meteorology, Irrigation, and Water Management.	1	1		1	1	1	5
After - Food safety and traceability.	1		1		2		4
Inside - Content, Education, Social Media.	1	1	1	1		1	5
Before - Marketplace for Agribusiness Inputs.	1	1		2	1		5
After - Storage, Infrastructure, and Logistics.		1	2		1		4
Before - Laboratory analysis.	2	1		1		1	5
After - Innovative foods and new food trends.		1	1	2			4
Inside - Agricultural waste management.	1			1	1		3
After - Biodiversity and Sustainability.				1	1		2

Continued ►

Category	A	B	C	D	E	F	Grand Total
Inside - Connectivity and Telecommunications.	1	1		2			4
After - Marketplaces and platforms for trading and selling agricultural products.		2				1	3
Inside - Shared economy.	1					1	2
Inside - Beekeeping and Pollination.					1		1
Before - Genomics and Animal Reproduction.	1			1			2
After - Bioenergy and Renewable Energy.				1			1
After - Urban planting: plant factory and new forms of planting.				1			1
Before - Animal Nutrition and Health.	2	2					4
Before - Seeds, Seedlings, and Plant Genomics.	2	1					3
After - Packaging Systems, Environment, and Recycling.	2	1					3
Grand Total	29	24	19	37	39	22	170
	17,1%	14,1%	11,2%	21,8%	22,9%	12,9%	100,0%

2.22 Trends and Analytical Interpretations

2.22.1 Key business challenges

The most recurring challenge in the 145 open responses concerns market access and commercial traction, often associated with the difficulty of reaching rural producers, structuring sales channels, reducing long commercial cycles, and clearly communicating the value proposition of technologies. This challenge appears across B2B and B2G companies, with explicit mentions of barriers such as low digitization of rural producers, cultural resistance to the adoption of new technologies, the need to re-educate the public, difficulty in generating brand recognition, and complexity in selling technological solutions in traditional production chains. In many cases, market access is described as conditional on field validation, the building of strategic partnerships, and a clear demonstration of economic return (ROI), especially in contexts of tight margins and high cost sensitivity on the part of agricultural customers.

A second central axis refers to financial and financing challenges, including the lack of capital to scale operations, invest in R&D, purchase equipment, structure commercial teams, and sustain long cycles of technological validation. The responses highlight difficulties in

accessing private investment, especially for early-stage startups or deep- -tech companies that do not yet have recurring revenue, as well as in accessing credit, which is described as expensive, bureaucratic, or unsuited to the reality of startups. There are also recurring mentions of dependence on public tenders, the scarcity of non-reimbursable resources, the so-called “valley of death” for startups, and the misalignment between financial instrument requirements and the actual stage of the companies. In several reports, financing appears directly connected to the ability to scale, innovate, and survive in the short term.

The third major set of challenges involves technological, operational, and regulatory aspects, with a particular emphasis on connectivity in the field, technical scalability, data integration, information security, and regulatory compliance. Rural connectivity is repeatedly cited as a structural bottleneck, directly affecting solutions based on data, AI, IoT, and digital platforms. At the same time, many companies report difficulties in transforming prototypes and laboratory processes into scalable, standardized, and economically viable industrial operations. For science-based agtech companies, challenges often arise related to regulatory registrations, certifications, intellectual property, scientific validation, and requirements from agencies such as MAPA, ANVISA, and environmental authorities. There are also concerns about skilled labor, talent retention, technical training for users, cybersecurity, and dependence on global supply chains, especially in contexts of economic and geopolitical instability.

In line with what was seen in 2024, analysis of the open responses from the 2025 edition confirms that the challenges faced by agtechs remain diverse and structural, with recurring emphasis on access to capital, especially in the early stages and during transitions to commercial scale. In both surveys, financing appears directly associated with the ability to scale the business, sustain long cycles of technological validation, and cross the so-called “valley of death” for startups. In 2025, this diagnosis deepens by highlighting simultaneous difficulties in accessing private investment, adequate credit, and non-reimbursable resources, in addition to the misalignment between the requirements of financial instruments and the operational reality of agtechs, particularly deep- -techs, and companies still in the pre-revenue phase.

Also continuing from the 2024 analysis, challenges related to market entry persist, often described as the need for a change in mindset on the part of customers, partners, and the agricultural sector itself. The responses from 2025 reiterate the difficulty of clearly demonstrating the economic, productive, or environmental value of the solutions offered, especially in contexts of low digitization among rural producers, cultural resistance to technological adoption, and high cost sensitivity. This challenge is linked to the shortage of qualified professionals and the growing incorporation of cutting-edge technologies, such as artificial intelligence, data science, biotechnology, and IoT, which increase the technical complexity of solutions and require greater training for users and teams. A comparison between 2024 and 2025 indicates continuity and deepening of the bottlenecks already identified, reiterating that the challenges of the agtech ecosystem in Brazil remain systemic and require coordinated medium- and long-term responses.

2.22.2 Technological and market trends

The 130 responses in this edition differentiated between some short-term and some medium- and long-term trends. In the short term (up to 6 months), the technological and market

trends indicated by agtechs focus on applications that can be implemented quickly and have a direct operational impact. Noteworthy are the expansion of the use of artificial intelligence, including generative AI in customer service, technical support, and decision-making, as well as the incremental adoption of IoT sensors, telemetry, and real-time monitoring for soil, irrigation, controlled environments, and animal welfare. Process digitization, integration with cloud platforms, and the use of accessible channels, such as mobile apps and WhatsApp, appear as strategies to reduce adoption barriers. At the same time, pressure for traceability, regulatory compliance, and ESG reporting is growing, driven by market and supply chain requirements. Connectivity in the field repeatedly emerges as a key constraint: more than a trend, it is perceived as a structural bottleneck that limits the full adoption of digital solutions in the short term.

In the medium and long term (3 to 5 years), the responses point to more structural transformations, associated with the intensification of agriculture 5.0 and the convergence of different technologies. The deep integration of AI and machine learning with IoT, advanced automation, robotics, edge computing, digital twins, and predictive models is gaining relevance, enabling the existence of increasingly autonomous and data-driven systems. There are also growing expectations for advances in solutions linked to measurable sustainability, such as carbon monitoring, biodiversity, and environmental performance, with greater use of digital tools for Monitoring, Reporting, and Verification, certifications, and, in some cases, blockchain. In the field of biotechnology, trends such as bio-inputs, new-generation biologics, RNAi, gene editing, nanotechnology, and bioeconomy stand out, often combined with digital platforms and AI to scale R&D, validation, and production, indicating a movement toward hybrid solutions between biological and digital.

In light of the 2024 analysis, the 2025 results reinforce the continuity of these perceptions, with strong convergence around AI, IoT, automation, digitization, sensors, and sustainable technologies as central vectors for the future of the sector. However, as noted earlier, there remains a possible mismatch between the technological vision of agtechs and market reality, especially in the Brazilian context. Infrastructure limitations, low connectivity in rural areas, and the slow diffusion of advanced networks are still mentioned as relevant barriers. Thus, although trends point to greater technological sophistication and sustainability, their materialization tends to occur unevenly and gradually, conditioned by agtechs' ability to demonstrate clear economic value, adapt solutions to field constraints, and keep pace with regulatory and infrastructure developments.

2.22.3 Desired improvements in the agtech ecosystem

As for what could be improved in Brazil's agtech ecosystem, the main highlight of the 131 responses is access to financing, both private and public. The responses repeatedly indicate that capital constraints—especially in the early stages, in *scale-ups*, and in deeptechs with longer development cycles—continue to be one of the main obstacles to the validation, traction, and scalability of solutions. In this context, the role assigned to the State as a structuring agent of the ecosystem is clearly observed, with a strong emphasis on the need for supportive legislation, economic subsidies, public procurement of innovation, non-reimbursable capital, long-term credit, specialized funds, and greater efficiency in the operation of existing public

instruments. This perception is consistent with the analysis presented in Radar Agtech Brasil 2024, which already pointed to a mismatch between the strategic centrality of agriculture to the Brazilian economy and the still limited supply of financial mechanisms compatible with technological risk and the maturation time of innovations.

Despite the existence of a significant number of innovation environments, hubs, incubators, accelerators, technology parks, and regional initiatives, agtechs indicate that connections between the different actors in the ecosystem could still be more frequent, structured, and oriented toward concrete results. The responses reveal a persistent perception of fragmentation, with universities, research institutes, startups, investors, corporations, cooperatives, and public agencies operating in a poorly integrated manner. In this sense, proposals such as expanding events focused on business generation, creating qualified matchmaking mechanisms, and, above all, strengthening structured fields of technological validation, such as living labs, experimental farms, assisted pilots, and open innovation programs with clear criteria, appear repeatedly. The difficulty of accessing real testing environments, especially for agtechs in the early stages or outside major centers, limits the generation of technical evidence, the confidence of rural producers, and the reduction of risk perceived by investors and corporate partners, in line with the findings of Radar Agtech 2024.

With regard to the institutional environment, the responses point less to a generic criticism of regulation and more to the need to improve existing instruments, in order to make them more agile, predictable, and in line with the reality of startups. The proposal for regulatory sandboxes, technical regulatory guidance bodies, clearer regulatory frameworks for bio-inputs, biotechnology, hardware, IoT, and digital solutions, as well as greater coordination between regulatory agencies, ministries, Embrapa, ICTs, universities, and the private sector, stands out. Proposals to simplify processes in scientific and technological institutions, reduce costs and deadlines for testing and registration, and greater alignment between regulatory requirements and the technological maturity stage of solutions are also consistently mentioned. These suggestions reflect a search for predictability and institutional coordination, rather than deregulation, and directly address the practical limitations reported by agtechs in the survey.

Finally, the responses reiterate the need to train professionals and entrepreneurs in advanced skills that go beyond technical and agronomic expertise and include management, commercial structuring, intellectual property, regulation, fundraising, internationalization, data integration, and go-to-market strategies. These results are in line with the 2024 analysis, which characterized the agtech ecosystem as maturing, but still marked by gaps in the training of hybrid talents capable of moving between applied science, technological development, the field, and the market. Complementary concerns also arise regarding the retention of young people in the field, cultural resistance to technological adoption, and the need for greater digital and entrepreneurial education for rural producers.

There is a consistent expectation that Radar Agtech will progressively evolve from a predominantly analytical and descriptive tool to a more active mechanism for articulating the ecosystem, capable of inducing qualified and recurring connections between startups, producers, researchers, investors, and public policy makers. The responses indicate that the mapping already fulfills its function of providing visibility, organizing information, and legitimizing actors very well, but that there is room to advance in the practical orchestration of interactions, bringing innovation closer to the real field and reducing the gap between

technological development, validation, and adoption. This expectation is directly in line with the findings of Radar Agtech 2024, which already pointed to the fragmentation of initiatives, the scarcity of structured testing environments under real conditions, and the difficulty of transforming knowledge into contracts, partnerships, and business deals.

In this sense, the role of Radar Agtech tends to be perceived as that of a platform for continuous connection, and not just annual, supported by Embrapa as a technical-scientific validation agent, by the State's capacity to induce demand and reduce institutional uncertainties, and by investors as catalysts of smart capital and venture client models. The articulation between structured information (Radar Agtech), validation and technical credibility (Embrapa and Homo Ludens), and economic traction (SP Ventures) appears, in the responses, as a concrete path to strengthen the ecosystem, accelerate value generation in agriculture, and transform mapped innovation into effective impact in the field.

2.23 Final Considerations

The consolidated results of the 2025 survey reveal an agtech ecosystem that combines high technological intensity with persistent structural weaknesses. The sample reveals mostly young startups with lean organizational structures and still low revenue levels, but with a strong focus on innovation, widespread adoption of digital technologies, and growing incorporation of artificial intelligence. This asymmetry between technological sophistication and economic robustness suggests that the main challenge for the ecosystem is not the ability to develop solutions, but rather the feasibility of scaling, monetizing, and spreading them across the territory.

Throughout the chapter, there is consistency between different analytical blocks: high technological readiness, positive perception of growth, relevant integration with innovation ecosystems, and strong dependence on equity capital and non-reimbursable public instruments. However, bottlenecks persist in relation to access to structured financing, validation in real field conditions, rural connectivity, and coordination between public policies, regulatory frameworks, and market dynamics. Financial vulnerability appears as a cross-cutting limiting factor, conditioning the ability of agtechs to transform innovation into systemic impact.

In this scenario, strengthening the agtech ecosystem in Brazil depends less on the creation of new isolated instruments and more on the strategic coordination of existing ones. The articulation between qualified mapping, technical-scientific validation, adequate financing, and market generation emerges as a structuring axis for the next phase of the sector's maturation. This agenda could reduce the gap between technological development and effective adoption in the field, expanding the contribution of agtechs to the competitiveness, sustainability, and resilience of Brazilian agriculture.

PART III

Investors

1. Investments in the innovation ecosystem: the global and Brazilian context and the perspective of investors

• João Paulo Marchesan, Pedro Jábali, and Felipe Guth

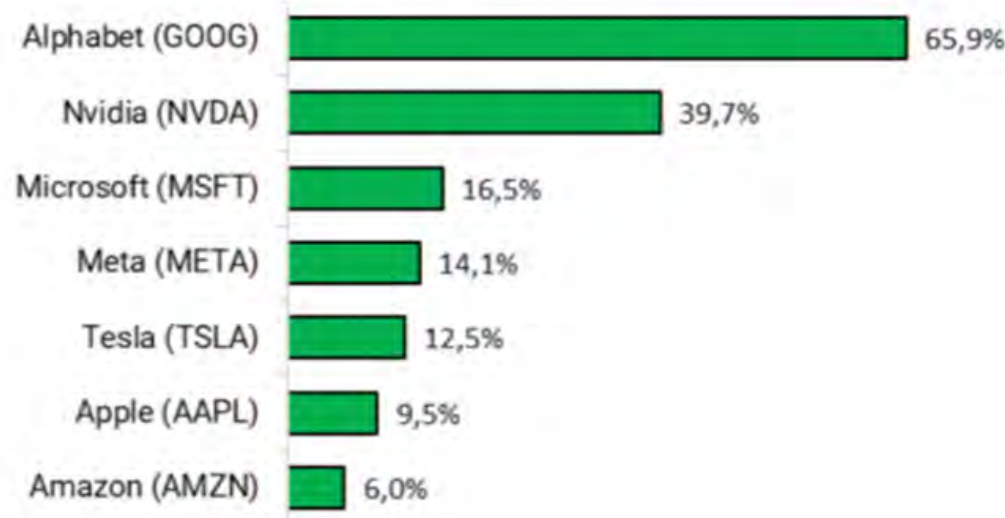
1.1 World 2025

How can we discuss expectations for Brazilian agribusiness in 2026 without first understanding the global backdrop that took shape throughout 2025? The previous year was one of the most intense in recent decades in terms of information density, strategic disruptions, and power realignments, creating an environment in which investment decisions came to depend more on a structural reading of the global landscape.

One of the key drivers of this period was the accelerated advancement of technology, particularly artificial intelligence. In 2025, AI definitively moved beyond the realm of promise to establish itself as a cross-cutting infrastructure of the global economy. Companies such as Nvidia, OpenAI, and Google began to occupy a decisive position not only as technology providers but as central assets in the competition for productivity, efficiency, and economic leadership among companies and countries. Artificial intelligence began to reshape entire value chains, influencing everything from industrial processes to public policy decisions, becoming a direct driver of global competitive advantage, and leading to a significant rise in their stock prices, as shown in Chart 1 on the performance of these companies throughout 2025, and to their status as the Magnificent Seven.

Chart 1. Performance of the Magnificent Seven in 2025, year-over-year percentage change in USD

Big Techs (% in the year, USD)



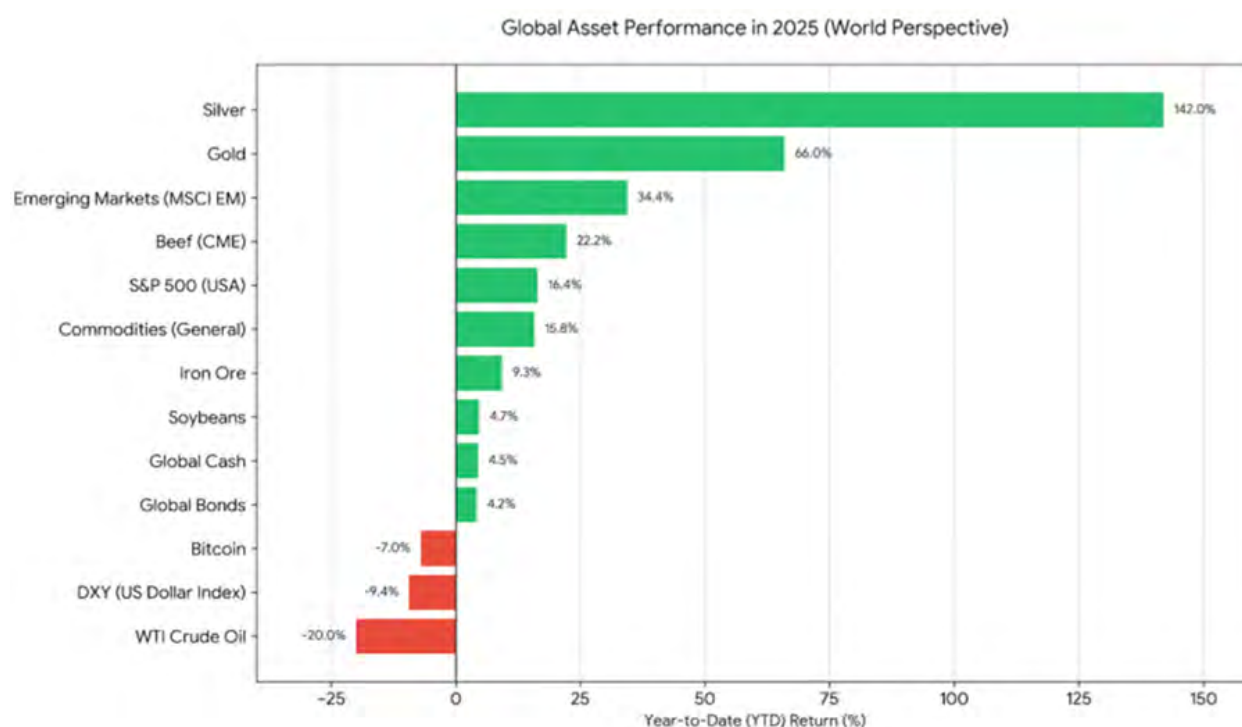
Sources: XP Research, FactSet. Dados até 30/12/2025.

At the same time, the geopolitical environment continued to deteriorate. Armed conflicts remained active, notably the war between Russia and Ukraine, in addition to persistent tensions in the Middle East and around Taiwan. At the same time, trade disputes became more explicit among major economic blocs, especially between the United States, China, and the European Union. The result was a growing fragmentation of global governance, with the weakening of multilateral mechanisms, the advancement of national industrial policies, and a silent yet profound yet profound, of global supply chains through strategies such as reshoring (bringing the supply chain back to the country of origin) and friendshoring (locating the supply chain in allied countries), increasing costs, redundancies, and systemic risks.

In the macroeconomic sphere, the year 2025 was marked by an asymmetric slowdown in inflation. Developed economies began signaling cycles of monetary easing, led by shifts in the Federal Reserve's policy stance, while several emerging economies remained under pressure from fiscal imbalances and structural constraints. Brazil joined this group, grappling with high interest rates (15% nominal and between 9% and 10% real), not only due to inflationary pressures but primarily due to fiscal and y constraints and deteriorating expectations. This mismatch directly affected the overall cost of financing, risk appetite, and the availability of capital for long-term investments.

The significant increase in sovereign deficits around the world—led by the U.S. deficit of \$1.775 trillion in the fiscal year and the \$38 trillion mark in sovereign debt—combined with persistent geopolitical uncertainty and expectations of a reorganization of global supply chains, has significantly altered the dynamics of international capital flows. This process was amplified by the prospect of a structurally weaker dollar, resulting from the easing of U.S. monetary policy, which reduced the relative attractiveness of U.S. Treasury securities and encouraged a global repricing of assets.

As a result, emerging economies began to benefit from a reallocation of capital—a recurring phenomenon during cycles of dollar weakness—as investors sought higher real returns outside the traditional safe-haven assets. Even more notably, precious metals took center stage. In 2025, gold and silver recorded one of the most intense rallies ever seen, not only as classic hedges against inflation and geopolitical risk, but also as reserve assets in an environment of growing skepticism regarding the fiscal sustainability of major sovereign debt issuers. At year-end, as shown in Chart 2, these metals were the top performers in the asset performance rankings.

Chart 2. Cumulative returns of different asset classes in 2025, in %

Source: Author's own calculations (2025). Data consolidated via financial terminals (CME Group, MSCI, S&P Global, and Bloomberg). Returns measured in USD (U.S. Dollar).

In the case of silver, this trend was amplified by its dual nature. In addition to serving as a store of value, the metal has become increasingly in demand as a strategic input for technologies related to the energy transition, electrification, and digitalization, reflecting structural—rather than merely cyclical—demand, which drove its impressive appreciation of over 100%. Gold, meanwhile, established its role as a safe-haven asset and store of value in a scenario marked by greater volatility, a loss of macroeconomic predictability, and profound realignments in the global economic order, with its demand growing primarily due to purchases by central banks around the world.

Another decisive factor during this period was the deepening of the climate agenda, which is no longer treated exclusively as an environmental issue but has taken on a central role in global economic and geopolitical dynamics. According to the IPCC AR6, an intergovernmental scientific body linked to the UN, extreme events such as heat waves, agricultural droughts, and intense precipitation have become significantly more frequent and severe, with high scientific confidence. The report indicates that the probability of extreme heat waves, which previously occurred once every 50 years, has already increased up to fivefold in several regions, and underscores the more simultaneous occurrence of climate shocks across different producing regions. By 2025, this new climate pattern directly affected the predictability of harvests, the stability of supply chains, and global food pricing, increasing the systemic risk associated with agricultural production.

At the same time, international climate governance faced new tensions. The United States, under President Donald Trump, adopted a more transactional stance toward multilateral commitments, increasing regulatory uncertainty and reinforcing the fragmentation of global

coordination by announcing its withdrawal from the Paris Agreement, the World Health Organization (WHO), and the United Nations Framework Convention on Climate Change (UNFCCC). This move contrasted with the regulatory progress observed in the European Union, which intensified carbon pricing mechanisms, traceability requirements, and environmental criteria for market access, transforming sustainability into a non-tariff economic barrier and a trade policy instrument.

Figure 1. Figure 1. Signing of executive orders in the Oval Office



Photo: Official White House Photo / Public Domain.

As a result, agricultural producer and exporter countries began operating in an environment of greater regulatory asymmetry, in which environmental requirements ceased to be merely reputational parameters and became concrete factors affecting competitiveness, market access, and the cost of capital. In this context, climate adaptation, transparency, and productive efficiency became permanently integrated into the economic logic of global agribusiness.

A structural shift in capital behavior was also observed. Global investors began prioritizing operational efficiency, predictability, and risk-adjusted returns, reevaluating the logic of accelerated growth at any cost. This shift has directly impacted the technology and innovation ecosystem, with profound effects on startups, venture capital funds, and corporate venture strategies, imposing greater financial discipline and a focus on sustainable business models across all sectors. The only piece that does not fit into this new puzzle is Artificial Intelligence. The sector remains mired in a spiral of massive investments and inflated valuations, creating a scenario of hyper-speculation that many already classify as a systemic bubble with an expiration date.

This set of factors has redefined the context in which the global agribusiness sector—and the Brazilian sector in particular—now operates. Rather than merely reacting to isolated

shocks, the sector has been challenged to position itself strategically in a world that is more technologically advanced, more fragmented, and structurally more volatile. It is in this environment that Brazil enters 2026, simultaneously exposed to global uncertainties and possessing unique structural advantages, which form the basis for understanding the investment decisions, capital allocation, and production strategies of Brazilian agribusiness in the coming cycle.

1.2 Brazil in 2025

In 2025, Brazil experienced a year of transition marked by increasingly evident asymmetries between the domestic environment and the international landscape. The global backdrop was characterized by economic slowdown, asset repricing, persistent geopolitical tensions, and the establishment of a new financial regime, with interest rates still high in real terms and greater selectivity in capital allocation. Emerging economies returned to investors' radar unevenly, influenced by macroeconomic fundamentals, fiscal discipline, financing capacity, and external positions.

Domestically, Brazil navigated 2025 under intense scrutiny regarding its fiscal trajectory and the sustainability of economic growth. The dynamics of public finances, the conduct of monetary policy, the cost of credit, and exchange rate volatility shaped investment, consumption, and capital allocation decisions throughout the year. At the same time, the country benefited from a unique position on the global stage: as one of the largest producers and exporters of food, energy, and raw materials, Brazil operated as a structural supplier in a world more sensitive to climate shocks, logistical disruptions, and geopolitical risks.

Agribusiness once again assumed a central role in the Brazilian economy. Amid high interest rates, credit restrictions, and increased risk aversion in financial markets, the sector served as the primary driver of foreign exchange earnings, support for the trade balance, and macroeconomic stability. Even so, this performance occurred under increasingly complex conditions, with greater exposure to extreme weather events, regulatory changes in consumer markets, pressures for traceability, and a transformation in the production financing model.

Analyzing Brazil in 2025, therefore, requires looking beyond aggregate indicators. It is necessary to understand how the fiscal landscape, interest rates, credit, exchange rates, financial markets, climate, production, exports, and trade relations have intertwined throughout the year and how agribusiness has positioned itself at the center of these interactions—not merely as a productive sector, but as an economic, financial, and strategic pillar of the country within a global landscape in flux.

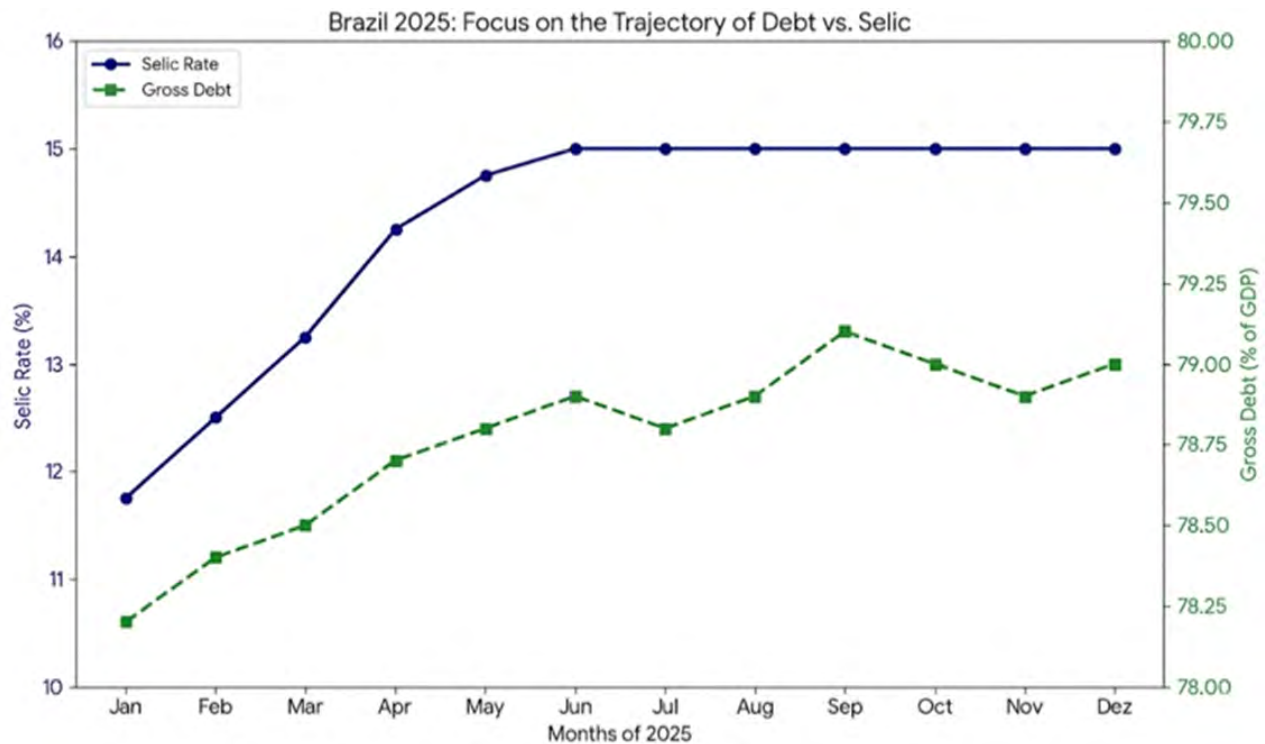
1.2.1 Fiscal landscape, interest rates, and credit: the cycle of acceleration and deceleration

The Brazilian economy operated under a regime of strong macroeconomic constraints last year, in which an expansionary fiscal policy clashed with a monetary policy that became even more restrictive as the year progressed. The result was an environment marked by the well-known “accelerate and brake” phenomenon, with stimulus from public spending continually offset by high borrowing costs, tighter credit conditions, and increased financial volatility.

From a fiscal perspective, the year was characterized by the gradual deterioration of public accounts and the difficulty in converging toward a credible strengthening path. The

primary deficit widened again, standing at nearly 0.7% of GDP, reflecting the growth of mandatory expenditures, the expansion of social programs, increased public investment, and high budgetary rigidity. Tax revenue, despite occasional gains, proved insufficient to keep pace with spending. As a result, general government gross debt rose throughout the year and ended 2025 at nearly 79% of GDP, as shown in Chart 3—a historically high level and significantly above that observed at the start of the previous decade.

Chart 3. Monthly Evolution of the Selic Rate and General Government Gross Debt in 2025



Source: Author's own calculations (2025). Data: Central Bank of Brazil / National Treasury (2025).

This fiscal situation put pressure on risk premiums and had direct effects on the conduct of monetary policy. Contrary to initial expectations of more rapid easing, the benchmark interest rate faced renewed upward pressure throughout the year, ending 2025 at around 15% per year in nominal terms. In real terms, Brazil remained among the countries with the highest interest rates in the world. From a historical perspective, this level is substantially higher than the average observed between 2017 and 2019, when the Selic rate hovered around 6.5%, and higher than in other recent cycles of economic recovery.

The combination of a weakened fiscal scenario and high interest rates had clear effects on economic activity. Brazilian GDP grew by about 2.3% in 2025, a positive performance, but below potential and marked by strong sectoral heterogeneity. While sectors dependent on the domestic market, such as consumer goods, services, and parts of industry, were more impacted by the high cost of credit and subdued demand, export-oriented activities performed relatively better. Within this group, agribusiness once again stood out, supported by dollar-denominated revenues, productivity gains, and resilient external demand, as will be demonstrated later in this chapter.

In the credit market, tightening was evident throughout the year. Banks became more selective, spreads remained high, and total credit growth slowed in real terms. Corporate credit was particularly affected by high financing costs and increased risk aversion. Targeted credit, particularly rural credit, faced fiscal constraints that reduced the scope for subsidies and equalization mechanisms. This environment accelerated a structural transformation in the financing of the economy, with greater participation by the capital markets and private instruments, such as CRAs, Fiagros, and other alternative structures—a significant development for agribusiness.

The increase in public spending without a clear counterpart in structural adjustment generated cascading effects. In addition to putting pressure on debt and interest rates, it contributed to greater exchange rate volatility, increased the cost of long-term capital, and reduced predictability for investment decisions. For the agribusiness sector, this context translated into greater caution regarding expansion, a growing focus on operational efficiency, more sophisticated financial management, and greater use of hedging instruments, private credit, and financing outside the traditional banking system.

In summary, the fiscal outlook, interest rates, and credit formed a triangle of constraints on sustainable growth in 2025. The Brazilian economy advanced, but intermittently, with short-term stimuli continually offset by structural weaknesses. Beyond weathering this environment, agribusiness once again acted as a macroeconomic stabilizer, strengthening its leading role in the country's economic, financial, and external dynamics.

1.2.2 Exchange Rate and External Sector: A Weaker Dollar and Agribusiness as a Macroeconomic Buffer

Brazil's exchange rate dynamics throughout 2025 were marked by a trend that, at first glance, could be interpreted as a strengthening of the domestic currency, but which primarily reflected the global revaluation of the dollar. After starting the year above R\$ 6.00, the U.S. dollar accumulated a decline of nearly 11% against the real over the period. This appreciation of the real, however, was far from representing a structural change in the perception of the country's risk.

To understand this movement, it is essential to analyze the dollar's behavior in global terms. The DXY index, which measures the dollar's strength against a basket of major currencies—including the euro, yen, British pound, Canadian dollar, Swedish krona, and Swiss franc—fell by about 10% in 2025 (versus 11% against the real), marking its worst annual performance since 2016. This data indicates that the dollar's depreciation was a broad phenomenon, affecting several currencies simultaneously, and not a specific event related to the real-dollar exchange rate, as evidenced by the index's performance in 2025.

Table 1. Variation in Exchange Rate Indicators (DXY and BRL) in 2025.

Indicator	Start of 2025	End of 2025	Change (%)
DXY	108,9	98,5	-9,55%
Dollar/Real (BRL)	R\$6,09	R\$5,40	-11,33%

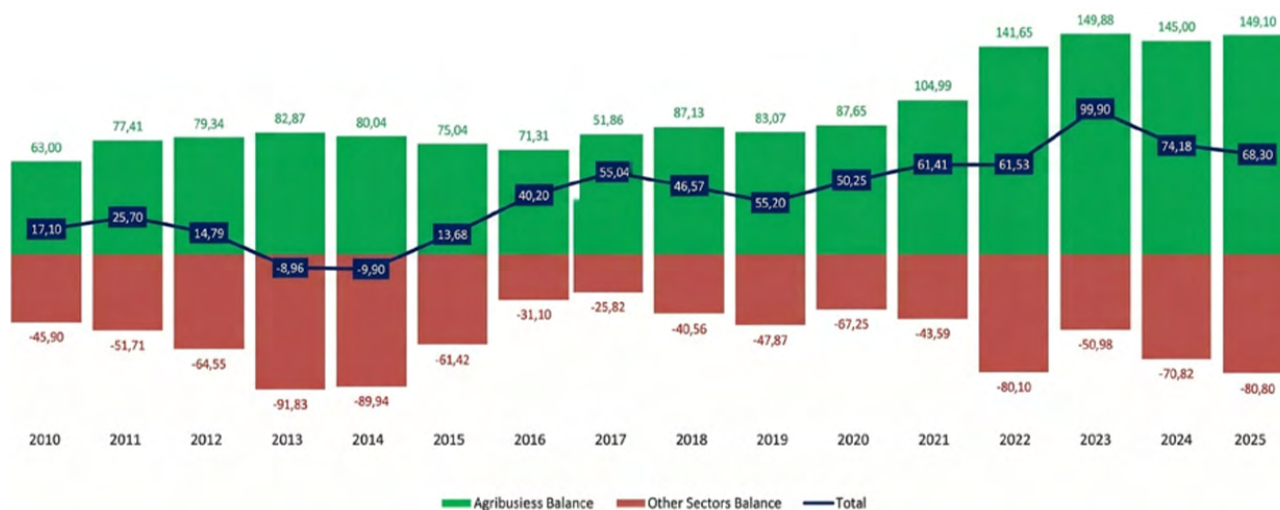
Source: Author's own calculations (2025). Data: Central Bank of Brazil and Bloomberg.

The weakening of the DXY reflected the shift in U.S. monetary policy. The growing perception that the tightening cycle in the U.S. was coming to an end, combined with expectations of gradual interest rate cuts by the Federal Reserve, reduced the relative attractiveness of dollar-denominated assets after years of significant appreciation. At the same time, global investors began seeking greater portfolio diversification, reducing their concentration in the U.S. dollar.

Currencies of countries with high interest rates began to benefit relatively, including the Brazilian real. The interest rate differential favored investment strategies such as the carry trade, in which investors raise funds in low-interest-rate countries and invest them in economies with higher interest rates to capture this spread, attracting short-term financial flows to Brazil and contributing to the observed appreciation. This movement was much more closely linked to the global weakness of the dollar than to a substantial improvement in domestic fundamentals, which remained under pressure from fiscal uncertainties and high macroeconomic volatility.

Despite the year-to-date appreciation, the Brazilian exchange rate remained marked by strong instability. Episodes of appreciation were frequently interrupted by corrections associated with fiscal noise, revisions in expectations, and shifts in global risk appetite. The result was a more favorable average level, though accompanied by high uncertainty, with significant impacts on inflation, the cost of capital, and investment decisions.

The current account remained close to balance throughout the year, but this result masked deeply asymmetric sectoral dynamics. According to the Central Bank of Brazil, the country recorded a current account deficit of US\$68.8 billion, indicating that the record trade surplus of US\$68.3 billion reported by the Ministry of Industry, Foreign Trade, and Services (MDIC) was insufficient to offset the structural pressure from the services and income accounts. The primary income deficit, which reached US\$81.3 billion, was driven mainly by remittances of profits and dividends and by the cost of servicing external debt. At the same time, data from the Ministry of Agriculture and Livestock (MAPA) confirm that agribusiness exports, totaling US\$169.2 billion, were the vital support in preventing a larger imbalance, emphasizing the country's dependence on robust trade surpluses to sustain its external solvency in the face of net foreign exchange outflows in other sectors.

Chart 4. Agribusiness as the backbone of Brazil's trade surplus

Source: Prepared by CNA (adapted by SP Ventures).

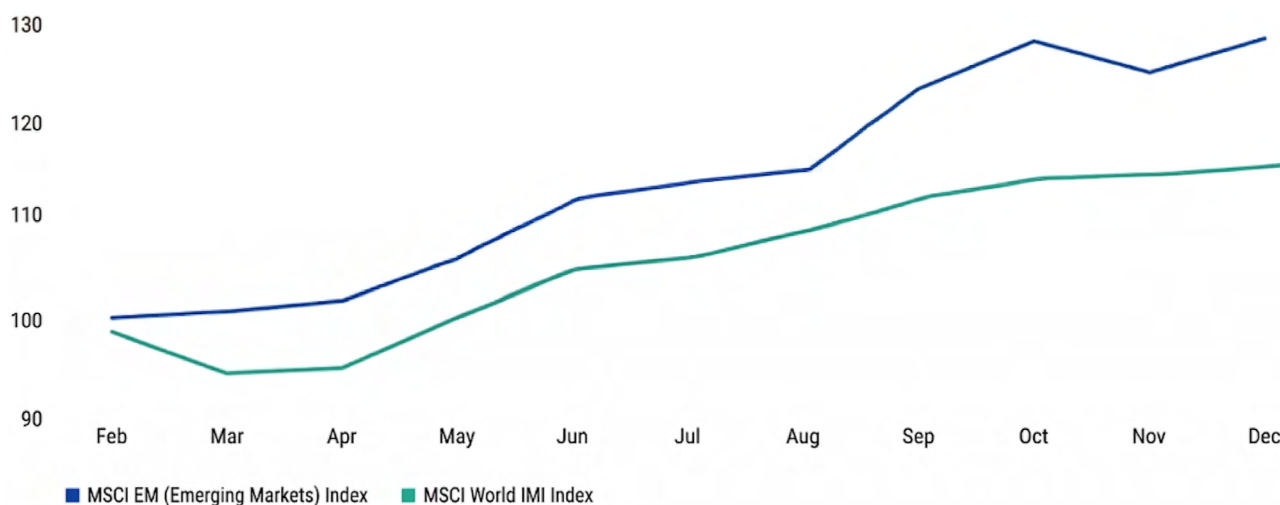
The average appreciation of the real had mixed effects on the real economy. For sectors focused on the domestic market, it helped partially alleviate inflationary pressures through the prices of imported goods and inputs. In agribusiness, despite the less depreciated exchange rate, the combination of productivity, scale, and external demand sustained margins in reais, particularly in the most export-oriented sectors. Sectoral heterogeneity remained evident, emphasizing the centrality of agribusiness in macroeconomic dynamics.

On the capital flows side, a defensive pattern prevailed. Brazil attracted funds mainly to short-term fixed-income instruments, benefiting from the interest rate differential, while direct investment and flows into higher-risk assets remained subdued. This profile kept the exchange rate sensitive to external factors and limited the stabilizing effect of long-term flows.

A combined analysis of the real's behavior and the DXY's performance throughout 2025 clearly demonstrates the nature of the exchange rate adjustment observed. The appreciation of the Brazilian currency was, to a large extent, a reflection of a globally weaker dollar. Even so, the performance of the external sector, led by agribusiness, was decisive in transforming this favorable external tailwind into relative macroeconomic stability. In an environment of fiscal fragility and high financial selectivity, the ability to generate dollars on a recurring basis remained one of the main pillars supporting the Brazilian economy.

1.2.3 Financial markets and cost of capital: risk premium, global rotation, and the appreciation of emerging markets

The international financial environment of 2025 favored a partial reallocation of capital away from developed markets. The combination of shifting monetary conditions in the United States, a greater search for geographic diversification, and more attractive valuations outside the core markets led global investors to increase their exposure to risk assets in emerging economies. These factors had a clear impact on the performance of these countries' stock markets throughout the year.

Chart 5. Comparative performance in 2025, MSCI Emerging Markets vs. MSCI World IMI, base 100

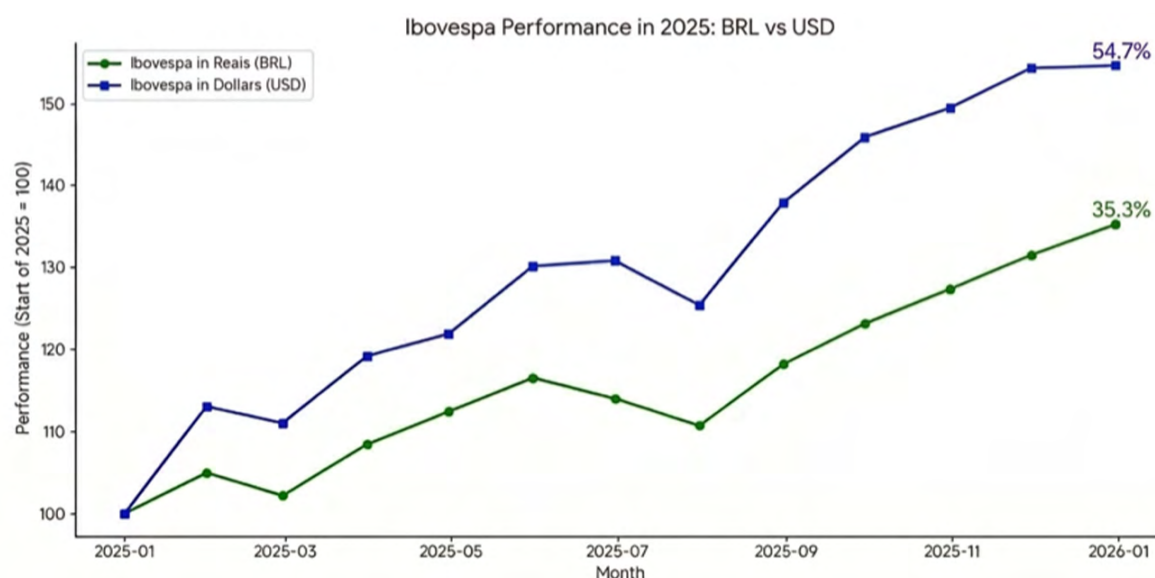
Source: MSCI. Author's own analysis (2026). Data as of December 30, 2025.

The aggregate market data shown in Chart 5 clearly captures this dynamic. In 2025, the major stock indices of emerging economies (represented by the MSCI Emerging Markets Index) posted significant gains in U.S. dollar terms, outperforming the global benchmarks of developed countries (represented by the MSCI World Index). This performance reflected a tactical shift in capital flows, as well as relative repricing following years of underperformance, combined with more favorable expectations for corporate earnings in sectors linked to banking, industry, energy, mining, and agribusiness.

The appreciation of emerging stock markets occurred in a relatively widespread manner across regions, with a particular focus on countries in Asia and Latin America. In many cases, the sectoral profile of these markets—which are more exposed to commodities, food and energy—served as an additional factor of attractiveness in a global context marked by geopolitical realignments, the climate agenda, and greater concern over supply security.

This trend had direct implications for the risk premium and the cost of capital. The improved performance of equity markets helped reduce the perception of extreme risk and increase liquidity in secondary markets, though without eliminating selectivity. The return of risk appetite was gradual and concentrated on companies with solid balance sheets, consistent cash flow, and greater operational predictability, while more leveraged models or those dependent on rapid growth continued to face constraints.

In Brazil, the stock market followed this broader trend, albeit constrained by domestic factors. Fiscal uncertainty and high local interest rates continued to weigh on the cost of long-term capital, but the flow of capital toward emerging markets, combined with the weight of export-oriented and commodity-linked companies, provided relative support to equities. The 34% appreciation in reais and 50% appreciation in dollars of the Ibovespa in 2025, shown in Figure 6, corroborates the view that performance was more closely tied to the external environment and global rotation than to a structural shift in the Brazilian economy.

Chart 6. Cumulative performance of the Ibovespa in 2025, in BRL and US\$, base 100

Source: B3, Central Bank of Brazil. Author's own calculations (2026). Data through December 30, 2025.

From a financing perspective, the appreciation of equity assets helped to selectively expand the scope for capital market operations. Although the environment remained restrictive, especially for issuers with lower credit quality, there was a relative improvement in liquidity conditions and a willingness among investors to evaluate opportunities outside the traditional banking system. This effect was most noticeable in sectors with resilient cash flow and exposure to foreign markets.

The performance of emerging stock markets in 2025 should therefore be understood as part of a global financial realignment, in which the search for diversification and returns outside developed markets has gained prominence. For Brazil, this trend served as a partial financial buffer, helping to mitigate pressures on risk premiums and financing conditions, even in a domestic context still marked by structural weaknesses.

1.2.4 Agricultural financing and capital structure

Financing for the Brazilian agribusiness sector in 2025 clearly reflected the structural transformations underway in the economy and the financial system. In an environment marked by high interest rates, stricter credit standards, and fiscal constraints, the sector began to operate based on a more diversified funding mix, combining traditional rural credit, private instruments, and the capital markets.

The 2025/2026 Harvest Plan remained the primary public policy, with funds announced in the amount of approximately R\$ 600 billion, according to MAPA. It remained the central pillar of rural credit, corroborating the state's role as a provider of liquidity for financing, investment, and marketing. Even so, the effective operation of this credit took place in a more restrictive context: with less fiscal space for subsidies and stricter bank lending standards, approximately 75% of funds borrowed through banks already operate under floating rates, according to CNA analyses, bringing the cost of official credit closer to market rates. This reality limited the expansion of subsidized credit and drove the search for alternative sources.

In this environment, the capital market emphasized its role as a robust alternative to the Safra Plan. According to MAPA's Private Agribusiness Finance Bulletin, instruments such as Agribusiness Receivables Certificates (CRA), which reached R\$ 178 billion, Fiagros, which tripled in assets over the past two years to approximately R\$ 45 billion, and Agribusiness Credit Notes (LCA), which hit the R\$ 600 billion mark in 2025, have aggressively advanced into the market share previously dominated by official credit. Although they have not yet replaced rural credit for small producers, these mechanisms have begun to fill the gap left by government sources, financing larger-scale operations and producers with sound governance and predictable cash flow.

Rural Product Notes (CPRs) have also gained prominence as the primary instrument for direct financing and securitization. According to MAPA's Private Agriculture Finance Bulletin, the stock of registered CPRs reached R\$ 562 billion in 2025. By enabling the raising of funds based on future production deliveries, CPRs—especially in their digital format—increased financial flexibility and reduced dependence on banks. This mechanism became the cornerstone of barter and structured transactions with trading companies and suppliers.

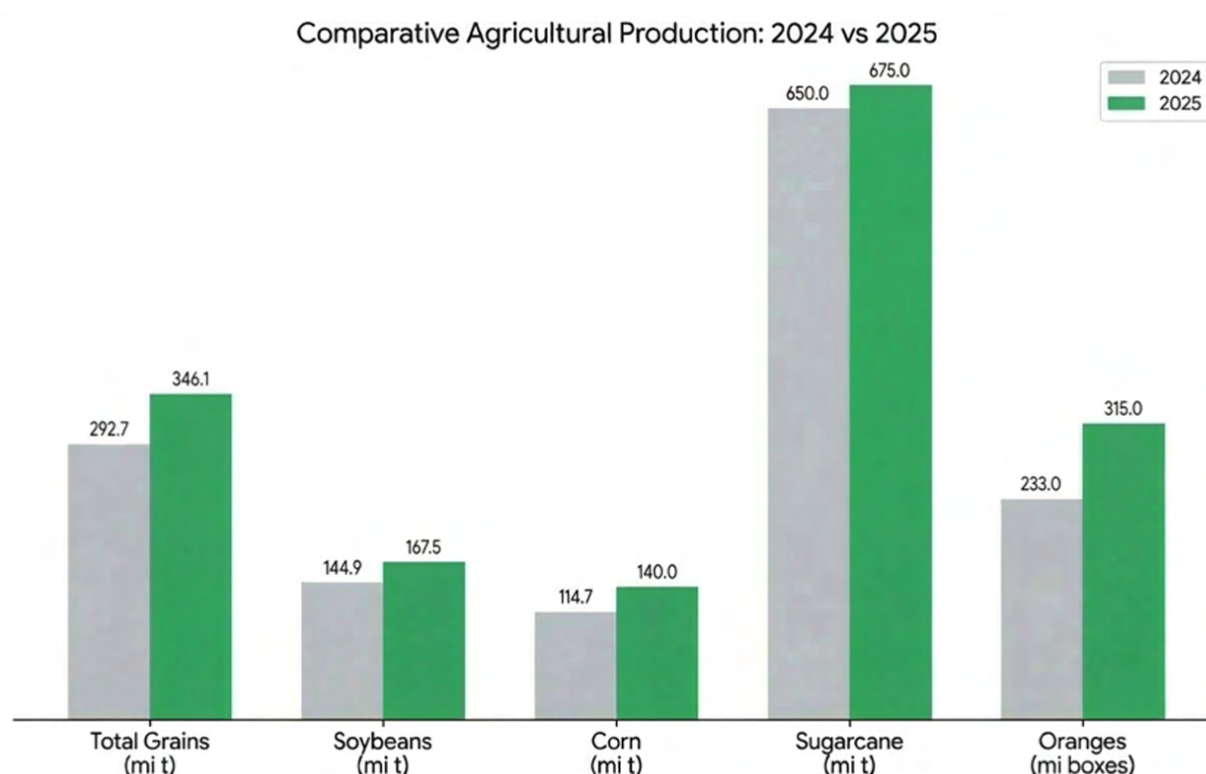
This diversification increased the sector's resilience, reducing vulnerability to government fiscal restrictions. On the other hand, it imposed new requirements for financial discipline and transparency, since access to private capital depends on rigorous risk and performance metrics.

The transformation of financing in 2025 did not signal the end of the Safra Plan's role, but rather its evolution into a complementary model. Public credit remains essential to sustain the productive base, while the capital markets and private instruments provide the sophistication necessary for the sector's global expansion. In a scenario of scarce and high-cost capital, this three-way division was the determining factor in enabling Brazilian agribusiness to maintain its investment capacity and competitiveness throughout the year.

1.3 Agribusiness 2025

In 2025, Brazilian agribusiness operated in a paradoxical environment. While reaffirming its role as the country's main pillar of macroeconomic stability, the sector faced one of the most challenging operating contexts of the past decade, marked by greater production volatility, price normalization, and growing pressure on margins throughout the supply chains.

From an aggregate perspective, performance was robust. According to the IBGE, Brazilian production of cereals, legumes, and oilseeds reached approximately 346 million tons in 2025, an increase of nearly 18% compared to 2024, as shown in Figure 7, setting a new historical record. This progress strengthened Brazil's position as one of the world's leading food suppliers at a time of heightened sensitivity to food security and supply stability.

Figure 1. Figure 7. Agricultural production in Brazil, major crops, 2024 and 2025

Source: IBGE and Conab. Author's own analysis (2026). 2025 data are estimates.

Note: Orange production in millions of boxes. Other crops in millions of tons.

In grain production, soybeans maintained a prominent position, with a harvest estimated by Conab at around 165 to 170 million tons, supported by productivity gains and improved performance in key regions of the Center-West and South. Corn showed one of the largest relative expansions of the year, with production nearing 140 million tons, driven mainly by the second crop, which benefited from a better planting window and productivity above the historical average. Cotton, meanwhile, recorded a record lint crop (the fiber that is clean and ready for industry), with over 4 million tons. This result corroborates Brazil's position as one of the world's largest exporters of the product.

This productive performance, however, occurred in an environment of less favorable prices than in previous years. Following the cycle of strong appreciation observed between 2020 and 2023, agricultural commodities began trading at levels more in line with supply and demand fundamentals. The normalization of prices reduced the cushioning effect observed in previous cycles, in which high prices offset operational inefficiencies or cost shocks. In 2025, profitability came to depend much more directly on productivity, scale, logistics efficiency, and financial management.

In the cattle sector, the two-year period was marked by a historic record of 37 million slaughterings in 2024 and the transition of the cycle in 2025. The culling of females (43% of the total) sustained the record supply, maintaining Brazil as the global leader with monthly shipments of 270,000 tons in 2025. As a result, the price per arroba began a robust recovery, jumping from R\$250 to over R\$340, driven by the retention of breeding stock and a 22% in-

crease in calf prices. Despite the price appreciation, the sector faced tight margins due to high Selic rates and new costs related to traceability and geospatial monitoring.

In the sugar-energy sector, the 2024/25 harvest in the Center-South concluded with the crushing of 621.88 million tons of sugarcane, a drop of approximately 5% compared to the previous cycle, according to UNICA data. The result reflects a cycle marked by severe water stress and fires in sugarcane fields, identified as key factors behind the observed decline. Nevertheless, this represents the second-largest crushing volume in the region's history, calling attention to the sector's structural resilience even in the face of adverse weather conditions and lower agricultural productivity.

Sugar production totaled approximately 40.17 million tons, representing a 5.3% decline, while ethanol reached a historic record of 34.96 billion liters. The most significant structural factor was the complementarity between sugarcane ethanol and corn ethanol.

Sugarcane offers flexibility in the production mix, allowing it to be directed toward sugar production when international prices are favorable, which maximizes value capture. On the other hand, it requires rapid processing and does not allow for prolonged storage. Corn, however, lacks the same industrial flexibility but can be stored for long periods and directed toward multiple uses, ensuring greater supply predictability.

For Brazil, this combination is an economic strength. Sugarcane adds flexibility and global market access via sugar, while corn provides stability, storage capacity, and production diversification. Together, the two pathways make the biofuel matrix more resilient, reducing volatility and strengthening national energy security.

Citrus farming saw one of the most significant developments of the year. Following a poor harvest in 2024/25, orange production in the citrus belt of São Paulo and the Triângulo Mineiro region showed a strong recovery. Data from Fundecitrus indicate an estimated 2025/26 harvest of approximately 290 million boxes, pointing to growth of over 30% compared to the previous cycle. This increase reflected higher fruit yield per tree, a recovery in orchard productivity, and the entry of new areas into the productive phase. The increase in supply began to put pressure on fruit prices for the industry during the second half of the year, in addition to slowing the pace of juice exports, signaling a rebalancing of the market after years of scarcity.

Climate impacts remained significant in 2025, though in a more localized and selective manner. Extreme events continued to affect specific regions and critical moments in the production cycle, widening the dispersion of results among producers. In this environment, more structured production systems—with better use of data, soil management, irrigation, genetics, and operational planning—demonstrated a greater capacity to absorb these shocks. Performance differences were no longer associated solely with scale but increasingly reflected the degree of technology adoption, operational intelligence, and decision-making capacity.

At the same time, the growing demands for traceability and environmental compliance in consumer markets, especially in the European Union, have increased the complexity of agro-industrial supply chains. Meeting these requirements began to demand regulatory compliance and investments in monitoring, control, certification, and data integration systems throughout the chain. As a result, there was a short-term increase in costs, barriers to entry were reinforced, and lasting competitive advantages were created for producers and companies capable of structuring processes, governance, and technological solutions compatible with this new standard.

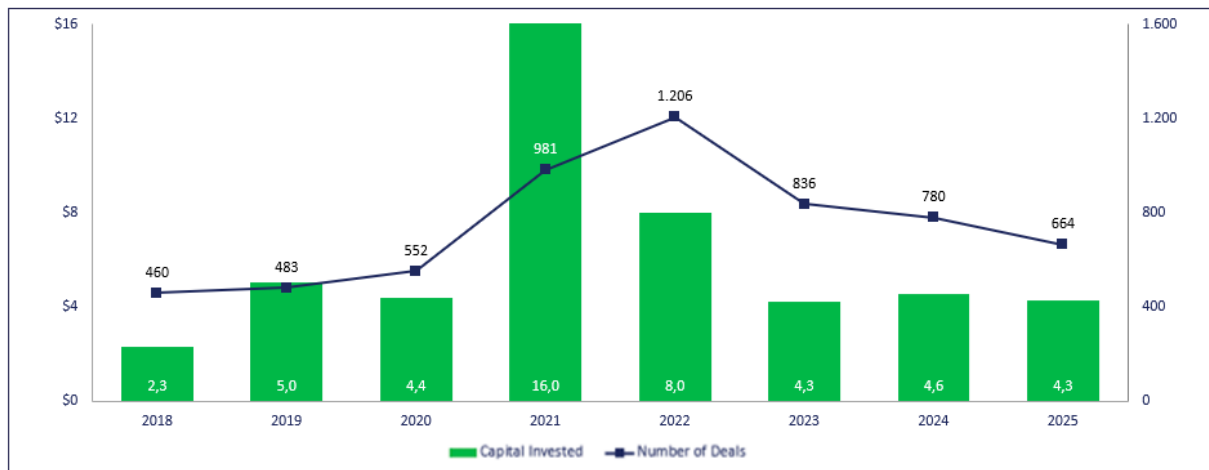
Brazilian agribusiness in 2025, therefore, was not marked by euphoria, but by a clear process of maturation and economic selection. The sector maintained its macroeconomic relevance and global competitiveness, but began operating under stricter criteria and under greater margin pressure, in an environment of price normalization. Increased productivity played a central role in sustaining the sector's expansion. The combination of technological advancements, operational efficiency, and a record-breaking harvest enabled Brazil to expand its presence as one of the world's leading food suppliers. Evidence of this productivity and the international competitiveness of Brazilian agricultural production is the fact that agribusiness subsidies in the country are among the lowest in the world. Thus, although profitability continues to be influenced by price cycles, the sector is increasingly dependent on the quality of execution, productive efficiency, risk management, and the ability to transform information into better operational and financial decisions.

With a more selective and disciplined approach, Brazilian agriculture begins 2026 in an environment where capital allocation is increasingly directed toward technologies, models, and companies capable of unlocking productivity, reducing volatility, and scaling solutions that address the sector's structural challenges. More than just capturing trends, the new cycle now demands investment in applied innovation, with a direct impact on efficiency, predictability, and long-term economic sustainability.

1.4 Venture Capital and agtech investors

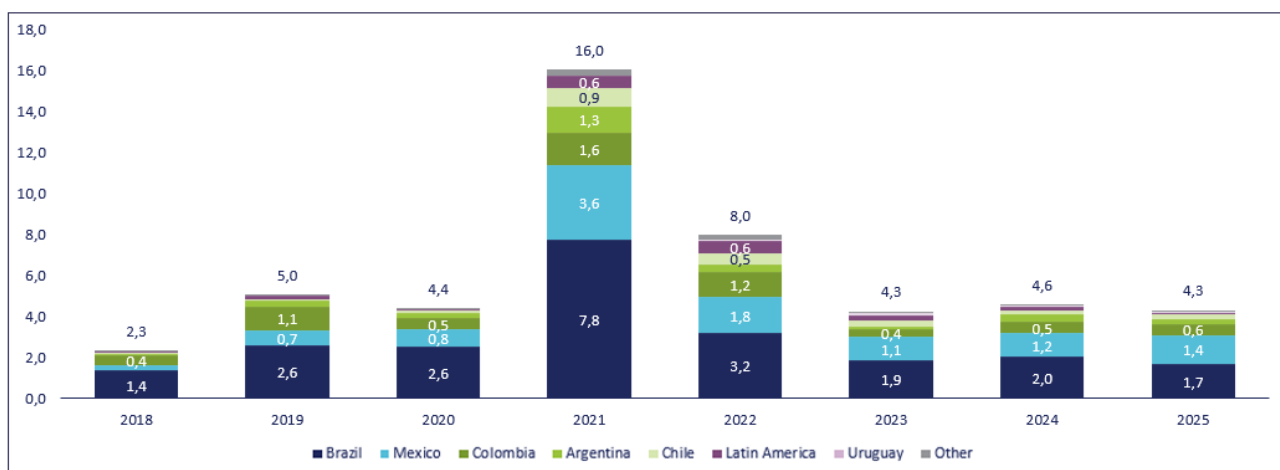
And in the venture capital market as a whole: how did 2025 ultimately unfold in Latin America and Brazil?

Following a cycle of euphoria and excess liquidity that marked the years 2021 and 2022—when capital for alternative assets reached historic highs, driving stratospheric funding rounds and valuations often disconnected from fundamentals—the year 2025 was marked by a very different scenario. It was not a year of further deterioration, nor of significant recovery. Above all, the pattern of the previous two years remained: the market is still subject to ups and downs, with selective appetite, more disciplined capital, and dynamics that remained far from recent peaks. Instead of accelerated expansion, 2025 underpins the transition to an environment where growth at any cost was no longer the norm, and investment logic began to demand more traction, efficiency, and clarity of execution. Chart 8 shows annual venture capital investment in Latin America and underscores the “euphoria” of 2021 and 2022, followed by a return to reality and fundamentals in the subsequent years.

Chart 8. Annual Venture Capital Investment in Latin America in Billions of R\$ (2018–2025)


Source: LAVCA_Industry-Data_Excel__2026

The market accelerated through 2021, when invested capital peaked, reflecting the height of the global liquidity cycle and risk appetite. Starting in 2022, there was a significant decline, and the market began operating at a lower, more stable level. However, 2025 does not represent a new downturn but rather the continuation of this new regime. The volume invested remains relatively in line with previous years, indicating a more disciplined environment. At the same time, the number of transactions has been on a downward trajectory since the 2022 peak, showing an ecosystem with fewer funding rounds, greater capital concentration, and stricter screening based on execution quality and fundamentals.

Chart 9. Venture Capital Investment Volume by Country, 2018–2025 (US\$ billion)


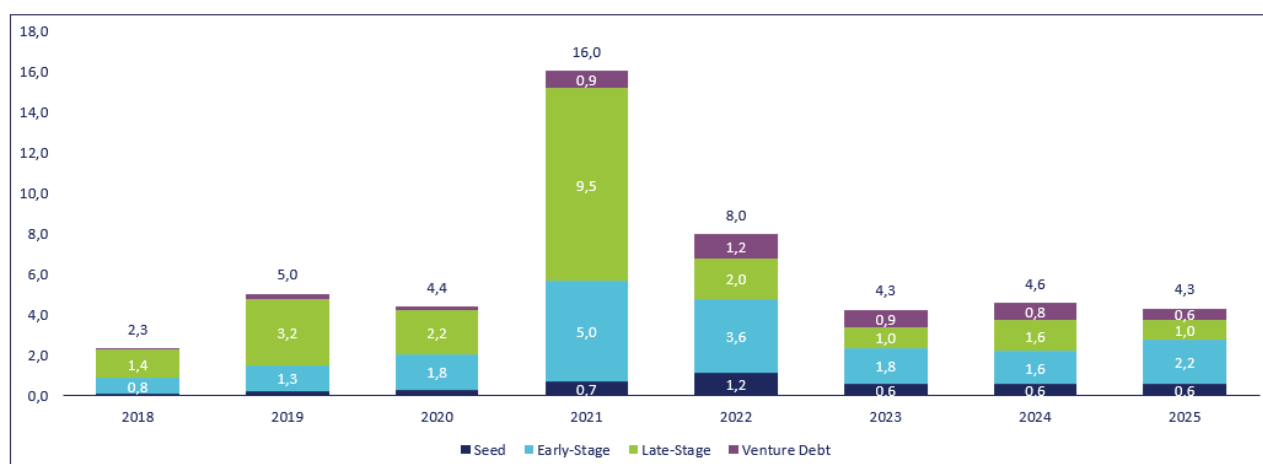
Source: LAVCA_Industry-Data_Excel__2026

When looking at the composition of capital invested by country, the concentration becomes even more evident. Brazil and Mexico remain the two dominant venture capital markets in Latin America and, in 2025, together accounted for about 75% of the capital allocated in the region. Brazil maintained a relatively stable level compared to the previous year, emphasizing its position as the region's leading hub in terms of *deal* volume and density. Mexico, on the

other hand, has shown a more positive trajectory in recent years, with gradual growth starting in 2023—still far from the 2021 peak, but clearly recovering from the trough of the cycle.

This is not a random trend. The Mexican ecosystem combines characteristics that remain attractive to investors: proximity and economic integration with the United States, a strong presence of international funds, greater connectivity with the global technology market, and an environment with a large consumer and business base, which facilitates the building of scalable businesses. Furthermore, the maturity of the local ecosystem in sectors such as fintech, logistics, and software creates a significant spillover effect, sustaining the development of talent, entrepreneurs, and capital infrastructure over the past few years.

Figure 10. Venture Capital Investment by Stage, 2018–2025 (US\$ billion)



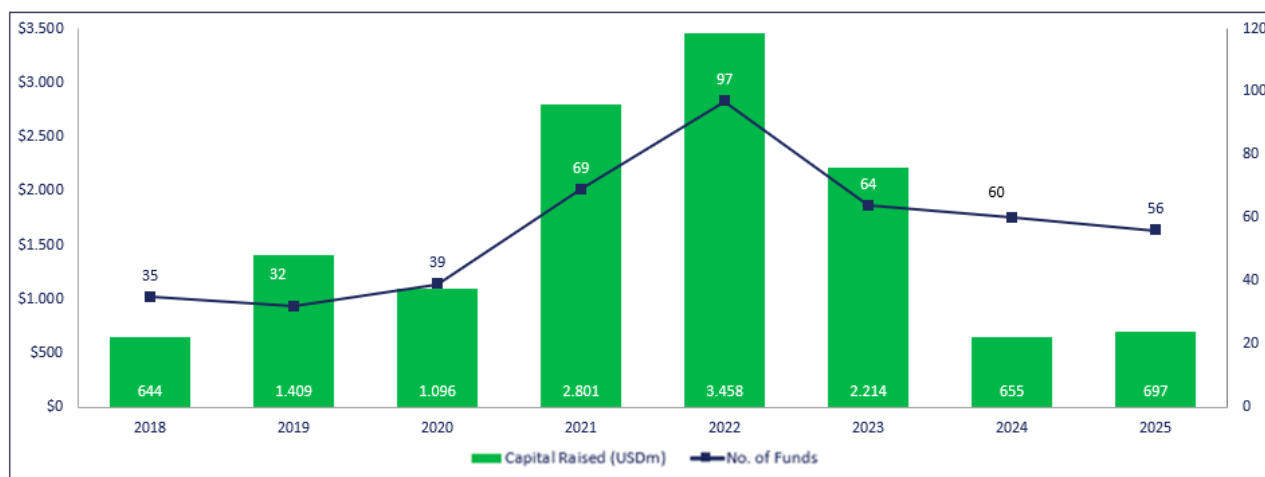
Source: LAVCA_Industry-Data_Excel__2026

Furthermore, it is important to understand at which stages venture capital funds are allocating capital in Latin America. The breakdown of transactions between 2018 and 2025 shows that the peak of the cycle, especially in 2021, was driven primarily by *late-stage* rounds—equivalent to Series C and beyond—in an environment of greater liquidity and risk appetite.

Starting in 2022, a structural adjustment is observed. Late-stage rounds lose ground, and the market begins to be sustained more consistently by early-stage transactions, with a higher relative share of Series A and Series B rounds, revealing an ecosystem with fewer mega-rounds, more rational valuations, and greater selectivity based on execution and fundamentals.

And in the world of fundraising for venture capital funds, has the battle been easy?

Data from LAVCA show that, for venture capital managers in Latin America, the landscape has been far from simple in recent years. Following the peak in 2021 and 2022, there has been a significant decline in both the number of funds that managed to raise capital and the total amount raised.

Chart 11. Venture Capital Fund Raising in Latin America, 2018–2025

Source: LAVCA_Industry-Data_Excel__2026

In 2025, despite a slight increase in capital raised compared to 2024, the number of funds that actually managed to raise capital continued to decline, corroborating a more restrictive and concentrated environment. To get an idea of the magnitude of this adjustment, the total volume raised fell from approximately \$3.5 billion in 2022 to about \$0.7 billion in 2025, a decline of nearly 80%. This decline suggests a lower level of *dry powder* being built up for the coming cycles, which tends to keep the market more selective and with less capital available, at least in the short term, especially as funds raised at the peak of the cycle approach the end of their investment period.

It is within this new environment—marked by lower liquidity, greater discipline, and a focus on fundamentals—that agribusiness-focused venture capital must be analyzed. Agribusiness does not operate on the margins of the cycle but is embedded within it, responding to the same macroeconomic constraints and the same growing demands for efficiency and risk-adjusted returns.

The agribusiness venture capital cycle entered 2025 as a structural transition. While 2024 was marked by the continuation of widespread contraction and an extreme concentration on a few large-scale investments, 2025 was marked by an environment of greater selectivity, in which capital returns in a more disciplined, demanding, and execution-oriented manner.

A cross-analysis of market data, completed transactions, and investor sentiment (as revealed by the Radar Agtech 2025 survey) suggests that an assessment of the sector's health should be based on more than just the volume of capital transacted. In 2024, a large portion of the total amount invested was driven by a few *late-stage* funding rounds, inflated by high valuations in companies such as Solinftec, Agrolend, and Cayena, each raising R\$300 million. In 2025, it was observed that these higher-value transactions did not occur, despite some exceptions such as Mombak's R\$280 million funding round, but just over twenty significant deals were recorded throughout the year.

In Latin America, the picture is even more lopsided. Outside Brazil, the volume invested remained significantly lower and highly concentrated in a few assets and regions, such as Mexico—notably AgFintech Blooms' US\$2.6 million funding—and Argentina, which returned to investors' radar with the recovery of its economy, emphasized by Agtech Kilimo's US\$7.5

million funding. This asymmetry corroborates Brazil's role as the primary hub for capital absorption in the regional agtech sector, not only due to the size of the market but also because of its ability to structure operations that simultaneously meet criteria for scale, governance, and predictability.

From the investor's perspective, capital efficiency is no longer merely a desirable virtue but has become a central asset for risk mitigation, particularly in technology-intensive sectors with long maturation cycles.

This recalibration helps explain why, even in a more restrictive macroeconomic context, there is still high interest in agribusiness. The investor survey conducted by Radar Agtech shows that nearly two-thirds of them intend to increase their exposure to the sector, reflecting the perception that agribusiness offers a rare combination of systemic relevance, real assets, cash generation, and clear opportunities for productivity gains. -capital has not returned to finance growth at any cost, but to position itself in models capable of transforming technology into risk-adjusted returns.

1.4.1 Artificial Intelligence as Infrastructure

If the recalibration of capital redefines allocation criteria, the evolution of artificial intelligence (AI) redefines the competitive landscape among agribusiness startups. By 2025, AI had ceased to be a distinctive selling point in pitches and came to be treated as basic, implicit, and expected infrastructure. The investor's central question was no longer whether the company used artificial intelligence, but where, how, and with what economic impact this technology is integrated into operations.

Data from the startup survey supports this shift in focus. Over 83% of responding companies reported actively using artificial intelligence, whether in the product, in operations, or in both. In just over 35% of cases, AI is already at the core of the value proposition. This level of adoption indicates that the initial adoption phase is behind us. The debate has shifted from the mere presence of the technology to its depth, quality of implementation, and ability to generate measurable gains in productivity, efficiency, or predictability.

Investor perception clearly aligns with this assessment. In 2024, artificial intelligence still appeared in a more isolated manner within investment theses. In 2025, the analysis becomes more sophisticated, and AI is now viewed as a horizontal layer, cutting across the entire agribusiness chain—before, during, and after the farm gate. The value lies not in the technology itself, but in the combination of artificial intelligence, automation, sensors, robotics, and deep integration into the producer's or agribusiness's operational workflow.

This transition is particularly evident in the areas most frequently cited by investors as promising for the coming years. Artificial intelligence is seen as a catalyst for major areas or subsectors of agribusiness, such as biotechnology and biological solutions applied to agriculture, farm management and field digitization, mechanization, and robotics—areas cited as the most promising for agribusiness over the next five years, as shown in Table 2. This recurrence indicates that the market no longer views these technologies as isolated trends, but as the foundation upon which new solutions will be built. The focus is shifting toward applications capable of addressing structural bottlenecks in agriculture, such as labor shortages, rising operational costs, climate volatility, and the need for greater production predictability.

Table 2. Frequency of mentions of the most promising areas over the next 5 years in the Radar Agtech 2025 investor survey

Rank	Area	Percentage of Selections
1st	Biotechnology and biological solutions applied to agriculture	44%
2nd	Traceability and supply chains	33%
3rd	Farm management and digitalization in the field	11%
3rd	Agricultural mechanization and robotics	11%

Source: Own elaboration (2026). **Data:** Radar Agtech 2025 investor survey.

In the startup ecosystem, this logic manifests itself in a preference for models that use AI as a decision-making engine rather than merely as a support tool. Agronomic recommendation systems, climate prediction models, operational management platforms, and automation solutions are now evaluated based on their ability to transform data into actionable decisions at the right time.

1.5 Conclusion and Forecasts for 2026

This investment chapter devotes special attention to the global macroeconomic environment, Brazil, and Latin America. Given the growing influence of these variables on capital flows and investment decisions, we explore throughout the analysis the key macroeconomic and geopolitical shifts that are reshaping the international economic landscape. As we look ahead to the coming years, it becomes clear that we are operating in an environment of high uncertainty, where various forces can alter expectations, markets, and growth trajectories rapidly and, often, abruptly.

These uncertainties manifest themselves on both the negative and positive sides. On the negative side, we continue to observe wars and rumors of wars that are increasingly prone to escalation, with the potential to undermine economic projections, growth, and global production, as has historically occurred during periods of greater geopolitical instability. Added to this are the fragmentation of international governance, the weakening of multilateralism, the reorganization of global supply chains with rising costs and increased climate volatility, the structural rise in the cost of capital, and greater selectivity in credit. Together, these elements make the environment more complex, less predictable, and more demanding for investment decisions and resource allocation.

On the positive side, a set of technologies—catalyzed by and deeply connected to artificial intelligence—is advancing rapidly, with real potential to drive productivity gains across virtually all sectors of the economy. This opens up a concrete possibility for structural efficiency gains, process automation, better use of data, reduced waste, and greater operational predictability. Ultimately, this is a driver capable of expanding the supply of goods and services, alleviating production constraints, and creating conditions for a sustained increase in the average standard of living of the global population.

In agribusiness, the sector from which most supply chains originate, this potential becomes even more evident. A wave of productivity in agricultural production, input development, logistics, and risk management spreads throughout the entire chain, with direct impacts on costs, supply, food and climate security, as well as economic stability. It is at this point that technology and innovation cease to be mere accessories and take on a central role in the sector's dynamics.

Productivity, in this context, means doing more with the same resources, or the same with fewer, which is only possible through innovation and the consistent application of technology. Given this scenario, we believe this is an excellent time to be invested in the market. Not despite the uncertainties, but precisely because of them. Historically, the greatest distortions arise in environments of greatest uncertainty, and consequently, the greatest rewards for those who are able to trust in increased productivity, invest with discipline, and bet on technology and innovation as the main drivers of value creation in the next cycle.

2. Mapping Investors in the Ag&Foodtech Ecosystem

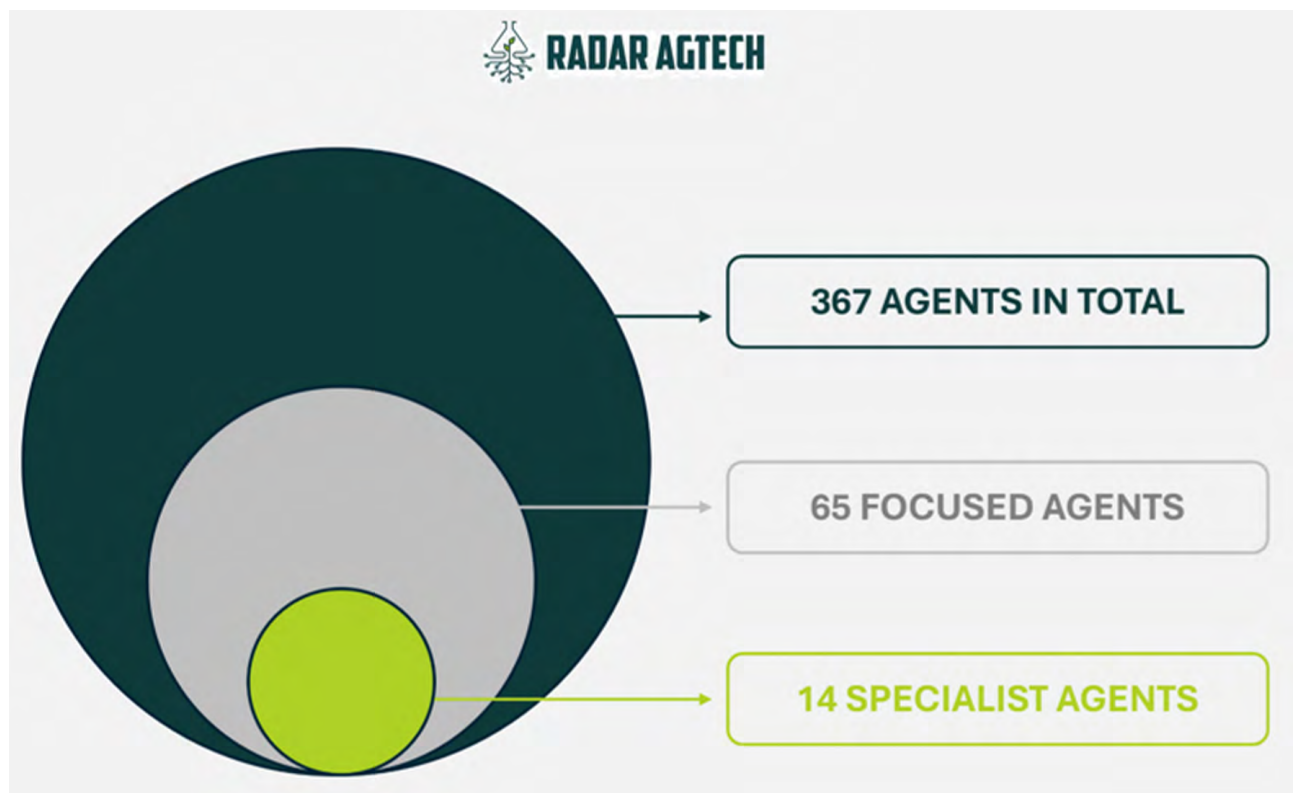
• *Pedro Jábali, João Paulo Marchesan and Felipe Guth*

In 2025, Radar AgTech Brasil expanded the scope of its analysis of the agribusiness innovation ecosystem. While in 2024 we conducted our first survey targeting investors specialized in the sector, in 2025 we took it a step further by building a more comprehensive database of investment agents active in the Brazilian innovation ecosystem.

The goal of this effort was not only to understand investors directly specialized in AgTech and FoodTech, but also to assess the broader venture capital landscape in the country and identify, within that group, those with a strategic interest in agribusiness.

Throughout 2025, Radar AgTech mapped 367 investment agents headquartered in Brazil, whether through local offices, dedicated teams, or recurring activity in the national ecosystem. This survey considered different investor profiles, including micro VCs, independent venture capital funds, corporate venture capital, and other venture capital vehicles. These investors are active from the earliest stages, such as pre-seed and seed, through to more advanced rounds such as Series B, Series C, and later stages.

Figure 1. Number of investment entities with headquarters or operations in Brazil



Source: Author's own analysis (2026).

Within this universe of 367 investment agents, we identified 65 investors who prioritize the agribusiness sector within their investment thesis, focusing primarily on AgTech and FoodTech solutions.

This means that approximately 17.7% of the mapped venture capital investors have some level of focus or strategic priority on the agri-food sector. The data corroborates the growing relevance of agribusiness as a frontier for technological innovation and a destination for venture capital in the country.

Upon further analysis, Radar AgTech also identified an even more specialized group comprising 14 investors whose investment thesis is exclusively dedicated to the agribusiness chain. These agents focus specifically on developing technologies and solutions for the sector.

This group represents specialist investors, equipped with deep knowledge of the agri-food chain and playing a significant role in financing startups operating across the spectrum from agricultural inputs and production to solutions focused on food processing, logistics, distribution, and consumption.

With the aim of giving greater visibility to this group of highly specialized investors, Radar AgTech presents below a table of investment agents whose investment thesis is dedicated exclusively to the agribusiness chain, financing startups across the entire sector's value chain.

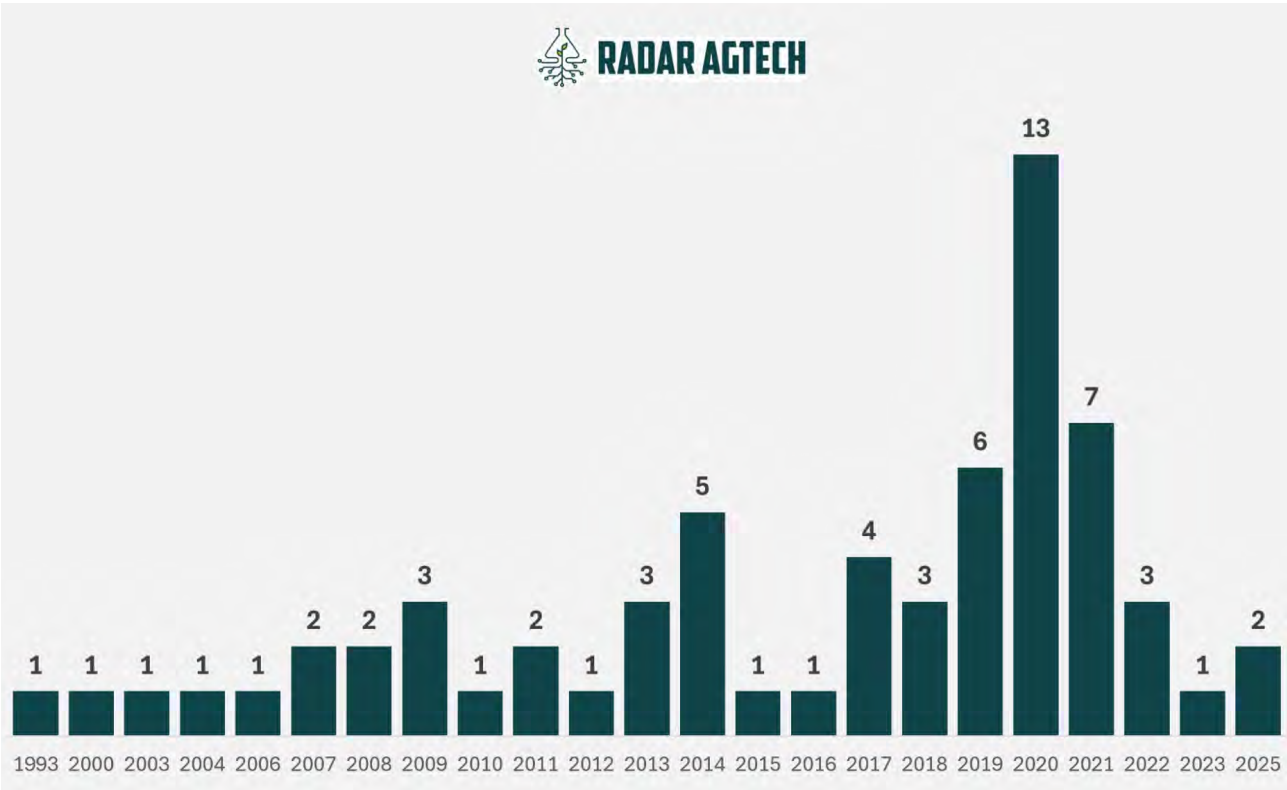
Figure 2. Investment agents whose investment thesis is exclusively dedicated to the agribusiness chain

		
Company Name	Investor Type	Website
Arara Seed	Equity Crowdfunding	https://araraseed.com.br
AgFoodVentures	Equity Crowdfunding	https://agfood.ventures/
SP Ventures	Early Stage VC	http://www.spventures.com.br
Agroven	Early Stage VC	https://agroven.com.br/
The Yield Lab Latam	Early Stage VC	https://theyieldlablatam.com/
Rural Ventures	Early Stage VC	https://ruralventures.com.br
Mandi Ventures	Early Stage VC	https://www.mandiventures.com/
Barn Investimentos	Late & Early Stage	https://barninvest.com.br/
Arar Capital	Late & Early Stage	https://www.ararcapital.com/
Minerva Ventures	Corporate Venture Capital	https://minervafoods.com/
Colorado Ventures	Corporate Venture Capital	https://www.colorado.com.br/
SLC Ventures	Corporate Venture Capital	https://www.slcagricula.com.br/
Suzano Ventures	Corporate Venture Capital	https://www.suzano.com.br/
Casale Ventures	Corporate Venture Capital	https://casale.com.br/

Source: Author's own work (2026).

Another relevant point observed in the mapping concerns the founding dates of these AgTech and FoodTech-focused investors. A significant portion of them emerged during the period of greatest expansion of global venture capital.

Figure 3. Figure 3. Year of establishment of investment firms active in agribusiness, 1993–2025



Source: Author's own work (2026).

About 40% of investors focused on the sector were established between 2019 and 2021. This period was marked by high global liquidity and historically low interest rates, factors that stimulated the creation of new funds and investment vehicles focused on innovation.

This trend follows a global pattern of growing investment in technologies applied to agriculture and the food chain, reflecting structural challenges such as food security, climate change, and increased agricultural productivity.

Overall, the data underscore that Brazil currently boasts a significant ecosystem of investors interested in agribusiness, with a substantial base of funds that dedicate part of their investment strategies to the sector, as well as a smaller but highly specialized group focused exclusively on AgTech and FoodTech.

PART IV

Integrated Analysis and Conclusion

1. Comprehensive Analysis of 2025 Startup, Innovation Ecosystem, and Investor Mappings and Surveys

● *Luiz Ojima Sakuda*

1.1 Structural Consolidations of the Brazilian Agricultural Innovation Ecosystem

The consolidation of data from the startup mapping (2025), the survey of innovation environments, and the IBGE’s structural indicators (Population 2025 and GDP 2023) allows for an integrated assessment of the current stage of the Brazilian agricultural innovation ecosystem. The analysis reveals a system in the process of maturing, characterized by high territorial concentration, significant institutional asymmetries, and growing technological sophistication, embedded in a sector that plays a central macroeconomic role in the country.

The regional structure of the ecosystem shows a strong concentration in the Southeast and South regions: of the 2,075 agtechs mapped in 2025, 1,146 (55.2%) are in the Southeast and 491 (23.7%) in the South. The Center-West accounts for 147 (7.1%), the North for 157 (7.6%), and the Northeast for 134 (6.5%) agtechs. Regarding the 390 agriculture-focused innovation hubs identified in the survey, a distinct distribution is observed: the South accounts for 145 (37.2%), the Southeast for 128 (32.8%), the Northeast for 62 (15.9%), the Center-West for 37 (9.5%), and the North for 18 (4.6%) of these environments. When these data are compared with the country’s structural baseline, according to the IBGE—an estimated population of 213.4 million (July 1, 2025) and a GDP of approximately R\$ 10.94 trillion (2023)—distinct patterns of density and institutional pressure become apparent.

Table 1. Regional Consolidation (2025)

Region	Agtechs	Environments	Population (millions)	GDP (R\$ billion)	Agtechs/Region	Agtechs / 100,000 inhabitants	Agtechs / R\$ 100 billion GDP
North	157	18	18,8	637	8,7	0,84	24,6
Northeast	134	62	57,2	1.513	2,2	0,23	8,9
Center-West	147	37	17,2	1.160	4,0	0,85	12,7
Southeast	1.146	128	88,8	5.799	9,0	1,29	19,8
South	491	145	31,3	1.834	3,4	1,57	26,8
Brazil	2.075	390	213,4	10.943	5,3	0,97	19,0

An analysis of this data shows that the absolute concentration in the Southeast does not translate into institutional proportionality. The ratio of approximately nine startups per agtech environment in the region indicates pressure higher than the national average (5.3). The South, on the other hand, shows a better balance between institutional supply and the entrepreneurial base, with an agtech/environment ratio of 3.4 and the highest *per capita* density in the country (1.57 agtech per 100,000 inhabitants). The Center-West, although a productive hub of Brazilian agriculture, exhibits relatively lower technological intensity when adjusted for GDP (12.7 versus a national average of 19), suggesting that innovation density does not yet fully reflect the sector's regional economic weight. The Northeast stands out for having a proportion of environments (15.9%) significantly higher than its share of startups (6.5%), indicating potentially underutilized institutional capacity. The North, despite having a smaller absolute scale, exhibits high relative intensity when adjusted for GDP, but with a weak institutional base.

This regional heterogeneity becomes even more evident when analyzing specific states. States such as São Paulo, Paraná, Rio Grande do Sul, and Santa Catarina combine high entrepreneurial density with economic relevance, while other states reveal distinct patterns of institutional pressure or underutilization.

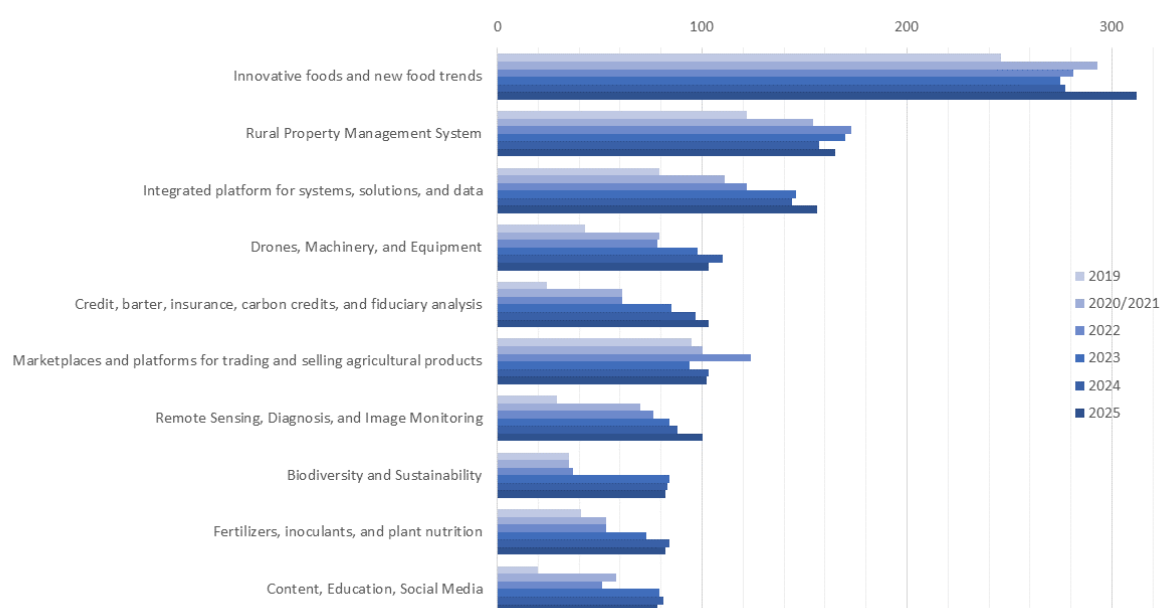
Table 2. Selected Federal Units

State	Agtechs	Environments	Population (million)	GDP (R\$ billion)	Agtech/Environment	Agtech / 100,000 inhabitants	Agtech / R\$ 100 billion
SP	851	60	46,1	3.445	14,2	1,8	24,7
MG	187	41	21,4	972	4,6	0,9	19,2
PR	186	43	11,9	671	4,3	1,6	27,7
RS	163	68	11,2	650	2,4	1,5	25,1
SC	142	34	8,2	513	4,2	1,7	27,7
MT	51	7	3,9	273	7,3	1,3	18,7
BA	31	11	14,9	431	2,8	0,2	7,2

São Paulo accounts for 41% of Brazil's agtech companies and faces significant institutional pressure, despite having 60 business environments. The Southern bloc (PR, RS, SC) stands out for combining high *per capita* density, high intensity relative to GDP, and better institutional balance. Meanwhile, Minas Gerais maintains an intermediate position, with indicators close to the national average. Mato Grosso, on the other hand, shows a mismatch between its productive importance and proportional institutional infrastructure, while Bahia illustrates the opposite situation: a large population and significant GDP, but relatively low technological density.

To complement the territorial analysis of the ecosystem, a historical series was organized for the categories with the highest number of agtechs in 2025. The graph illustrates the evolution of the number of startups by category between 2019 and 2025, revealing significant changes in the composition of the agricultural innovation ecosystem.

EVOLUTION OF THE CATEGORIES WITH THE HIGHEST NUMBER OF AGTECHS



Noteworthy is the consistent growth of the Innovative Foods and New Food Trends category, which rose from 246 startups in 2019 to 312 in 2025, establishing itself as the segment with the highest number of companies and indicating an expansion of solutions focused on later stages of the production chain. Among the categories positioned within the production chain, significant growth is observed in Systems, Solutions, and Data Integration Platforms (from 111 to 156, since its introduction in the 2020/21 edition) and in Remote Sensing, Diagnostics, and Image Monitoring (from 29 to 100), reflecting the intensification of digitization and data integration in agriculture. Also noteworthy are the advances in the categories of Drones, Machinery and Equipment, and Farm Management Systems, which have maintained an upward trajectory throughout the period. In categories associated with pre-production stages, such as Credit, Barter, Insurance, and Carbon Credits, there has been significant expansion, rising from 24 to 103 startups, indicating greater financial and institutional sophistication in the sector. In contrast, segments focused on post-production, such as Marketplaces and Biodiversity and Sustainability, show more moderate growth following strong initial expansion. Taken together, the data suggest the establishment of a more diversified and technologically sophisticated ecosystem, with simultaneous expansion of financial, digital, and data integration solutions throughout the entire agribusiness chain.

1.2 Startup demands and ecosystem offerings: integrated evidence from the 2025 survey

A joint analysis of startup responses (in the chapter on startup perceptions of ecosystem services) and information reported by innovation environments (in the section on the activities, services, and connections of innovation environments) allows for an assessment of the degree of alignment between demand and supply in the Brazilian agribusiness ecosystem in 2025. The integrated analysis reveals significant convergences, but also structural shifts that indicate a need for institutional evolution.

On the startup side, the research indicates a high level of technological maturity. The incorporation of artificial intelligence is widespread: 83% of companies reported using AI in their processes or products, with approximately 35% having it as the core of their value proposition. This data signals that digital technology is no longer a one-off differentiator but has become a structural layer of the business model. In this context, startups' demands are progressively shifting from basic infrastructure to strategic infrastructure, understood as access to markets, capital, validation, and integration into production chains.

Even so, technical infrastructure remains relevant. In the "Infrastructure and Spaces" section, 79.1% of startups rated the importance of resources for R&D and prototyping as 4 or 5 (on a scale of 1 to 5), while 68.5% did the same for specialized laboratories and equipment. These percentages indicate that, even in a highly digitized environment, applied experimentation remains a critical component, especially in segments such as biotechnology, bio-inputs, agricultural hardware, and integrated rural management systems.

When examining the offerings of these environments, it becomes clear that part of this demand is being met. Among the participating environments, 32.18% highlight the provision of physical space and connectivity (rooms, coworking spaces, Wi-Fi) as their primary infrastructure. More than 13% mention experimental areas, laboratories, and R&D resources, while a smaller portion cites the provision of specialized databases, support for intellectual property licensing, and technology vouchers. These figures indicate that there is an institutional base capable of meeting the demand for technical experimentation and technological development.

However, the integrated analysis reveals that the main challenge lies not in physical infrastructure, but in the relational and market dimensions. Startups place high priority on services related to connecting with customers, integration into business networks, access to investors, and preparation for fundraising. These elements carry strategic weight in the responses, reflecting a stage of the ecosystem where the central challenge is scaling solutions and making business models more robust, rather than merely developing prototypes.

As for the incubators, although they mention institutional connections and participation in regional or national networks, their offerings are still predominantly structured around infrastructure and traditional incubation and acceleration services. Only a portion of the ecosystems report supra-regional operations (26.67% serve startups from all over Brazil) or international operations (13.33% serve startups operating outside the country), suggesting that the capacity for expanded coordination is not yet uniform.

This difference reveals a qualitative shift: startups have advanced to a stage where they require sophisticated coordination with capital, markets, and regulation, while some environments remain anchored in traditional support models. The gap becomes more evident when considering the investment environment already described in this report: more selective capital, a focus on efficiency, greater rigor in governance, and a priority on areas such as biotechnology and traceability. In this scenario, environments that do not offer structured support for preparing funding rounds, due diligence, regulatory compliance, and integration into supply chains tend to lose their centrality.

Another point of partial convergence relates to field validation. Startups highly value the ability to conduct tests under real-world conditions, obtain technical evidence, and engage with producers for structured pilot programs. Some of the environments claim to offer experimental areas and laboratories, which constitutes an important foundation. However,

the strategic difference lies in the ability to transform this infrastructure into formal proof-of-concept processes, with clear performance metrics, integration with buyers, and the potential for replication at scale.

There is also a growing importance of regulatory, intellectual property, and certification services, especially due to international requirements related to traceability and environmental compliance. Although these services are included in the environments' offerings, their prevalence is still relatively low. Given the increasing external regulatory pressures and investors' prioritization of traceability, this aspect is likely to become more central.

An analysis of the findings from the 2025 study indicates that Brazil's agricultural innovation ecosystem is in a transitional phase. There is sufficient institutional foundation to support initial technological development, but the next stage of consolidation will depend on the ability of these environments to evolve from providers of physical infrastructure to platforms for market orchestration, capital, and regulatory validation. Startups have demonstrated that they have reached an advanced technological level; the systemic challenge now becomes structuring institutional mechanisms compatible with this new phase of maturity.

1.3 Capital Reconfiguration and Strategic Convergence

The third axis of ecosystem consolidation concerns the structural transformation of the investment environment. The recent venture capital cycle in Brazil and Latin America consolidated, by 2025, a regime characterized by greater selectivity, financial discipline, and rationality in resource allocation. Following the period of high global liquidity observed in previous years, the volume of capital invested remains below its historical peak, and the number of transactions has declined. The focus has shifted from rapid growth with high risk tolerance to models oriented toward operational efficiency, cash generation, structured governance, and predictable results.

In this more restrictive macrofinancial context, the agribusiness sector maintains a strategic position in investors' portfolios due to its distinctive structural characteristics. The sector combines macroeconomic relevance—reflected in its significant share of GDP, exports, and trade surpluses—with a robust productive base and recurring foreign exchange generation. Furthermore, it offers significant potential for productivity gains through technological adoption, especially in a global landscape driven by demands for efficiency, sustainability, and food security, which reduces the relative perception of systemic risk and positions agriculture as a long-term strategic driver.

The investor survey conducted in 2025 indicates a growing priority for areas such as biotechnology and biological solutions applied to agriculture (44% of mentions), traceability and supply chains (33%), and two segments tied for third place with 11% each: farm management and digitalization in the field, and agricultural mechanization and robotics. Artificial intelligence, although widely adopted among startups (83% use it and 35% have it as the core of their product), is no longer treated as an isolated differentiator but is now understood as cross-cutting infrastructure, integrated into sector-specific solutions. Capital, therefore, is not directed generically toward AI, but toward applications with a direct impact on productivity, regulatory compliance, and supply chain efficiency.

There is a clear convergence between investment theses and international regulatory pressures, particularly those related to traceability, environmental compliance, and ESG criteria. European regulatory requirements regarding product origin, deforestation, and transparency in the supply chain have transformed traceability and monitoring into central economic variables. This dynamic creates alignment among four structural vectors: (i) external regulatory demands; (ii) investor priorities; (iii) needs expressed by startups; and (iv) public programs and open innovation calls. The convergence of private capital, public policy, and institutional infrastructure reduces uncertainty and strengthens the ecosystem's systemic coherence.

Another key element is the diversification of agribusiness financing. The sector now operates within a more sophisticated financial framework, combining traditional rural credit instruments (Plano Safra) with capital market mechanisms such as CRA, LCA, and Fiagro, and private instruments such as the CPR. This structure expands the availability of resources, reduces fiscal dependence, and integrates agriculture into the national and international financial system in a more structured manner. However, this financial sophistication also raises the bar for corporate governance, transparency, and performance, including for startups seeking to scale solutions across complex supply chains.

In a more discerning capital environment, reducing regional disparities and transaction costs becomes a strategic variable. Public programs focused on territorial governance, national digital platforms connecting stakeholders, and technological validation tools gain importance as mechanisms for mitigating perceived risk. Through the structuring of regional assessments, state committees, data integration, and coordination among startups, producers, investors, and ICTs, these instruments help raise the average quality of projects presented to the market and increase predictability for investors.

The reconfiguration of capital, therefore, does not represent a contraction of the ecosystem, but rather a transition to a stage of qualitative consolidation. Agribusiness remains attractive, but growth now depends on efficiency, regulatory alignment, systemic integration, and robust governance. The strategic convergence observed among investors, public policy, and institutional infrastructure suggests that the next cycle will be less marked by quantitative expansion and more oriented toward structural consolidation and long-term competitiveness.

1.4 Final Consolidation: Regional Structure, Demands, Capital, and the Role of the Agtech Radar

The integration of the three axes analyzed—the territorial structure of the ecosystem, startup demands, and capital reconfiguration—enables a systemic understanding of the current stage of innovation in Brazilian agriculture. This understanding gains even greater depth when the open-ended responses from the startup and environment surveys are incorporated, revealing qualitative insights into bottlenecks, opportunities, and structural needs.

At the territorial level, the consolidated data reveal a concentrated yet heterogeneous ecosystem. The Southeast and South account for nearly 80% of agtechs but exhibit distinct institutional dynamics: while the Southeast operates under relatively high institutional pressure (a higher number of startups per environment), the South exhibits greater structural balance. Despite agriculture's central role in the region's production, the Center-West has not yet fully converted its economic weight into proportional technological density. The Northeast, in

turn, has an institutional infrastructure that is relatively superior to its current startup base, indicating potential for regional growth. Finally, the North demonstrates significant relative intensity when adjusted for GDP, but lacks institutional scale.

The open-ended responses from the environment survey corroborates this regional analysis. Several respondents mention difficulties related to coordination among local actors, low integration with production chains, and limited access to specialized capital outside major urban centers. In less densely populated regions, the need for greater territorial coordination, stable public policies, and regulatory predictability stands out. In more robust regions, however, demands related to thematic specialization, internationalization, and connections with larger investors emerge.

On the startup side, the open-ended responses confirm the qualitative transition of the ecosystem. Although physical and laboratory infrastructure remains relevant, the main bottlenecks mentioned focus on market access, connections with large companies, fundraising, regulatory validation, and integration into production chains. Entrepreneurs point to difficulties in scaling solutions, structuring appropriate governance for investors, and navigating complex regulatory environments. There are also recurring mentions of the need for greater integration between research, public policy, and the market, particularly in segments such as bio-inputs, innovative foods, and traceability.

On the financial front, the reconfiguration of capital demands greater discipline and selectivity. The investment environment in 2025 is characterized by lower aggregate volume and greater analytical rigor. Investors prioritize areas with potential for structural productivity gains and regulatory compliance, such as biotechnology and traceability. Investors' open-ended responses indicate a preference for business models with market clarity, operational efficiency, and robust governance. This logic aligns with startups' demands for structured support in fundraising and with market perceptions regarding the need for project qualification to access capital.

In this scenario, the importance of tools capable of integrating information, reducing information asymmetries, and guiding strategic decisions becomes evident. The Agtech Radar plays a foundational role in this process, as it offers a consolidated database on startups, ecosystems, and investors, enabling comparative regional analyses, the identification of institutional gaps, and the mapping of technological trends. With systematized quantitative and qualitative information, including insights gathered from open-ended *survey* questions, the Agtech Radar helps reduce search costs, improve public policies, and guide investment strategies.

Furthermore, the Radar serves as the ecosystem's cognitive infrastructure. By presenting evidence regarding regional patterns, relative densities, technological priorities, and thematic convergences, the Radar provides inputs for decision-making by public officials, investors, ecosystems, and entrepreneurs. In a landscape of more selective capital and growing regulatory demands, the availability of structured information becomes a strategic asset. Transparency regarding where startups are located, which categories are growing, where there is greater institutional pressure, and which demands are emerging qualitatively fosters better alignment between institutional offerings, public policy, and private strategy.

The open-ended responses emphasizes the need for greater national integration of the ecosystem. Several stakeholders mention the fragmentation of initiatives, the overlap of pro-

grams, and the difficulty in connecting regions. In this regard, the Agtech Radar can serve as a reference platform for federal coordination and collaboration among stakeholders, supporting programs such as national digital platforms, state governance, and open innovation calls.

In summary, the three structural consolidations—territorial concentration with regional asymmetries, the maturation of startup demands, and the disciplined reconfiguration of capital—converge toward a diagnosis of a qualitative transition in the Brazilian agri-innovation ecosystem. The quantitative growth of the past decade has given way to a moment of structural consolidation, in which efficiency, governance, integration, and coordination have become decisive factors.

In this context, the role of Radar Agtech transcends statistical mapping. It positions itself as a strategic intelligence tool, capable of integrating economic data provided by the IBGE, empirical evidence from field research, and investment trends into a coherent narrative of the ecosystem. By integrating territorial, technological, and financial dimensions, Radar Agtech helps reduce information asymmetries, guide region-specific public policies, and support private decisions that are better aligned with the structural transformations of Brazilian agriculture.

The challenge of the next cycle lies not only in increasing the number of startups, but in strengthening the quality of the connections between technology, capital, production, and regulation. The fortification of the ecosystem will depend on the ability to transform information into strategic coordination, institutional infrastructure into commercial-scale operations, and technological innovation into long-term sustainable competitiveness. In this process, the systematized intelligence shared by Radar Agtech is a central element for the maturity and coherence of the national agricultural innovation system.

2. Conclusion

• *Aurélio Favarin, Luiz Sakuda, and Pedro Jábali*

The integration of the analyses and evidence presented throughout the Radar Agtech Brasil 2025 provides a clearer understanding of the current stage of development of the Brazilian agri-innovation ecosystem, which is undergoing a clear process of becoming more robust. This is an ecosystem that combines consistent technological expansion, regional diversity, and transformations in the dynamics of financing and business development.

From a structural perspective, the results indicate significant growth over the past decade. By 2025, Brazil will have 2,075 active agtechs, compared to the 1,125 identified in 2019, highlighting a significant expansion of the entrepreneurial base focused on agricultural innovation. At the same time, 390 innovation environments were identified with activities related to the agriculture and food sector, including incubators, accelerators, hubs, technology parks, and organized ecosystems. These figures reveal a numerically robust entrepreneurial system supported by an institutional infrastructure relevant to the development of technological solutions applied to the sector.

Despite this progress, the territorial distribution of the ecosystem remains uneven. The Southeast and South regions concentrate the majority of startups and innovation environments, although they exhibit distinct institutional dynamics. The Southeast has the largest base of entrepreneurs, while the South stands out for a more pronounced balance between startup density and institutional offerings. Other regions exhibit different patterns of maturity: the Center-West, despite its central role in national agricultural production, still has a technological intensity that lags behind the sector's economic weight; the Northeast demonstrates significant institutional potential, with a substantial presence of innovation environments; and the North, even with a smaller absolute scale, presents relative indicators that suggest opportunities for future development. This overview confirms that the Brazilian ecosystem combines strong geographic concentration with clear opportunities for regional expansion.

The analysis of startups also shows consistent progress in technology adoption. Digitalization has become a structural component of business models, with widespread use of artificial intelligence and data integration in solutions focused on production management, monitoring, and operational efficiency. The solutions are concentrated primarily in the stages inside and after the farm, indicating that technological transformation in Brazilian agriculture extends beyond primary production and encompasses processing, logistics, marketing, and value-added chains.

At the same time, challenges related to the economic strengthening of startups persist. A significant portion of these companies still has low revenue and relies heavily on equity capital, underlining a contrast between high technological intensity and limited financial capacity. This situation suggests that the ecosystem's main challenge lies not only in generating new solutions but in the ability to transform innovation into scalable and economically sustainable business models.

Feedback from startups and innovation environments also points to a qualitative shift in the ecosystem's demands. While physical infrastructure, laboratories, and experimental spaces

remain relevant, factors related to market access, capital, in-the-field technology validation, and regulatory support are growing in importance. As many startups advance to growth stages, connections with supply chains, investors, and corporate partners become more relevant.

In this context, some innovation environments still operate using traditional support models, focused primarily on physical infrastructure and classic incubation services. Despite the importance of these elements, the ecosystem's advancement tends to require these environments to play a more coordinating role, connecting technology, market, and capital. The institutional evolution of these arrangements will be crucial to sustaining the next stage of growth for Brazilian agtechs.

Another key area identified by the report concerns the transformation of the investment environment. The year 2025 marks the consolidation of a cycle characterized by greater financial discipline, selectivity, and a focus on fundamentals. Following a period of high global liquidity, investors have begun to prioritize operational efficiency, structured governance, and the effective ability to generate value. In the agribusiness sector, this shift does not represent a decline in capital interest, but rather a process of market maturation.

Agribusiness remains a strategic sector for investors, as it combines macroeconomic relevance, a solid production base, and high potential for gains in productivity through technological innovation. Investment priorities are concentrated in areas such as biotechnology, biological solutions, traceability, operational digitization, and technologies aimed at improving the efficiency of agri-food chains. In this context, artificial intelligence is likely to establish itself as cross-cutting infrastructure integrated into technological solutions, rather than as an isolated differentiator.

The convergence of international regulatory demands, investor priorities, and the sector's technological needs creates a favorable environment for the development of solutions focused on sustainability, transparency, and productive efficiency. Growing requirements related to traceability and environmental compliance thus become key drivers of innovation and investment.

Viewed together, the different axes analyzed (regional ecosystem structure, evolution of entrepreneurial demands, and reconfiguration of capital) point to a moment of qualitative transition. The recent cycle was marked by the expansion of the number of startups and the consolidation of a significant institutional base. The next stage is likely to be defined by the ability to transform technological density into effective economic impact, expanding scale, productivity, and competitiveness.

In this process, intelligence and coordination tools are becoming increasingly relevant. By systematizing information on startups, innovation environments, and investors, Radar Agtech Brasil helps reduce information asymmetries, supports the formulation of public policies, and guides strategic decisions by entrepreneurs and capital agents. The availability of structured data makes it possible to identify regional gaps, map technological trends, and understand with greater precision the transformations underway in the ecosystem.

In summary, the Brazilian agri-innovation ecosystem is in a phase of structural consolidation. The quantitative expansion observed in recent years lays the groundwork for a new stage of development, in which efficiency, institutional integration, governance, and access to capital become decisive factors. The central challenge of the next cycle will not only be

to increase the number of startups, but to strengthen the connections between technology, production, market, and financing, thereby converting innovation into sustainable competitiveness for Brazilian agribusiness.

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