PRODUTO NEUTRO de CARBONO IBDN.ORG.BR

Panorama Brasil 2026

Agronegócio

PUBLIC Projetos Editoriais

*O **futuro** do agro já começou.*

*E está sendo construído por você, que **transforma propósito em avanço.***

Você e John Deere.
Uma só força.

JOHN DEERE

AGRIBUSINESS PARTNERS

Gilberto Figueira
Public Projetos Editoriais
Director of Special Projects

A TRIBUTE TO THE STRENGTH OF BRAZILIAN AGRIBUSINESS

As PUBLIC celebrates 20 years of activity, we are proud to launch the first edition of Panorama Brasil Agronegócio, a publication that reaffirms the relevance of one of the most dynamic and strategic sectors of the national economy. In a landscape of constant transformation, marked by technological advances, climatic challenges, and new global demands, agribusiness continues to demonstrate strength, resilience, and a high capacity for adaptation, consistently breaking production records and consolidating itself as the country's main engine of growth.

More than just a publication, Panorama Brasil Agronegócio positions itself as a reliable source of information, analysis, and market intelligence. By gathering up-to-date data, consistent indicators, and qualified editorial content, the work offers a broad and structured view of the sector, contributing directly to decision-making and the generation of new business opportunities.

Throughout its pages, a comprehensive portrait is presented that values the entire production chain, highlighting companies, leaders, and initiatives that drive the development of Brazilian agribusiness, which is responsible for a significant portion of the GDP and national exports.

This project only comes to fruition thanks to the support of companies, entities, and professionals who believe in the power of information and the importance of strengthening the sector. To everyone who contributed to the realization of this edition, our sincere thanks.

It is this partnership that keeps Brazilian agribusiness competitive, innovative, productive, and sustainable, prepared for the challenges of the future and to fulfill its goal: to feed the world's population.

PANORAMA BRASIL AGRONEGÓCIO

This yearbook is a publication of Public Projetos Editoriais with controlled circulation, directed at entrepreneurs in the sector.

PUBLIC Projetos Editoriais

Director of Special Projects
Gilberto Figueira

Chief Financial Officer
Cleide Antunes

Journalist
Katia Penteado
(Mtb: 11.682-SP)

Graphic Design and Layout
Fábio Figueiredo

Commercial
Douglas Garcia
Sergio Carillo
Silvana Baierl

Tradução
Arabera

Printing
Elyon Indústria Gráfica

Circulation
10.000 Copies

Contact: +55 11 982598482
gilberto@publicbrasil.com.br

Jornada do Agro

A tecnologia no ciclo da produção rural.

As aplicações tecnológicas nas diversas fases do ciclo de produção resultam em mais eficiência, redução de custos e riscos climáticos, elevando a produtividade e trazendo mais segurança e renda para o agro brasileiro.

ABIMAQ

01

INOVAÇÃO

A tecnologia presente nas **Máquinas e Implementos Agrícolas** auxiliam no preparo do solo, plantio, trato cultural, colheita e na criação de animais.

02

EFICIÊNCIA

A eficiência das **Máquinas e Implementos Agrícolas** também proporcionam ao produtor rural mais agilidade, otimizando as operações e reduzindo os custos de produção.

03

QUALIDADE

Considerada a 4ª revolução da nossa agricultura, a **Irrigação** permite que a eficiência na produção possa ser potencializada com o fornecimento adequado de água.

04

PROTEÇÃO

A **Irrigação** também minimiza os riscos climáticos inerentes à atividade agrícola, resultando em um maior aumento da produtividade e redução da necessidade de abertura de novas áreas de cultivo.

05

SEGURANÇA

O uso da tecnologia de **Armazenagem de Grãos** garante que todo o esforço produtivo do campo gere o resultado esperado, evitando perdas de safra.

06

LUCRATIVIDADE

A **Armazenagem de Grãos** também garante a integridade da safra e permite programar a comercialização da produção, possibilitando redução nos custos de logística e maior renda ao produtor.

Acesse
e saiba mais
abimaq.org.br

Jornada do Agro é uma campanha da Câmara Setorial de Máquinas e Implementos Agrícolas (CSMIA), Câmara Setorial de Equipamentos de Irrigação (CSEI) e Câmara Setorial de Equipamentos para Armazenagem de Grãos da ABIMAQ (CSEAG).

Realização:

CSMIA CSEI CSEAG

Brazilian agriculture as seen by a farmer, minister, academic, and cooperative member...

...not necessarily in that order

Roberto Rodrigues, one of the leading and most recognized figures in Brazilian agriculture, opens the pages of this publication, discusses topics covered throughout the issue, and outlines a profile of the national agricultural sector, rural producers, and the sector's achievements and challenges.

A history interwoven with current events, the importance and role of cooperativism, and the need for structural public policies are also topics he addresses in this exclusive interview, in which he discusses strategies for Brazilian agriculture to fulfill its role, replicate technology developed for tropical agriculture, and meet the request of the Organization for Economic Cooperation and Development (OECD) to increase current production by 40% within ten years to feed the world.

Check it out!

The Contemporary World vs. Brazil

We live in an extremely complicated world, full of unforeseen events. Many of major multilateral organizations have lost their leading role and, consequently, their direction in the world. There is also growing ideological, ethnic, religious, and economic polarization, besides a general unwillingness to understand. We lack clear prospects for the future. I come from a time when the world was divided between Moscow and New York (Russia and the United States), during the Cold War. This ended with the fall of the Berlin Wall, economic globalization, and the principle of global harmonization, which died at the dawn of the 21st century, when we returned to this polarized scenario, which created a hostile environment for the entire world – one no longer defined by the United States and Russia, but by Asia and the West – , the United States, and China.

In this scenario, Brazil has an interesting characteristic: it is a Western country, and yet maintains a strong partnership with China, which is both a difficult and favorable situation.

Four aspects mark the world's entry into the 21st century: food insecurity, energy issues, social inequality, and climate change.

Four modern Horsemen of the Apocalypse

Today, the world is being shaken by four forces that, for educational purposes, I am calling the four modern Horsemen of the Apocalypse: food insecurity, energy crisis, social inequality, and climate change. These issues must be addressed because they affect world peace.

The first of these, food security, is clearly an absolutely central issue for world peace, and so are the other issues. A country plagued by hunger cannot be governed; just look at the Arab Spring, not so far behind us.

So, perhaps because I'm "biased," I am convinced that agriculture is the way to solve these four problems. And, more specifically, the planet's tropical agriculture – which encompasses Latin America, Sub-Saharan Africa, and parts of Asia as well – because it is in this tropical belt where there is land for production to grow both horizontally and vertically, by incorporating new areas and technology, where current productivity and technology levels are very low.

In this way, tropical agriculture will be responsible for world peace, ensuring food, energy, jobs, and income, and addressing the climate crisis. Okay, that's a beautiful theory. But what about practice? The reality is that someone has to take charge of this; someone has to lead the way.

Brazil in the lead

It is not patriotism to say that Brazil is the only country in this region that has developed sustainable tropical technology, replicable in most tropical countries with vegetation similar to ours, like Cerrado, Savanna, etc. Of course, considering the differences in climate, administrative, and economic systems..., we know that the model developed is one that can be replicated worldwide.

So, in this global scenario – directionless, aimless, and leaderless – Brazil plays a very important role in preserving or ensuring universal peace by resolving these central problems for human life on the planet. It is the only country in this region that developed sustainable tropical technology, and therefore has a destiny: to lead the process of eliminating the four spectra or the four horsemen of human disorder so that universal peace may prevail. I affirm this, in fact, based on studies conducted by the OECD, a serious, reputable, and liberal think tank in the world, which states that the food issue is determined by food supply. Therefore, in order to have food supply for the entire world in ten years' time, from now on, exportable food production must grow by 20%.

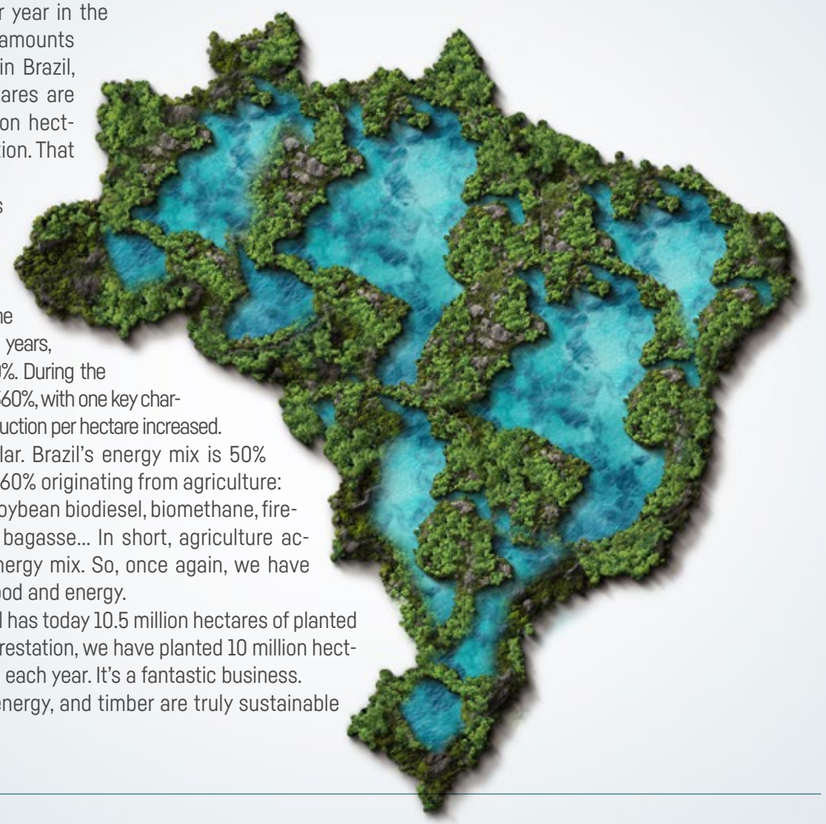
Based on this, let's take a closer look: by how much can the Northern Hemisphere grow? The United States and Canada, 12%; Europe, 11%; Eurasia (China, India, Iran, Ukraine, Russia), 15% at most. No one grows by 20%, and the OECD itself acknowledges that for the world to grow by 20%, Brazil would have to grow by 40%.

And Brazil can grow 40% because it has sustainable tropical technology, enough land to plant, a vigorous entrepreneurial spirit that can overcome any obstacle, and some reasonable public policies.

Thus, Brazil has four internal conditions that have allowed it to reach this point by growing as we have, and I would add a fifth: the growing global market. There is a combination of factors that allows Brazil to be, in fact, the leader of a process of growing food and energy security. Some data prove this. For grains, from 1990 to the present – that is, over 35 years – the area planted with grains has grown by 120%, and grain production has grown by 540%. In other words, production has grown four times more than the planted area, thanks to tropical technology and sustainable practices. Today, in Brazil, 60 million hectares are planted with grains, but in many areas of the country two or even three crops are grown per year in the same area.

Sustainability in our DNA

The sum of three harvests per year in the same place, in the same year, amounts to 82 million hectares. So, today in Brazil, in the same year, 82 million hectares are planted with grains, and 124 million hectares are protected from deforestation. That is sustainability in our blood.



It's no different with meat. What is meat? Meat is grass plus grain, and we've seen animal protein growing in the same direction as grain, almost at the same pace as grain, during the same period. For example, over the past 35 years, chicken production has grown by 560%. During the same period, pork production grew by 360%, with one key characteristic: pasture use decreased; production per hectare increased.

In energy, the scenario is similar. Brazil's energy mix is 50% renewable – globally it's 15%, with 60% originating from agriculture: sugarcane ethanol, corn ethanol, soybean biodiesel, biomethane, firewood, electricity from sugarcane bagasse... In short, agriculture accounts for 30% of Brazil's total energy mix. So, once again, we have extraordinary competitiveness in food and energy.

And more: planted forests. Brazil has today 10.5 million hectares of planted forests. In addition to avoiding deforestation, we have planted 10 million hectares and are adding nearly 1 million each year. It's a fantastic business.

Our activities in grains, meat, energy, and timber are truly sustainable and replicable in the tropics.

The Role of Brazilian Agriculture

The figures are impressive: agriculture accounts for one-third of Brazil's GDP and 30% of the country's jobs. In 2025, it accounted for 49% of exports. In other words, it is a critically important and fundamental sector for the economy that generates jobs, wealth, and income, as well as export activity that sustains Brazil's trade balance, which, in turn, guarantees foreign exchange reserves.

These results are fantastic. It is the greatest agricultural feat of the 20th century. Until 1970, Brazil imported 30% of the food it consumed. We were under military rule; the military believed that a country of this size could not import food.

Until then, agriculture had been concentrated along the coast, just like consumption and the major cities. At that time, programs were launched to develop the Brazilian Midwest, the Cerrado–a land that no one wanted because it was infertile, lacking organic matter, and, naturally, devoid of nutrients. Technology changed that, and gauchos (people from Rio Grande do Sul) went to the Midwest with nothing but their guts and determination, facing malaria, yellow fever, rattlesnakes, urutu, and poor soil. Today, the Midwest is the Maracanã, where the final of the Food World Cup will be played. And we're going to win that World Cup too.

Thus, in 50 to 60 years, Brazil went from being an importer of 30% of our food, to an exporter to 200 countries. This is fantastic, especially given that Brazil has no strategy for agriculture, nor logistics, infrastructure, or income policies, and does not make trade agreements with major consumer countries. If the country has this universal calling to be the world champion of peace, food, energy, etc., reducing social inequalities, caring for the climate... this is a wonderful calling; we could grow on the world stage as an extraordinary country for world peace.

Technology and science: lack of investment

Even technology, which was the great lever, is losing its impact. We have a process that has been flawed for a long time. In São Paulo, for example, the Campinas Agronomic Institute (IAC) was founded by Dom Pedro II; it is a universal heritage, and today it has no money; the Brazilian Agricultural Research Corporation (Embrapa) itself is losing ground due to lack of resources. Governments do not invest in technology or science, and without science, Brazil is a country without a future; without scientists, there is no science; and to have scientists, there must be education, because there is a lack of basic education to train scientists to advance science.

There is a lack of structural policy action, and technology is central to this entire process. We cannot let Embrapa suffer the same fate as that of Campinas Agronomic Institute. We must make room for IAC, Embrapa, universities, and extension and research programs. There must be a concentration of intellectual resources so that Brazil can realize the potential bestowed upon it in a peaceful world.

I keep wondering why it takes us so long to wake up to this destiny that lies before us, that is being offered to us, and to seize it, we must invest in technology, trade agreements, infrastructure, education, and training, as well as in a function that is rarely practiced: the organization of the rural society.

Cooperativism and Social Organization

Today, what distinguishes a developed country from an undeveloped one is the degree of social organization. And the cooperative is the economic arm of that organization. The union is the political arm. They are arms of the same body and must work together, integrated. But this vision is missing.

In Brazil, the cooperative has strength, but given its size, it should have much more strength than it does. Today, most Brazilian producers are small-scale farmers, and with the globalized economy, the unit margin on the product has become very small. Without scale, there is no margin or income. Thus, the small-scale farmer is doomed if they are not part of a cooperative. For this reason, the cooperative is an instrument for the growth of small-scale farmers in partnership with their peers; these are therefore relevant issues that need to be addressed in a government strategy.

A study by Embrapa states that Brazil has roughly5.4 million farmers, of whom 1 million are in the market – they are the competitive ones, the "large-scale producers"; the remaining 3 million are outside the market: they are small-scale producers who are isolated, lacking access to good planting and land-care techniques or to technology. This is the space for cooperatives to reach this large group. We need public policis to address itthis, because without education, no one will join a cooperative.

The cooperative is the extension of what the farmer cannot do alone. He cannot have a warehouse on the farm because it is expensive; he cannot have an agronomist or a lawyer, but he can obtain all this in the cooperative – scale, technical assistance, supply of inputs, and industrialization. The cooperative is a central element for the survival and progress of Brazilian producers, a system that functions effectively worldwide.

European Union-Mercosur Agreement

Brazil has no agreements with China, India, the United States, or the European Union. This Mercosur-EU agreement is very important because, in 20 to 25 years, we could increase–or even double–our production of grains, meat, sugar, and ethanol, but there must be a market and, therefore, trade agreements that truly guarantee this. Why is Europe so resistant to this? This is a new topic, and I've only recently come to this realization. Compared to Brazil, France has 3% of its population in rural areas; the bulk of agricultural income is similar, but the French people take pride in their agriculture. Pride in their cheese, wine, ham, dairy products... The urban population grew up with this, admiring, respecting, and valuing the origin of these products.

And this happens in France, Italy, and Germany. In other words, in Europe, the population takes pride in farmers and agriculture that has developed there over centuries. The same is true in Japan and the United States. In New York, for example, you go to a party on a Saturday night, and there's a 20-year-old wearing boots, a belt with a buckle, a hat... people are proud of their rural roots. Here, that doesn't exist; there's no such pride. Here, no one understands the effort it took to go to the Midwest, to Cerrado, to plant grains, just as in the Southeast of the country. The conquest of Cerrado is a massive, huge undertaking.

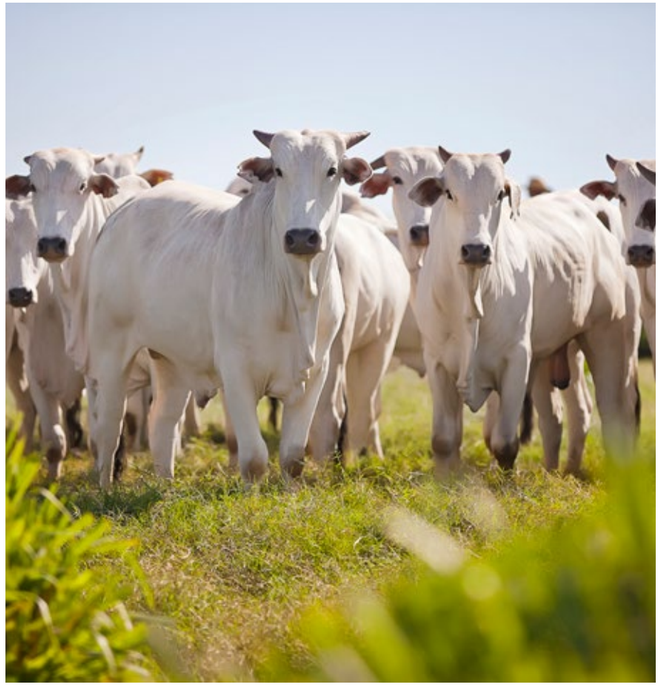
Pride in agriculture

I feel very sad about Brazilian people's attitude; perhaps it's even lack of knowledge about what agriculture is, ignoring the evolution of this process, thinking that food has to be cheap, and forgetting that jeans are made of cotton, that a wool coat comes from a sheep, that cows in the pasture provide shoes, belts and bags, barbecue, and such. There is a lack of that sense of belonging and vision that establishes an emotional legacy.

The issue extends to the following aspect: If Brazil becomes a world champion in food security, everyone will take pride in it. The farmer produces out in the fields, but who produced the technology? Was it the scientist? The university, which is urban for the scientist. Who manufactured the tractor, the fertilizer, the pesticide? Urban factories. Who built the road? An urban contractor. It is the city that does everything. The truck driver is not a farmer; he is a truck driver who works for the countryside. The banker who grants the loan is not a farmer; he is a banker, but he helps the countryside with credit.

In this context, everyone participates in the process, or else consumes, eats. Agriculture is a national activity in which the whole of society plays a part, but this sense of unity does not exist here in Brazil, and this awareness has to do with education and propaganda, with adequate information.

For Brazil to assume its global, universal role as supplier of food, energy, and fibers – generating wealth for poor countries and thereby reducing social inequality through technology that addresses the climate crisis – it is also essential to have a strategy that combines public policies with private-sector initiatives; interaction with the private sector.



The future depends on strategy

Returning to the OECD's forecast, we know that Brazil can grow by 40%, particularly because we have already done so. The same factors that brought the country this far – technology, entrepreneurship – persist; they are still here. But we cannot do this without an internal strategy to organize the sector and an external strategy to offer the world not just food, not just "give a fish, but teach how to fish", with the technology we have learned and developed.

I see, here, as Roberto Campos used to say, that "Brazil never misses an opportunity to miss an opportunity." At this moment, when the world is facing this political and ideological polarization that is stealing the peace of the planet, Brazil cannot miss the chance to lead a process that can bring peace to the world. This lack of information, knowledge, and sense of belonging saddens me deeply.

Agricultural Financing

When I was Minister of Agriculture, from 2003 to 2006, I held the same conviction I have today regarding Brazil's role on the global food and energy stage. I do not wish to speak of myself, but of public policies that allowed Brazil to grow more and more and more.

Among these instruments is Rural Insurance, created in 2003 based on what already existed worldwide. The goal was to stabilize income, since agriculture is a very high-risk activity. It has been 23 years, and not even 10% of agriculture in Brazil is insured, because the government does not do its part, and when a massive climate-related disaster strikes, the government extends the debt, grants amnesty, and society pays.

Insurance would solve this problem and a few others, since no insurer will provide coverage to a producer who lacks technology. Therefore, insurance is a driver of technological improvement. Furthermore, insurance doesn't need Banco do Brasil. Every bank provides credit because, since there's insurance, they're at ease.

In addition to rural insurance, during my tenure, LCA, CRA, and CDCA were created – market-based instruments that currently finance 60% of Brazilian agricultural production, significantly reducing the burden on Banco do Brasil and Caixa Econômica, as they serve as mechanisms to attract capital. I also spearheaded efforts to support credit unions, which today account for 20% of rural credit and continue to grow.

Legal Instruments

Illegal deforestation is a crime; land invasion is a crime, not agriculture. But our competitors abroad take advantage of these crimes and attribute them to agriculture, claiming that rural producers are the ones doing this. This is a battle for market share, a savage battle.

I've been writing about this for many years and I maintain that the Brazilian government is not effective in combating corruption and crime. It must put an end to what is illegal now, not in 2030.

There is also the provision in the Forest Code regarding how much of their land rural producers themselves must preserve. It is a fantastic law that needs to be enforced. We have a wonderful, sustainable, efficient, competitive agriculture sector, tarnished by criminals, and we are mistaken for criminals. To get out of this hole, we must comply with the law and leave no room for criminals.

Sources of financing, investments in science and technology, and law enforcement to end illegal deforestation: immediate and permanent needs.

Foto: Edilson Rodrigues/Agência Senado

ROBERTO RODRIGUES

Born in Cordeirópolis (SP), he is an agricultural engineer who graduated from ESALQ-USP in 1965, with advanced courses in rural administration, and was a rural entrepreneur in São Paulo, Minas Gerais, and Maranhão, in addition to earning many titles. His career has three strands: academic, agricultural, and cooperative.

With hundreds of published works on agriculture, cooperativism, and rural economics, he is the author of nine books and co-author of several others. Among his many positions, he is Professor Emeritus at Getulio Vargas Foundation, holds honorary doctorate from UNESP, serves as FAO Special Ambassador for Cooperativism, and is a member of ESALQ Advisory Board. He served as coordinator of FGV Agribusiness Research Center, member of FECAP Advisory Board, chairman of ESALQSHOW Advisory Board, member of Japan House Advisory Board, and member of Brazil/Japan Business Leaders Group–Wise Men Group–which seeks to foster closer ties between the two countries

He served as Minister of Agriculture, Livestock, and Supply from 2003 to 2006, and as president of the Brazilian Agribusiness Association (Abag), Brazilian Rural Society (SRB), and FIESP Higher Council for Agribusiness (COSAG). He served as vice president of the Brazilian Foundation for Sustainable Development and National Agricultural Society (SNA). As a farmer, he received numerous awards in environment areas, social issues, soil conservation, and productivity, as well as the Order of Agricultural Merit, Knight class, awarded by the French government.

He served as leader of agricultural and rural credit cooperatives, president of the Organization of Brazilian Cooperatives (OCB) for two terms (1985–1991), International Organization of Agricultural Cooperatives (1992–1997), and International Cooperative Alliance (ICA) (1997–2001).

He has visited 83 countries on every continent and has received numerous awards, including the Albin Johansson Medal for Swedish cooperativism, in recognition of his work to promote democracy and peace around the world.

1

NUMBERS OF SECTOR

The Brazilian GDP and agribusiness.

Conab data.

Positive correlation between production and land use.

Exports, trade agreements, and international partnerships.

The representation of agribusiness by sectoral entities.

GDP impressions: agribusiness drives the Brazilian economy

"Food production in Brazil is strategic for national development and also for guaranteeing food and nutritional security and exports. The Brazilian agricultural sector is diverse and plural. In addition to the diversity of food produced, production systems, scales of production and commercial arrangements are also multiple, with large-scale commodity production predominating. Our country is continental, producing food, fiber and energy from North to South, some grains in up to three agricultural harvests, with soybeans and corn accounting for around 90% of national production of the main grains."

This is the first paragraph of the publication Perspectivas para a agropecuária safra 2025/26, now in its 13th edition, prepared by the National Supply Company (Conab) and released in September 2025. This report sums up the importance of the sector, which is also proven by various statistics, not only from Conab, but also from the Brazilian Institute of Geography and Statistics (IBGE) and from entities representing the various branches that make up the activity.

Released on March 3 by the IBGE, the positive outcome of the Gross Domestic Product (GDP) for 2025 points to growth of 2.3%, reaching R$12.7 trillion. Although positive, it slowed down compared to 2024, when the economy grew by 3.4%.

An important fact is the 11.7% growth in agriculture and livestock, cited as the sector that most affected this statistic. Increases in production and gains in the productivity of various crops are mainly responsible for the result, especially corn (23.6%) and soybeans (14.6%), which reached record highs in 2025.

An open-air industry, agribusiness withstands geopolitical polarization, market instabilities, and weather conditions

The IBGE, in its presentation, also mentions other records, such as the evolution of livestock, which "surpassed its own records in a year marked by tariffs from the United States, Brazil's second largest beef buyer; and exports, driven by Chinese demand." In 2025, 3.50 million tons were sold, up 20.9% on the previous year.

IBGE's note on the GDP results highlights that "four activities—agriculture, extractive industries, information and communication and other service activities—contributed 72% of the total volume of added value in 2025, activities which were less affected by the contractionary monetary policy [high interest rates]."

Adaptation and resilience: intrinsic characteristics of Brazilian agribusiness

An activity that is completely dependent on factors that cannot be controlled because it is carried out in the open–with rare exceptions–farming is not only continually exposed to climatic fluctuations, but also to geopolitical polarity and instability in the international market. In Brazil, in response to developments aimed specifically at tropical agriculture, it is possible to harvest up to three grain crops a year, or at least five crops every two years. In this context, soybeans and corn stand out, accounting for around 90% of national production of these crops.

For the Brazilian Agribusiness Association (ABAG), the results for 2025 prove the resilience and adaptation of Brazilian agribusiness in the face of a challenging scenario, since "it has maintained its relevance to the national economy, with growth of 11,7% growth in the Gross Domestic Product (GDP) of agriculture and livestock, according to IBGE data, as well as a consistent performance in exports, reaching a record of US$169 billion and a surplus of US$149.07 billion, representing almost half of Brazil's total sales abroad, and advances in productivity in various chains."

The year 2026 has been characterized by tight margins, but–Abag assures–some growth is expected, not less than before as the sector continues to be one of the main global suppliers of food, fibers and renewable energy: "Agricultural production remains high, but the sector must combine productive efficiency and commercial strategy in order not to lose competitiveness. Investments in technology and sustainability are expected to increase."

In addition to the positive data previously mentioned, the sector is exporting to a greater number of countries, opening 211 new markets in 56 destinations, reaching the mark of 525 new markets opened since 2023. Breakthroughs in the adoption of technologies in the field, such as precision agriculture and digitalization, the development of research and innovations in the various academic, research and innovation institutes, such as Embrapa, and the search for sustainable practices, are listed by Abag as responsible for the results, as well as "important advances in regulatory and institutional agendas, which have brought a little more legal certainty and predictability to the sector."

Conab projections

Conab's projections for the current harvest (2025-2026) specifically in relation to the main grains produced in Brazil, even depending on climatic conditions, point to one of the largest ever recorded in Brazil, proving the country as "one of the world's main players in the production of agricultural commodities. At the same time, we are one of the most biodiverse countries in the world, with an extremely significant presence of family farming, agrarian reform settlements, traditional peoples and communities and indigenous peoples."

As expressed in the Perspectives for the 2025/26 agricultural harvest material, the report includes the diversity resulting from different production systems, with often complex production arrangements, which promote agrobiodiversity: "This production is expressed in food diversity in the different Brazilian biomes, ensuring a food culture of its own and promoting healthy eating."

The tables in Conab's report show the forecasts and evolution of these crops. Conab also closely monitors some crops, carrying out four-monthly surveys of coffee and sugar cane, and monthly surveys of grains. The company also publishes a monthly Agricultural Monitoring Bulletin for Summer Crops (cotton, rice, first and second crop corn, and soybeans) and another for the Grain Harvest (which includes wheat and beans and crops such as peanuts, sesame, sunflower, castor beans and sorghum), as well as maintaining a market information portal (https://portaldeinformacoes.conab.gov.br/) for corn, soybeans, rice, beans, wheat, coffee and feather cotton. This information includes climate and market analysis.

The most recent data, dated March 13 and relating to the sixth field survey for the 2025/26 grain crop, carried out in February, indicates a 1.7% increase in the planting area for the 2025-2026 crop, estimated at 83.2 million hectares. This increase corresponds to the addition of 1.4 million hectares compared to the previous harvest. Total production is estimated at 353.4 million tons, 0.3% more than in the previous harvest.

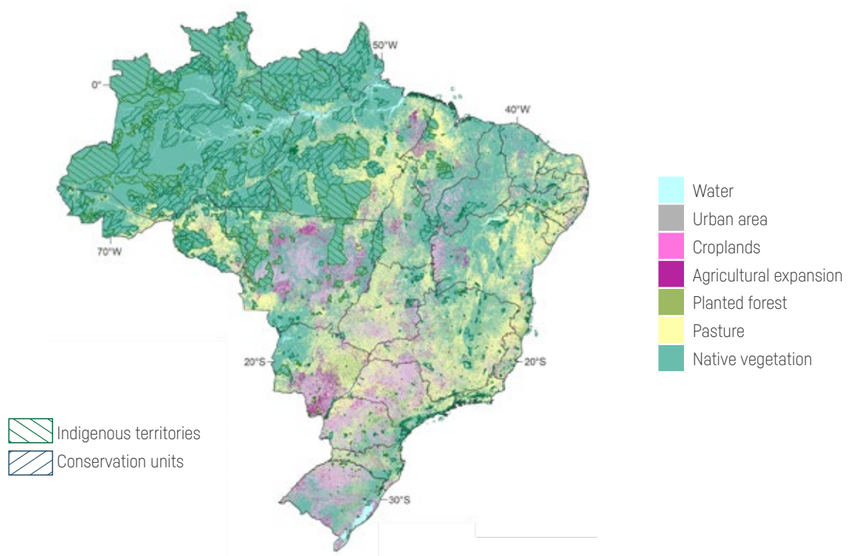
In the annual bulletin with Prospects for the 2025/26 agricultural harvest, the prospects for the harvest, by crop, are defined as cotton, rice, beans, corn and soybeans, also including cattle, chicken and swine.

	Comparison of grain area, yield, and production / 2024/25 and 2025/26 Harvests								
	AREA (in thousand ha)			YIELD (in kg/ha)			PRODUCTION (in thousand tons)		
CROP	HARVEST 2024/25	FORECAST 2025/26	VAR. %	HARVEST 2024/25	FORECAST 2025/26	VAR. %	HARVEST 2024/25	FORECAST 2025/26	VAR. %
Cotton (seed)	2.086,10	2.160,00	3,5	2.742	2.666	-2,8	5.719,90	5.759,30	0,7
Cotton (lint)	2.086,10	2.160,00	3,5	1.947	1.894	-2,7	4.061,10	4.090,50	0,7
Rice	1.764,00	1.664,80	-5,6	7.232	6.885	-4,8	12.756,90	11.462,40	-10,1
Beans (total)	2.697,60	2.713,90	0,6	1.139	1.141	0,2	3.073,40	3.097,80	0,8
Beans (1st crop)	908,5	868	-4,5	1.170	1.150	-1,6	1.062,70	998,6	-6
Beans (2nd crop)	1.404,30	1.418,50	1	960	984	2,5	1.348,10	1.396,50	3,6
Beans (3rd crop)	384,8	427,4	11,1	1.722	1.644	-4,5	662,9	702,7	6
Corn (total)	21.857,50	22.633,00	3,5	6.390	6.110	-4,4	139.695,80	138.281,70	-1
Corn (1st crop)	3.772,60	3.935,10	4,3	6.610	6.372	-3,6	24.935,80	25.076,20	0,6
Corn (2nd crop)	17.427,90	18.095,80	3,8	6.427	6.105	-5	112.032,80	110.478,00	-1,4
Corn (3rd crop)	657	602,1	-8,4	4.152	4.530	9,1	2.727,60	2.727,60	-
Soybean	47.350,60	49.083,40	3,7	3.621	3.620	-	171.472,30	177.670,00	3,6
Others*	5.987,10	5.987,10	-	2.921	2.921	-	17.488,00	17.488,00	-
BRAZIL	81.742,90	84.242,20	3,1	4.284	4.199	-2	350.206,30	353.759,20	1

Source: Conab / Legend: - 1) Cottonseed production; - 2) Excludes lint cotton production / Note: Estimate as of September 2025.
**Others: Peanuts, Sesame, Sunflower, Castor beans, Sorghum, and Winter crops.*

Land use map for the year 2024 / Source: UFMG

Current land use and agricultural expansion by 2050 under a modeled scenario without deforestation expansion / Source: UFMG



COTTON

+0,7% vs 2024/25

4,09 million tons produced

Brazilian cotton production has grown in both area and productivity. In the last eight years, the area devoted to the crop has more than doubled, reaching more than 2 million hectares, and productivity has increased by more than 16.3%, reaching 1.89 tons per hectare, a result associated with the use of high technology and highly efficient production systems. For the 2025-2026 harvest, the area is expected to grow by 3.5%, with production increasing by 0.7% over the volume of the previous harvest, reaching 4.09 million tons.

Supply Table

CROP YEAR	BEGINNING STOCKS	PRODUCTION	IMPORTS	CONSUMPTION	EXPORTS	ENDING STOCKS
2021/22	1.242,70	2.554,10	2,3	675	1.803,70	**1.320,40**
2022/23	1.320,40	3.173,30	1,7	710	1.618,20	**2.167,30**
2023/24	2.167,30	3.701,10	1,1	750	2.774,30	**2.345,10**
2024/25	2.345,10	4.061,10	1	735	2.943,00	**2.729,20**
2025/26*	2.729,20	4.090,50	1	720	2.950,00	**3.150,70**

*Source: Conab | Note: * estimate in thousand tons*

RICE

+31,3% vs 2024/25

2,1 million tons exported

The sown area is expected to fall by 5.6% and productivity by 4.8%, reflecting the exceptional level recorded in the last harvest 2024-2025. Despite this, the expected yield in the field will still be among the highest in the historical series, and national production is estimated at 11.5 million tons, 10.1% lower than the 2024-2025 harvest. Domestic consumption is expected to total 11.0 million tons, and exports could reach 2.1 million tons, up 31.3% on the previous harvest.

Supply Table

CROP YEAR	BEGINNING STOCKS	PRODUCTION	IMPORTS	CONSUMPTION	EXPORTS	ENDING STOCKS
2021/22	1.302,30	10.780,50	1.337,30	10.506,40	2.067,10	**846,60**
2022/23	846,60	10.031,80	1.550,30	10.324,10	1.696,70	**407,90**
2023/24	407,90	10.577,00	1.421,50	10.547,40	1.362,20	**496,80**
2024/25	496,80	12.756,90	1.400,00	11.000,00	1.600,00	**2.053,70**
2025/26*	2.053,70	11.462,40	1.400,00	11.000,00	2.100,00	**1.816,10**

*Source: Conab | Note: * estimate in thousand tons*

BEANS

+0,8% vs 2024/25

3,1 million tons produced

Since the 2024-2025 harvest, on average, for the common-color variety, ended with a volume below initial expectations and suffered as a result of various problems, whether due to weather conditions or prices, this can result in inflexible market behavior, and the common-black variety reached records in terms of area and production last season, The expectation for the 2025-2026 harvest, given that it is a short-cycle crop—three harvests per period, including irrigated production—is that the area will shrink and grow by an average of 0.8%, producing 3.1 million tons. 3.1 million tons.

Supply Table

CROP YEAR	BEGINNING STOCKS	PRODUCTION	IMPORTS	CONSUMPTION	EXPORTS	ENDING STOCKS
2021/22	121,90	2.990,20	76,10	2.850,00	136,10	**202,10**
2022/23	202,10	3.036,70	69,00	2.850,00	139,00	**318,80**
2023/24	318,80	3.198,60	22,20	3.000,00	343,60	**196,00**
2024/25	196,00	3.073,40	13,90	2.850,00	328,50	**104,80**
2025/26*	104,80	3.097,80	21,60	2.850,00	254,40	**119,80**

*Source: Conab | Note: * estimate in thousand tons*

CORN

+4,5% vs 2024/25

94,6 million tons of domestic demand

Projections for the 2025/26 harvest indicate an increase in the area cultivated for both the first and second corn crops. In the first crop, there is a reversal of the downward trend of recent years, with an estimated growth of 4.3% in the area sown; and in the second crop, the trend of expanding the area sown should continue, with corn being grown after soybeans, a strategy that has proved profitable. However, even with an increase in the total area, productivity is expected to fall, reaching 138.3 million tons. Domestic consumption is expected to grow by 4.5% to 94.6 million tons, driven mainly by increased demand for corn for ethanol production. Exports are also expected to grow by 16.3% to 46.5 million tons, 4.5% up on the previous harvest.

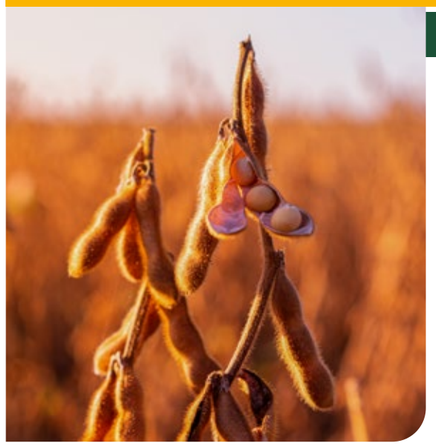
Supply Table

CROP YEAR	BEGINNING STOCKS	PRODUCTION	IMPORTS	CONSUMPTION	EXPORTS	ENDING STOCKS
2021/22	13.515,30	113.130,40	2.615,10	74.534,60	46.630,30	**8.095,90**
2022/23	8.095,90	131.892,60	1.313,20	79.466,00	54.634,40	**7.201,30**
2023/24	7.201,30	115.500,00	1.644,70	83.995,50	38.500,90	**1.849,60**
2024/25	1.849,60	139.695,80	1.700,00	90.471,00	40.000,00	**12.746,40**
2025/26*	12.746,40	138.281,70	1.700,00	94.565,30	46.500,00	**11.662,80**

*Source: Conab | Note: * estimate in thousand tons*

SOYBEANS

+3,6% vs 2024/25



177,7 million tons produced

For soybeans, projections for the 2025-2026 harvest indicate an expansion in the area under cultivation and, if there are no climatic problems, national production should reach yet another production record, reinforcing Brazil's position as the world's largest soybean producer. With a forecast reduction in exports from the United States and an increase in global demand, combined with the expansion of Brazilian production, a significant increase in Brazilian exports is expected, especially to China, which absorbs around 73% of the soy exported by Brazil. As a result, total exports could exceed 112 million tons. At the same time, the forecast increase in the biodiesel blend in diesel and the growing demand for vegetable protein indicate that the volume of soybean crushing should continue to expand in 2025, reinforcing the demand for Brazilian soybeans. In this scenario, the outlook is for 177.7 million tons produced, and growth of 3.6% compared to 2024-2025

Supply Table - Soybean

CROP YEAR	BEGINNING STOCKS	PRODUCTION	IMPORTS	CONSUMPTION	EXPORTS	ENDING STOCKS
2021/22	9.361,70	130.828,70	419,20	52.330,50	78.730,10	**9.549,00**
2022/23	9.549,00	159.154,30	181,00	55.980,50	101.869,90	**11.033,90**
2023/24	11.033,90	151.283,40	821,00	57.092,50	98.814,50	**7.231,30**
2024/25	7.231,30	171.472,30	500,00	62.256,90	106.655,10	**10.291,70**
2025/26*	10.291,70	177.670,00	500,00	63.338,50	112.122,00	**13.001,20**

*Source: Conab / Secex / ANP / Abiove / Sindirações | Note: * estimate in thousand tons*

Supply Table - Soybean Meal

CROP YEAR	BEGINNING STOCKS	PRODUCTION	IMPORTS	CONSUMPTION	EXPORTS	ENDING STOCKS
2021/22	1.785,80	38.881,30	3,20	17.600,00	20.352,90	**2.717,50**
2022/23	2.717,50	41.037,20	0,10	17.800,00	22.473,50	**3.481,20**
2023/24	3.481,20	41.019,20	0,70	18.000,00	23.133,80	**3.367,30**
2024/25	3.367,30	45.199,40	1,00	19.500,00	23.600,00	**5.467,80**
2025/26*	5.467,80	45.931,00	1,00	20.000,00	24.803,00	**6.596,80**

*Source: Conab / Secex / ANP / Abiove / Sindirações | Note: * estimate in thousand tons*

Supply Table - Soybean Oil

CROP YEAR	BEGINNING STOCKS	PRODUCTION	IMPORTS	CONSUMPTION	EXPORTS	ENDING STOCKS
2021/22	490,00	9.659,00	24,40	7.056,00	2.596,80	**520,60**
2022/23	520,60	10.471,00	21,40	8.368,00	2.332,60	**312,40**
2023/24	312,40	10.906,00	99,20	9.484,00	1.367,20	**466,40**
2024/25	466,40	11.754,00	50,00	10.504,00	1.400,00	**366,40**
2025/26*	366,40	11.944,00	50,00	10.600,00	1.400,00	**360,40**

*Source: Conab / Secex / ANP / Abiove / Sindirações | Note: * estimate in thousand tons*

COFFEE

CONAB's first field survey for the 2026 crop, released in February and conducted quarterly, indicates a 17.1% increase over the previous harvest, with a projection of 66.2 million processed bags. Compared to the 2024 harvest—a harvest that, theoretically, had a positive biennial cycle, when 54.2 million bags were produced—the current harvest shows a significant increase of 22.1%. In this initial estimate, the total area planted with coffee—Arabica and Conilon—reaches 2.3 million hectares, 3.4% higher than the previous harvest, an increase of 77,300 hectares. Of this total, 1.9 million hectares are in production, a 4.1% increase compared to the previous year, and 397,300 hectares are in development, a 0.2% increase.

CATTLE

-3,5% vs 2025

10 million tons of meat produced in 2026

We can notice a transition scenario, marked by the onset of the reversal of the livestock cycle, with retention of females and recomposition of herds. The goal is to reach 10 million tons of meat produced in 2026, recording a 3.5% drop in relation to 2025, after three consecutive years of high slaughter of females.

Supply Table

YEAR	HERD	PRODUCTION	IMPORTS	SUPPLY	EXPORTS	DOMESTIC AVAILABILITY	PER CAPITA AVAILABILITY
2022	234.852,00	8.673,70	64,70	8.738,40	3.018,00	5.720,40	28,2
2023	238.626,00	9.494,20	50,10	9.544,30	3.029,80	6.514,50	31,9
2024	232.661,00	11.114,80	46,30	11.161,10	3.779,00	7.382,10	36
2025*	229.475,00	10.998,20	46,30	11.044,50	4.016,10	7.028,40	34,1
2026*	227.421,00	10.608,90	42,70	10.651,60	4.113,60	6.538,00	31,6

*Source: Conab / IBGE / Secex | Note: *estimate / Herd in thousand heads; Production, imports, supply, exports, and domestic availability in 1,000 tons carcass weight equivalent (CWE); Per capita availability in kg/capita/year.*

CHICKEN

+2,6% vs 2025

51.1 kg per capita/year in 2026

The 2025 cycle, which ended under the effects of the Avian Influenza recorded in Rio Grande do Sul in May, is expected to grow by 2.6% in 2026, bringing consumption to 51.1 kg/inhabitant/year, as well as maintaining export indicators.

Supply Table

YEAR	BROILER CHICK PLACEMENTS	PRODUCTION	IMPORTS	SUPPLY	EXPORTS	DOMESTIC AVAILABILITY	PER CAPITA AVAILABILITY
2022	6.856,80	14.783,00	4,80	14.787,80	4.652,80	10.135,00	49,9
2023	6.876,00	14.851,00	2,10	14.853,10	5.009,30	9.843,80	48,2
2024	7.139,10	15.260,90	5,10	15.266,00	5.156,60	10.109,40	49,3
2025*	7.202,40	15.494,30	3,70	15.498,00	5.228,30	10.269,70	49,8
2026*	7.283,90	15.933,20	4,30	15.937,50	5.360,90	10.576,60	51,1

*Conab / Apinco / Secex | Note: *estimate / Placements in million heads; Production, imports, supply, exports, and domestic availability in 1,000 tons; Per capita availability in kg/capita/year.*

PORK

+5,2 % vs 2025

1,5 million tons exported

For 2026, the Brazilian pork production is expected to grow by around 3.6%, with a large part of this increase intended for export, but also sustained by the likely increase in domestic demand, due to the rise in beef prices. Foreign sales should reach a new record, increasing volume by 5.2% based on 2025, breaking the 1.5-million-ton mark.

Supply Table

YEAR	HERD	PRODUCTION	IMPORTS	SUPPLY	EXPORTS	DOMESTIC AVAILABILITY	PER CAPITA AVAILABILITY
2022	44.388,00	5.186,30	22,60	5.208,90	1.109,10	4.099,90	20,2
2023	42.998,00	5.298,60	17,00	5.315,60	1.211,70	4.103,90	20,1
2024	43.642,00	5.330,10	19,30	5.349,40	1.322,30	4.027,00	19,6
2025*	44.166,00	5.565,70	16,30	5.582,00	1.458,60	4.123,40	20
2026*	44.806,00	5.768,60	21,50	5.790,10	1.534,40	4.255,70	20,6

*Source: Conab / IBGE / Secex | Note: *estimate | Herd in thousand heads; production, imports, supply, exports, and domestic availability in 1,000 tons carcass weight equivalent (CWE); per capita availability in kg/capita/year.*

Main importers of Brazilian agribusiness

	COUNTRY / BLOC	REVENUE (2025)	MAIN PRODUCTS PURCHASED
1st	**China**	US$ 55.3 billion	Soybean (70% of total), Beef, Pulp, and Corn.
2nd	**European Union**	US$ 25.2 billion	Coffee, Soybean Meal, Orange Juice, and Pulp.
3rd	**United States**	US$ 11.4 billion	Coffee, Pulp, Beef, and Timber.
4th	**Middle East**	US$ 10.2 billion	Poultry, Sugar, and Corn (Highlight: Saudi Arabia and UAE).
5th	**Japan**	US$ 4.8 billion	Poultry, Corn, and Coffee.

Source: AgroStat and official sources

Exports

Brazil continues to be one of the main players in global agribusiness, with great potential for expanding production in a sustainable way. The trend is for Brazil to strengthen its presence in strategic markets, especially in Asia and the Middle East, as well as consolidating its position in traditional markets.

At the same time, the sector will have to deal with increasingly demanding markets. In this context, Brazilian agribusiness has the opportunity to position itself as a world reference in efficient and sustainable production, increasing its biocompetitiveness and adding value to its products.

AgroStat, MAPA's dynamic tool with statistics on Foreign Trade in Brazilian Agribusiness, which aims to publish statistics on Brazilian exports and imports of agricultural products, indicates that by February 2026, the sector had exported more than US$ 22 billion in agricultural products, 25.5% to China, 15.5% to the European Union and 6.6% to the United States of America.

In total, there are 5,004 products segmented into 25 sub-groups, including–in addition to the leading products–live bees, flowers, vegetables, legumes, roots and tubers; semen and embryos from cattle, swine and other animals; various products of animal origin, such as albumin, gelatine and other protein substances, feathers, skins, bristles and animal hair; products of plant origin for the chemical industry, essential oils, gums, resins and juices and plant extracts.

A leading player in global agribusiness, Brazil expands its sustainable production, strengthening and consolidating its presence in strategic and traditional markets. The goal is to be a global benchmark in efficient and sustainable production, biocompetitiveness, and value-added products.

Production vs land use: a positive relationship

The development of Brazilian agriculture is also characterized by an increase in productivity per hectare. In soybeans, for example, thanks to advances in science (genetic improvement) and techniques for planting, cultivating, harvesting, preserving and restoring the land (liming, no-till farming, crop rotation, among others).

Statistics for 2025 from MapBiomas and the IBGE's Systematic Survey of Agricultural Production, as well as information from Conab related to crop monitoring and the expansion of the grain area, prove that Brazil is one of the few countries that manages to be a global powerhouse by using a relatively small percentage of its territory for production, keeping most of it under native vegetation.

Thus, out of Brazil's 851 million hectares, agriculture currently occupies around 32% of the national territory (approximately 282 million hectares), with between 61% and 66% of the territory remaining under native vegetation, i.e. forests, savannahs and natural formations. Agriculture–comprising grains (temporary crops) such as soybeans, corn, sugar cane, cotton etc.–occupies 63 million hectares; and perennial crops (coffee, oranges, fruit, among others) are distributed over 2.3 million hectares; forestry (planted eucalyptus and pine forests for pulp) occupies 10 million hectares.

A key factor in the productivity achieved is the climate, which allows the 63 million hectares to be farmed more than once a year, i.e. soybeans can be planted in the summer and corn immediately afterwards on the same land, significantly increasing production without having to cut down a single tree.

Livestock farming also makes a valuable contribution to the verticalization of Brazilian agriculture, as the recovery of degraded pastures has allowed new areas to be added without having to open them up to the forest. Today, the pasture that used to fit an ox has been transformed into a soybean field. There are also integration techniques, whether it's crop-livestock-forestry, crop-livestock or livestock-forestry.

What's more, the Brazilian producer is a conservationist par excellence. By law (Forest Code), each Brazilian farm is obliged to maintain between 20% and 80% (in the Amazon) of untouched native forest (Legal Reserve and Permanent Preservation Area). This means that, within the 32% calculated as being in use by agribusiness, there is a slice of forest preserved by the farmers themselves.

An example

Using soya as an example, in the last 30 years, productivity has increased by around 61%, the result of productivity gains alone, which means that if the 1995 technology had been maintained, we would need much more land to produce what we produce today.

More recently, between 2015 and 2025, significant gains were recorded. Brazil now harvests an average of almost 60 bags per hectare, but in high-tech regions (such as Mato Grosso and western Bahia), it is common to see farms harvesting 80 to 90 bags/ha.

In short, in soybeans alone, while productivity grew by 61%, total production exploded by more than 500% (from 23 million tons in 1993 to 169 million today). The recipe seems simple: combining efficiency gains with the occupation of degraded pasture areas.

LAND USE	OCCUPIED AREA (Approx.)	OBSERVATION
Pastures	155 million ha	A significant portion consists of degraded pastures being converted into cropland.
Agriculture (Grains/Temporary crops)	63 million ha	Includes soybean, corn, sugarcane, cotton, etc.
Perennial Crops	2.3 million ha	Coffee, oranges, fruits, etc.
Forestry	10 million ha	Planted forests (eucalyptus and pine for pulp).

GRUPOAIZ

MEGA pesados .COM.BR

AIZI implementos

AIZM machines

AGRO, CONSTRUÇÃO E MINERAÇÃO!

CONHEÇA NOSSA LINHA DE PRODUTOS ESPECIAIS PARA MINERAÇÃO, CAMINHÕES IMPLEMENTADOS, MÁQUINAS PESADAS E IMPLEMENTOS RODOVIÁRIOS.

O Grupo AIZ é referência no mercado de equipamentos pesados, oferecendo soluções para a indústria, construção, mineração, agrícola, transporte, e infraestrutura, tornando-se sinônimo de qualidade.

GRUPOAIZ (41) 99715-0200 www.megapesados.com.br

GRUPOAIZ

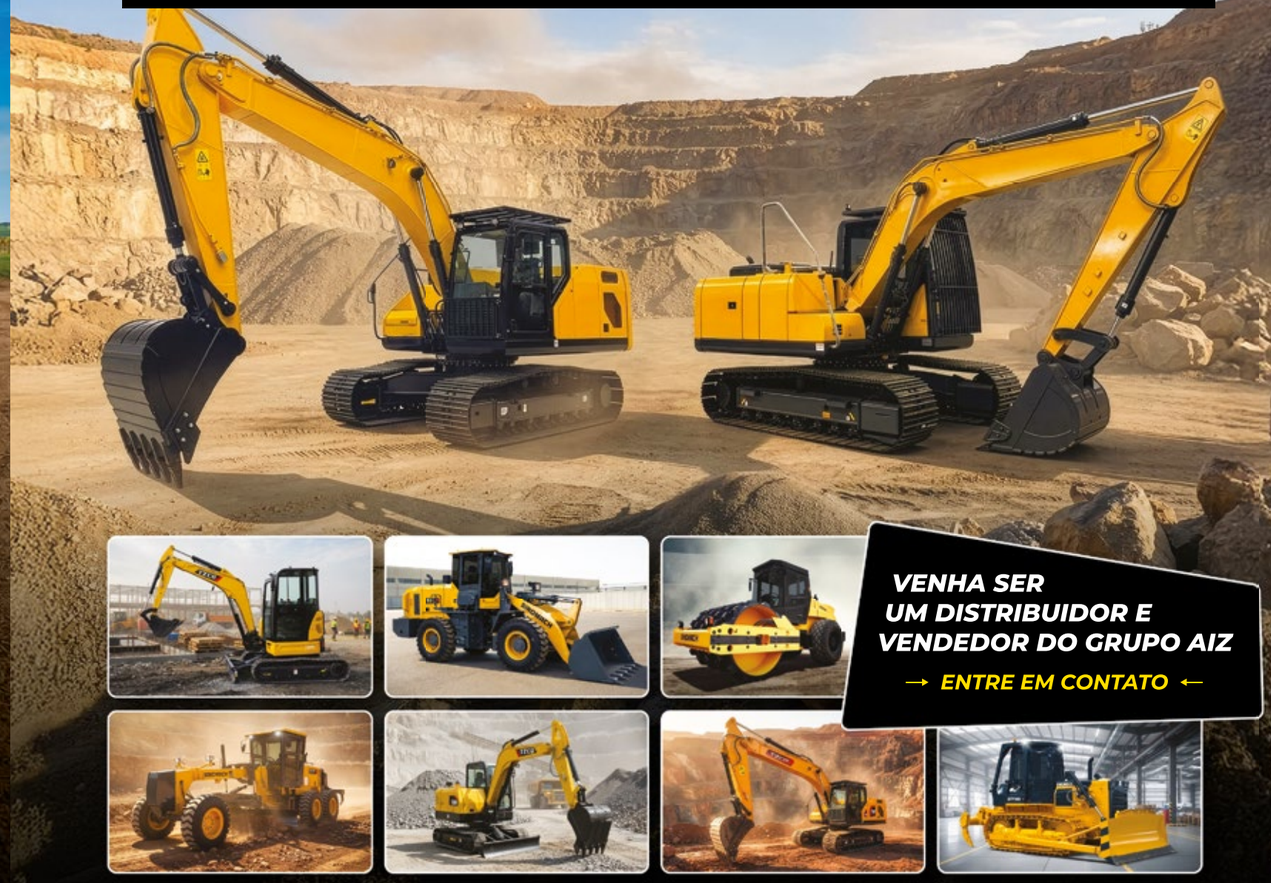
国机集团 SINOMACH

太重集团 TZCO

ESCAVADEIRA • PÁ CARREGADEIRA

MOTONIVELADORA • MINI ESCAVADEIRA

ROLO COMPACTADOR • TRATOR DE ESTEIRA



VENHA SER UM DISTRIBUIDOR E VENDEDOR DO GRUPO AIZ

→ ENTRE EM CONTATO ←

GRUPOAIZ (41) 99715-0200 www.megapesados.com.br

UNQUESTIONABLE LEADERSHIP IN PRODUCTION AND EXPORTS

Brazilian agricultural production stands out in various national and global rankings, organized by Conab, the Ministry of Agriculture and Livestock (MAPA), the "AgroStat" ranking, the Foreign Trade Secretariat (Secex) of the Ministry of Development, Industry, Trade and Services (MDIC), the Food and Agriculture Organization (FAO/UN) and data from the United States Department of Agriculture's (USDA) World Agricultural Supply and Demand Estimates (WASDE).

Considering only the most common commodities and data from the 2024-2025 harvest and consolidated 2023-2024 data, Brazil is the largest producer and, in most cases, the largest exporter. In soybeans and sugar, first place in both conditions. In coffee, Brazil has held the lead for more than 150 years, accounting for between 35% and 40% of all coffee in the world; while in beef, the country disputes the top spot in production, but is undoubtedly the largest exporter. Orange juice deserves to be highlighted, as Brazil accounts for around 70% of the global trade in orange juice.

In the top five, Brazilian production is also a reference in corn (3rd producer and alternating with the USA for 1st and 2nd place in exports), and in cotton it oscillates between 3rd and 4th place as a producer and between 1st and 2nd as an exporter. In chicken meat, cellulose and tobacco, as well as being among the top three global producers, it is the leader in sales to the international market.

The reasons for this success are related to science, limestone (liming, which has made the Cerrado productive) and genetics. In all of these areas, the Brazilian Agricultural Research Corporation (Embrapa) has a strong presence, becoming a reference in tropical agriculture.

Spatial tool

Concern about land use has led to developing various tools, such as SimBrasil/OTIMIZAGRO, a national, spatially explicit model developed by the Federal University of Minas Gerais (UFMG), which simulates land use, land use change, forestry, deforestation and forest regeneration under various scenarios of agricultural land demand and deforestation policies for Brazil, along with the resulting carbon emissions.

Otimizagro models the spatio-temporal distribution of the main temporary and semi-perennial crops: soybeans; sugarcane; corn; cotton; wheat; beans; rice; cassava; tobacco; arabica coffee; canephora coffee; oranges; cocoa; and bananas. It is worth noting that the first three together account for 82% of the area cultivated by temporary and semi-perennial crops in Brazil.

The tool also simulates winter crops, such as wheat, and off-season crops, such as beans and corn; simulates the expansion of planted forest under modeled scenarios and the need for environmental restoration, in accordance with the new Forest Code; uses maps of agroclimatic favorability and potential profitability to simulate crop expansion in a spatially explicit way; and allocates crops based on three spatial units, namely: the country as a whole, immediate regions or micro-regions (IBGE) and cells of 250x250 meters (6.25 ha) spatial resolution.

COMMODITY	PRODUCTION	EXPORTS
Coffee	1st	1st
Soybean	1st	1st
Sugar	1st	1st
Orange Juice	1st	1st
Corn	3rd	1st or 2nd
Beef	1st or 2nd	1st
Poultry	2nd	1st
Cotton	3rd or 4th	1st or 2nd
Pulp	2nd	1st
Tobacco	3rd	1st

Trade agreements and international partnerships: important tools for exports

International trade utilizes various instruments, some supported by the Brazilian government itself, notably the Brazilian Trade and Investment Promotion Agency (Apex-Brasil), which works to promote Brazilian products and services abroad and attract foreign investment to strategic sectors of the Brazilian economy.

Moreover, international trade is affected by tariff and, primarily, non-tariff barriers, often related to sanitary, phytosanitary, and environmental requirements. "In some cases, these measures can take on a protectionist character, creating additional obstacles for competitive countries like Brazil," warns Abag, which explains: "Brazilian agribusiness has been addressing these challenges by strengthening its technical and scientific foundation, expanding traceability, and ensuring compliance with international standards. In addition, there is an ongoing effort to engage in dialogue with trading partners to demonstrate the robustness and sustainability of national production systems."

In this context, ABAG acts as a key institutional coordinator, promoting alignment between the productive sector and the government, as well as contributing to the development of a consistent narrative about Brazilian agribusiness abroad. The organization also actively participates in international forums and debates, advocating for open markets and trade based on clear, predictable, and transparent rules.

Trade agreements—whether from Brazil or Mercosur—are important instruments in this scenario. In ABAG's view, "in the current geopolitical context, the trend is for these practices to become increasingly stringent, especially regarding environmental, social, and governance (ESG) criteria. Often, these requirements are protectionist. However, this trend also reflects a global shift in consumption patterns and public policies across various countries, which requires greater adaptability from exporters."

In this context, ABAG actively participates in international networks that strengthen the position of Brazilian agriculture on the global stage. One example is the GPS—Group of Southern Producing Countries, an initiative that brings together institutions from different countries to promote cooperation, knowledge exchange, and the development of common agendas on strategic issues for the sector. In these forums, ABAG helps align positions, share best practices, and expand dialogue on sustainability, international trade, and food security. Building alliances to strengthen bio-competitiveness.

Another group is highlighted by Paulo Bertolini, chairman of the Brazilian Association of Corn and Sorghum Producers (Abramilho), which brings together producer associations from Brazil, the United States, and Argentina. This is Maizall (International Corn Alliance), whose work focuses on "advocating for science-based trade, regulatory harmonization—especially on issues related to biotechnology—and promoting a predictable and transparent international environment for the sector," he explains and emphasizes: "This exchange strengthens Brazil's image as a reliable, competitive, and technically qualified supplier."

Initiatives such as this align with the international agenda of many national agricultural entities and involve both promoting technical and institutional missions abroad and hosting delegations from various countries interested in learning about the Brazilian production system, advances in sustainability, biotechnology, traceability, and supply capacity.

Bertolini summarizes the benefits of these initiatives by citing the reduction of technical and trade barriers; the promotion of regulatory standards based on scientific evidence; the expansion of institutional dialogue with governments and importers; and the strengthening of the reputation of Brazilian products—specifically, in the case of Abramilho, corn and sorghum—in the global market. "In this way, Abramilho not only keeps pace with export growth but also plays a foundational role in ensuring legal certainty, predictability, and international competitiveness for the sector," he emphasizes.

Furthermore, for Brazil, these agreements also represent an opportunity to highlight its competitive advantages, such as large-scale sustainable production, consolidating its position as a reliable supplier of food, fiber, and energy.

European Union

The most recent—signed on January 17, 2026, after 26 years of negotiations—is the Mercosur–European Union Strategic Partnership Agreement.

For the Brazilian agricultural sector, the Agreement strengthens the relationship with the European Union, which, in 2025, received US$21.8 billion in agricultural products from Brazil, accounting for 44% of Brazil's total export to the bloc. Official government data show that this figure reaches US$ 25.2 billion when considering agribusiness as a whole, including pulp, processed leather, and wood.

This agreement will be provisionally applied starting May 1, 2026; it stipulates that more than 5,000 Mercosur products will enter the U.S. duty-free, and that the reduction in import/export taxes will be gradual. The agribusiness provisions include meat, orange juice, fruits, instant coffee, and processed foods, in addition to recognizing Brazilian geographical indications. While "the agreement expands market access, reduces barriers, and tends to increase the competitiveness of Brazilian agribusiness," ABAG warns that "it requires greater attention to standards, traceability, and sustainability."

Among the sectors affected by the agreement and that will see tariffs gradually reduced for entry into the European bloc is fruit production. According to Guilherme Coelho, chairman of the Brazilian Association of Fruit and Derivatives Producers and Exporters (Abrafrutas), "the gradual reduction of tariffs will expand the presence of Brazilian fruits in the European market, which already accounts for about 70% of our sector's foreign sales." As an example, he notes that tariff reductions begin with grapes, effective immediately upon the agreement's entry into force, while the 4% tariff on avocados will be eliminated within four years; lemons and limes (14%) within seven; melons and watermelons (9%) also within seven years; and apples within ten.

NETWORK OPERATIONS:
THE PATH TO STRENGTHENING THE FFLV

Forming a network of 3,000 member companies—with a consolidated presence in markets such as South Africa, Australia, Brazil, Chile, China, the United States, Mexico, New Zealand, and Peru—and more than 40,000 contacts worldwide, the International Fresh Produce Association (IFPA)—assures Valeska de Oliveira Ciré, the organization's country manager in Brazil—"is the largest and most influential global association in the fruit, flower, and vegetable (FFLV) sector. "We act as a connecting link throughout the production chain, bringing together producers, distributors, retailers, and researchers to drive the sector's growth."

In the FFLV sector, as Ciré explains, the main challenges include the complexity of supply chains, the impact of climate change, logistics costs, and the need for greater integration with retailers to stimulate consumption.

To address these bottlenecks, IFPA offers practical solutions, "such as the IFPA Global Intelligence Engine (an AI platform that provides real-time insights and is exclusive to members), promotes technical training through workshops, and actively advocates for public policies that benefit the sector," says the institution's country manager, in addition to building bridges between producers, retail, and international markets, advocating for public policies that strengthen the industry on a global scale.

In the 2025 review for Brazil, Ciré highlights the holding of 14 training workshops for retailers, five business meetings, and four seasonal campaigns, as well as the release of an original study on Brazilian consumers of fresh produce, which contains data capable of informing commercial strategies. And more: "The 9th edition of the Brazil Conference & Expo brought together over 200 exhibitors and thousands of B2B visitors, establishing itself as the most specialized business event for fresh produce (FFLV) in Latin America," celebrates the interviewee.

On a global scale, the institution organizes the Global Produce & Floral Show. In 2025, the event set attendance records, attracting buyers from more than 50 countries and reaffirming its position as the industry's premier platform for innovation and business.

For 2026, the outlook outlined by Ciré includes "continuing the 2025-2027 Strategic Plan, with a focus on expanding our global influence, scaling up projects aimed at increasing FFLV consumption, and further strengthening business networks, fulfilling our mission to generate value and prosperity for the entire FFLV supply chain."

United States

The tariff changes announced in late February—or the "Trump tariff hike," as they became known—had a strong initial impact, raising tariffs on Brazilian products by up to 50%, jeopardizing exports, and requiring a diplomatic and technical response from the country.

Throughout the process, progress was made with the opening of negotiations, partial exclusions of products, and subsequent revisions of some tariffs, mitigating some of the most critical effects.

In this context, ABAG, along with other institutions representing business and economic sector groups, contributed "through institutional coordination within the sector, technical support for Brazilian positions, and collaboration with other entities to strengthen dialogue, promote trade predictability, and seek negotiated solutions."

According to the March 2026 edition of the Brazil–U.S. Trade Monitor, prepared by Amcham Brasil, bilateral trade statistics are only expected to be available starting in March. Even so, the report shows that in the first two months of the year, Brazilian exports to the United States reached US$4.9 billion, representing a 23.2% drop compared to the same period in 2025—equivalent to US$812 million less in sales. In February alone, Brazilian exports to the United States totaled US$2.5 billion in February 2026, marking a 20.3% decline compared to the same month in 2025.

The Mercosur-European Union agreement and the US tariff war impact Brazilian agribusiness, and not in a positive way

This result represents the lowest figure for the first two months of the year since 2023, according to Amcham's analysis, which notes that "with this result, Brazilian exports to the U.S. market have now seen seven consecutive months of decline, a trend that began in August 2025, when the United States imposed import surcharges—ranging from 40% to 50%—on a wide range of products. The Amcham report notes that "the tariff changes announced in late February—following a U.S. Supreme Court decision that led to the end of the 40% and 50% surcharges and the adoption of a new 10% global surcharge—are not yet fully reflected in the bilateral statistics."

Among the items showing declines in exports in February, coffee—despite being exempt from surcharges since November 2025—also saw a significant drop of 40% year-over-year, contributing to the reduction in the total value exported that month. Meanwhile, products subject to 40% and 50% surcharges through the end of February recorded a 27.4% decline for the month, while products impacted by Section 232 tariffs, such as wood products, saw an even sharper decline.

From the farm gate to the world: exporters' figures

Brazil operates in a tropical climate, which allows for year-round cultivation, with crop rotation systems and harvests fully structured for that specific year. This continuous production capacity sustains record production and export volumes of soybeans and corn and ensures regularity in the global supply.

Beyond scale, Brazil's competitive edge lies in technological development under tropical conditions, such as the correction and management of acidic soils, the adoption of no-till farming, second and even third crops, and advances in Crop-Livestock-Forest Integration (ILPF) systems. The combination of a favorable climate, tropical science developed over decades, and production efficiency positions the sector not only as a major exporter but also as a benchmark for other countries with hot and humid climates.

The result is the export of more than 5,000 products, divided into 25 subgroups, as shown in the figures from MAPA's AgroStat. This is further reflected in record grain harvests, a group in which cereals and coffee are particularly relevant benchmarks in the context of international trade. A significant portion of the consumer markets for Brazilian agriculture is increasingly attentive to the production models adopted in Brazil, demanding guarantees of sustainability and traceability.

In line with the Brazilian grain harvest, which in 2024–2025 once again set a record by totaling 352.1 million tons—with soybeans accounting for 171.5 million tons and corn for 141.0 million tons—exports reached their peak, setting record after record.

Soybeans and corn are among the winners. While soybeans set a record with 108.9 million tons exported, corn reached approximately 41.6 million tons. At the same time, soybean processing has been growing in the country and increasing domestic consumption, reaching 58.5 million tons, supporting higher exports of soybean meal, with 23.1 million tons exported in the previous year, reports Jean Carlo Budziak, from the market intelligence department of the National Association of Grain Exporters (ANEC).

For this crop year, ANEC confirms its forecast for total grain production at around 353.1 million tons, including 176.1 million tons of soybeans—a volume that could exceed 180 million tons—and 138.9 million tons of corn. These projections allow Budziak to estimate that soybean exports should "set a new record of 110 million tons. Corn could achieve the second-highest figure in history, reaching up to 44 million tons, second only to 2023, when 55.6 million tons were exported."

Alongside grains, the market for sorghum and DDG (Distillers Dried Grain, a byproduct of the biofuel industry derived from the fermentation of grains, primarily corn in Brazil, and widely used as a substitute for soybean meal in the nutrition of beef and dairy cattle due to its high nutritional value, rich in protein and energy) is growing. An example cited by the market intelligence professional at ANEC is the opening of the Chinese market and the opportunities that arise for both the domestic market and exports.

The main destinations for soybeans and corn, commodities that lead Brazil's export basket. For soybeans, China is the top destination, accounting for 80% of the total, followed by Spain, Thailand, and Turkey. For corn, the main markets were Iran (9.4 million tons), Egypt (7.5 million), and Vietnam (4.5 million).

In the specific case of corn, Paulo Bertolini points out a key difference from soybeans, noting that soybean exports are "highly concentrated among a few buyers." Brazilian corn, on the other hand, has a more diversified export profile, being sold to dozens of countries across different continents—with a focus on markets in the Middle East, North Africa, and Asia—reducing dependence on a single destination and increasing the sector's commercial resilience. This diversification strengthens Brazil's position in global trade and expands its geopolitical relevance in grain supply."

Alongside corn, the chairman of Abramilho notes that sorghum has also benefited, as the sector has made structural progress in the regulatory environment and in expanding strategic markets. In foreign trade, he highlights "the opening of the Chinese market to Brazilian DDG, adding value to the supply chain, as well as the recent opening of the sorghum market to China, which diversifies destinations and reinforces Brazil's role as a reliable grain supplier, strengthening competitiveness, expanding trade opportunities, and consolidating Brazil's role in global supply."

HIGHLIGHTS OF THE 2025 CLOSING (CECAFÉ)

- *Volume:* 40.04 million bags (a 20.8% decrease compared to 2024).
- *Revenue*: US$ 15.586 billion (all-time high, up 24.1%).
- *Main Destinations:* 1st Germany (5.41 million bags), 2nd USA (5.38 million—a 33.9% drop due to import tariffs).
- *Types:* Arabica coffee led the way (80.4% of exports), followed by canephora (conilon/robusta) and instant coffee.
- *Logistics:* Delays at ports resulted in losses of R$ 66.1 million, and Brazil failed to ship, on average, 601,000 bags per month.
- *Port:* Santos was the main port, accounting for 78.7% of shipments.

Coffee

Brazilian coffee exports in 2025 totaled 40.04 million 60-kg bags, a 20.8% drop in volume compared to 2024, but reached a record revenue of US$15.586 billion, up 24.1%. For 2026, Conab's first estimate points to a record coffee production of 66.2 million bags.

In a positive biennial year, the result, if confirmed, represents a 17.1% increase compared to the 2025 harvest and a new record in the historical series. As a result, shipments in the first half of 2026 will remain tight due to lower inventory levels and availability in warehouses.

In addition, the sector projects a significant increase in shipments of soluble/processed coffee to the world's largest consumer market. The agreement also recognizes Brazilian geographical indications, facilitating the entry of high-quality and sustainable coffees into the European market.

Another noteworthy result in 2025 involves specialty coffees, which demonstrated resilience and added value, establishing themselves as a vital economic driver for the sector. They accounted for 20.3% of total Brazilian exports between January and December 2025, with 8.145 million bags shipped abroad to destinations such as the United States, Germany, Belgium, the Netherlands, Italy, the United Kingdom, Japan, and Sweden.

This summary is presented by Marcos Matos, director-general of the Brazilian Coffee Exporters Council (Cecafé), who takes the opportunity to highlight that the coffee harvest begins in April for canephora coffee (conlon and robusta) and in May for arabica coffee. Starting in July and August 2026, greater coffee availability is expected, which will likely result in increased shipments in the second half of the year.

"Cecafé does not make shipment projections, but recognizes the favorable global coffee demand outlook, as well as the production challenges due to climate anomalies in recent years," says Matos, confident that "despite geopolitical and logistical challenges, market fundamentals are positive, which could generate continued positive results for Brazilian coffee growers, exporters, and the roasting industry."

The guarantee of sustainable coffee supply, with the presentation and verification of socio-environmental criteria as technical, adequate, conclusive, and verifiable evidence to importers and European authorities, includes the use of traceability platforms, socio-environmental monitoring and , programs for the verification and analysis of agrochemical residues, training for producers, technical and scientific studies related to the carbon footprint of coffee farming, communication campaigns, among other actions to ensure compliance and competitiveness in exports.

MAIN MARKETS, ACCORDING TO CECAFÉ'S EXPORT REPORT

Regarding the main markets, based on Cecafé's export report, the largest importers of Brazilian coffee in the year-to-date 2025 were:

1. Germany: 5.409 million bags (13.5% of the total).
2. United States: 5.381 million bags (13.4% of the total—a 33.9% drop due to tariffs).
3. Italy: 3.149 million bags.
4. Japan: 2.647 million bags (purchases increased by 19.4%).
5. Belgium: 2.321 million bags.
6. Turkey: 1.555 million bags (up 3.3%).
7. Netherlands: 1.4 million bags.
8. Russia: 1.3 million bags.
9. Spain: 1.2 million bags.
10. China: 1.123 million bags (up 19.5%).

Regarding continents and economic blocs in 2025, highlights include:

- *Europe:* imports of 20.2 million bags; US$8.13 billion in revenue, representing 50.4% of all coffee purchases from Brazil.
- *European Union:* imports of 17.6 million bags; US$7.10 billion in revenue, representing 43.8% of the total.

Beef

A spectacular year for Brazilian beef, surpassing even 2024, which had already been very positive. This sentence sums up the year 2025 in the view of Roberto Perosa, chairman of the Brazilian Association of Meat Exporting Industries (ABIEC).

The details highlight the sector's significance: "We exported around 3.5 million tons, with record revenue of approximately US$18 billion. But the most relevant data isn't just in the volume. We saw growth of about 20% in export volume and 40% in value, which clearly demonstrates the value added to Brazilian beef. The average price also rose, reinforcing this trend," Perosa asserts.

The outlook for 2026 is defined by the ABIEC chairman as "stability at a high level. We are working with a projection of between 3.3 and 3.5 million tons, depending on the behavior of markets such as China and the United States, as well as the opening or expansion of new markets. Given the international landscape, maintaining this level is already a positive result."

These results stem from the consolidation of Brazilian beef's growth in volume and, at the same time, increased value. For Perosa, "this repositioning of Brazilian beef is strategic. We have also made progress in consolidating key markets. Mexico, which opened in 2023, matured and gained scale in 2025. Chile has established itself as an important destination in terms of volume, while the European Union remains relevant for higher-value-added cuts. We also saw the return of markets like Russia to prominence."

The consistent evolution of Brazilian livestock farming in recent years, with significant gains in productivity, is one of the factors contributing to the growth of the market and exports, as it stems from the increased use of technology in the field, efficiency, and the ability to produce high-quality products. Furthermore, the expansion of the industry is increasingly linked to increased productivity—through greater use of technology and improved management—rather than merely expanding the land area.

As an example, Perosa cites tools such as fixed-time artificial insemination (FTAI), integrated crop-livestock-forestry (ICLF), advances in feedlots, and investments in genetics, which have changed the production model. The chairman of ABIEC does not deny that many analyses still use outdated parameters, but "the current reality is one of a more modern, efficient livestock industry, prepared to meet market demands."

Expectations also take into account the sustainability agenda, based on a study presented in partnership with FGV Agro that demonstrates the Brazilian livestock sector's capacity to reduce greenhouse gas emissions by up to 93% by 2050. "This work marked an important shift in how the sector is perceived internationally and expanded our presence in global forums," Perosa asserts, adding the entity's support for the federal government's structural initiatives, such as the National Individual Identification Plan (PNIB) and the AgroBrasil Mais Sustentável platform, which strengthen traceability and the verification of best practices.

The figures from the beef sector point to a strategic moment for Brazil on the global stage, as summarized by the chairman of ABIEC: "There is a global beef production deficit, which opens up significant opportunities for the country. At the same time, we retain approximately 70% of our production for the domestic market, ensuring national supply. We are also continuing to make progress in trade promotion, with a presence at trade shows, international events, business rounds in various countries, and initiatives such as the Brazilian Beef Dinner, which bring the Brazilian industry closer to buyers in strategic markets."

Chicken, Eggs, and Pork

As the national institutional organization for poultry and swine farming in Brazil, the Brazilian Animal Protein Association (ABPA) also aims to foster technological development in the sector, professionalization, and the expansion of the productive sector's operations in domestic and international markets, working to create opportunities for the sector through international negotiations, institutional relations with stakeholders in Brazil and abroad, and market-opening initiatives, among others.

In 2025, chicken meat exports totaled 5.324 million tons, closing with a 0.6% increase over the total exported in 2024 and setting a new record for the sector's annual exports. As a result, total export revenue in 2025 reached US$9.790 billion, a 1.4% decrease compared to the US$9.928 billion recorded in 2024.

In 2026, growth continues. From January to March, the volume shipped by the sector reached 1.456 million tons, exceeding the total exported in the first quarter of 2025–1.387 million tons–by 5%. Growth is even more significant in terms of revenue, with US$ 2.764 billion this year, a result 6.9% higher than the previous year, which recorded US$ 2.586 billion last year.

"The year 2025 was marked by the sector's resilience and its overcoming of one of the greatest challenges in the history of the national poultry industry, with the occurrence of an outbreak–now contained–of Highly Pathogenic Avian Influenza in commercial poultry. Closing the year with positive results, as predicted by ABPA, is an achievement to be celebrated and reinforces the outlook projected for 2026, expanding Brazil's presence in the global market in line with the sector's expected production for the year," says Ricardo Santin, chairman of ABPA.

Eggs - Brazilian egg exports (including all products, both fresh and processed) totaled 40,894 tons in the 12 months of 2025, reports ABPA, setting a historic record and exceeding the total exported in the same period last year by 121.4%, with 18,469, tons. Revenue also set a record, reaching US$97.240 million, a figure 147.5% higher than that achieved in 2024.

With these 2025 volumes, "exports exceeded the equivalent of 1% of the country's total egg production, a significant milestone for the sector's internationalization, without compromising domestic supply, which continues to absorb about 99% of what is produced in the country. With the consolidation of the export culture, the expectation is that the flow of exports will remain at positive levels," celebrates Santin.

Egg exports in 2026 continue to grow and "gradually consolidate the ex-

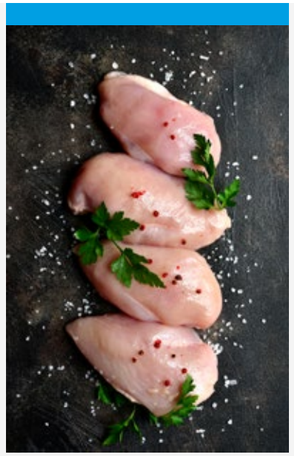
TOP DESTINATIONS IN 2025

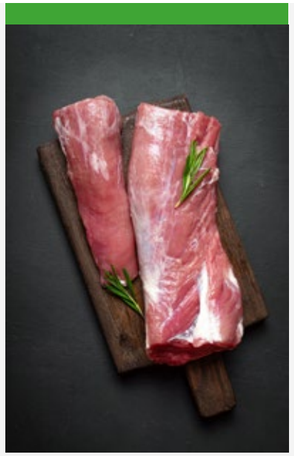
Fonte: ABPA

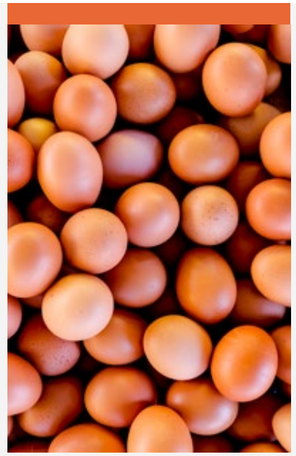
Chicken meat
United Arab Emirates - 479,900 tons (+5.5% compared to 2024)
Japan - 402,900 tons (-9.1%)
Saudi Arabia - 397,200 tons (+7.1%)
South Africa - 336,000 tons (+3.3%)
Philippines - 264,200 tons (+12.5%)

Eggs
United States - 19,597 tons (+826.7% compared to the 2024 total)
Japan - 5,375 tons (+229.1%)
Chile - 4,124 tons (-40%)
Mexico - 3,195 tons (+495.6%)
United Arab Emirates - 3,097 tons (+31.5%)

Pork
Philippines - 392,900 tons (+54.5% compared to 2024)
China - 159,200 tons (-33.9%)
Chile - 118,600 tons (+4.9%)
Japan - 114,400 tons (+22.4%)
Hong Kong - 110,900 tons (+3.7%)







	CHICKEN	PORK	EGGS
PRODUCTION (2024)	**14,972** million tons	**5,305** million tons	**57.6** billion units
EXPORTS (Jan/Dez 2025)	**5,324** million tons	**1,510** million tons	**40.8** million tons
EXPORTS (Fev 2026)	**493,000** tons	**122** million tons	**2.93** tons
CONSUMPTION Per Capita (2024)	**45,5 kg**	**18,6 kg**	**269 units**

port culture of the egg sector," assesses Santin, noting that "The diversification of destinations and the competitiveness of Brazilian products have expanded the market share of our production in international trade."

In the first two months of the year (most recent data), 6,025 tons were sold on the international market, a figure 23.4% higher than that recorded in the same period of 2025, when 4,884 tons were shipped. In terms of revenue, the comparative growth reaches 37.9%, with US$12.583 million earned in the first two months of 2026, compared to US$9.122 million in the same period last year.

Pork - ABPA surveys show that in 2025, Brazilian pork shipments totaled 1.510 million tons, setting a historic record for the sector's exports. This volume is 11.6% higher than that recorded in 2024, allowing Brazil to surpass Canada and take third place among the world's largest pork exporters. In terms of revenue, Brazilian pork exports totaled $3.619 billion in 2025, a figure 19.3% higher than that achieved in 2024.

"There has been a significant shift in the landscape of export destinations. The Philippines has established itself as the largest importer of Brazilian pork, and other markets, such as Japan and Chile, have taken center stage among the top five importers. "This demonstrates the effectiveness of the process of diversifying export destinations for Brazilian pork and, which reduces risks, expands opportunities, and strengthens Brazil's presence in the international market, supporting positive expectations for this year," notes ABPA Chairman Ricardo Santin.

In the first quarter of 2026, growth compared to 2025 was 16.5% in volume, with 392,200 tons, generating revenue of US$916 million—a 16.1% increase over the previous year.

For Santin, as global demand for Brazilian pork remains high, particularly "in markets such as the Philippines, Japan, and other countries in Asia and South America," the trend observed at the start of this year "is expected to persist over the coming months, confirming the upward projection for 2026 shipments

Farmed Fish

Francisco Medeiros, chairman of Peixe BR, celebrates the production of over 1 billion tons of farmed fish, noting that, after all, "very few countries achieve or have production on this scale!" He also highlights the size of the domestic market—which is very large—and points out that over the past two years, consumption has increased by more than 10% annually, and has done so for the past 12 years.

With 2025 production, Brazil—Medeiros assures—has become the largest producer of farmed fish in the Americas, meaning "across our entire continent, we've even surpassed Chile, which for many years was the largest producer of farmed fish. And tilapia, which accounts for 70% of everything we farm in Brazil, has become the most consumed fish in Brazil and also the most exported fish."

In 2025, had it not been for the steep tariffs imposed by the United States, which drastically reduced our exports, Brazil could have added another achievement: becoming the largest exporter of fresh fillets to the American market.

Furthermore, for the producer, the gains were not reflected in the same way: "The main achievement of 2025 was that the producer ended the year in the black. This happened because, in the last three months of 2025, as is usual, prices recovered. However, producers were penalized because 2025 was the year the federal government authorized the import of tilapia fillets from Vietnam, which compete unfairly with the product produced here in Brazil."

The decision to target the international market dates back five years and primarily supplies the U.S. and Canadian markets with fresh fillets, which receive 90% of Brazilian aquaculture exports, Medeiros asserts, noting that Brazil's quality standards, "the highest in the world, sometimes end up restricting access to markets that are less demanding, where other producers, mainly China and Vietnam, are able to supply the product with the quality that the buyer desires."

The chairman of Peixe BR comments on the need to "make significant internal progress on production so that we can even consider new international markets. By 2025, we haven't advanced much, but due to U.S. tariffs, we'll be exporting the same volume as in 2024."

Citing public policies that "have negatively impacted our activity" as the greatest challenge facing Brazilian fish farming, Medeiros asserts that, "today, our biggest challenge is precisely government regulation, whether federal, state, or even municipal." This reality means that Brazil, "beyond its borders, has the most competitive fish farming in the world. Outside our borders, we have the most rigorous and bureaucratic regulatory system in the world," he states.

Even in the face of existing bottlenecks, related exclusively to "external policies and government decisions, we ended the year on a positive note, demonstrating above all the resilience of producers and the aquaculture supply chain here in Brazil," acknowledges the chairman of Peixe BR, and believes that 2026 will be "another year of positive results; however, we believe there are still plenty of surprises ahead regarding these regulatory issues."

As the basis for this concern, Medeiro cites a publication by the Brazilian Institute of the Environment and Renewable Natural Resources (Ibama) in mid-March, which issued a regulatory directive classifying the pirarucu as an exotic and invasive species: "The pirarucu may even be invasive in some river basins, but it is never exotic, because it is a fish native to Brazil. These situations, including gross errors in analysis and considerations on the part of public policy, are cause for concern."

Cooperatives account for more than half of national production

The results obtained by Brazilian agriculture and livestock have an essential role to play in cooperatives in the agro sector. Data from the Brazilian Institute of Geography and Statistics shows that cooperatives account for more than 50% of national grain production, as well as 75% of wheat, 55% of coffee, 53% of corn, 52% of soybeans, 50% of swine, 48% of cotton, 46% of milk and 43% of beans in Brazil. In addition to this official information, it is important to highlight the presence of cooperatives in fruit-growing, horticulture, animal proteins, the sugar-energy sector, fibers and other production chains.

Rodolfo Jordão, coordinator of the Agricultural Branch of the OCB System (Organization of Brazilian Cooperatives), places cooperatives at the "forefront of national production. The results are obtained by 1,172 agricultural cooperatives throughout Brazil. In this sense, as cooperativism is a differentiated business model that does not focus on economic return, but also on the people who make up the movement, it is important to note that there are various ways of measuring the strength of cooperativism in the sectors in which it is present."

One of the ways used by the OCB to quantify the sector is by the number of cooperatives per state, with Minas Gerais, São Paulo and Rio Grande do Sul taking the top three spots, followed by Goiás and Pará. If the criterion is the number of cooperative members, Rio Grande do Sul takes the lead, followed by Minas Gerais, Paraná, São Paulo and Santa Catarina. Finally, in terms of economic representation, the order of highest income generation is Paraná, São Paulo, Santa Catarina, Minas Gerais and Rio Grande do Sul.

Credit link

When looking at the relationship between production and turnover in the sector, cooperatives also stand out, this time in the credit sector, which has a historical and structural link within Brazilian cooperativism. The very emergence of many credit cooperatives is directly linked to the need to finance rural production, organize access to inputs and guarantee working capital for producers.

The most recent data from the Panorama of the National Cooperative Credit System (SNCC), as of December 2024, cited by Jordão, helps to measure this relationship. In the Individual portfolio of credit cooperatives, 43.3% of operations are classified as Rural. In other words, almost half of the sector's individual credit portfolio is used to finance the rural production sector.

For the coordinator of the OCB System's Agro Branch, "this percentage shows that agro remains one of the main drivers of credit cooperatives, both in terms of volume and strategic relevance. Rural credit, in addition to sustaining production, boosts local chains, strengthens succession in the countryside and generates a multiplier effect in regional economies - which reinforces the interdependence and complementarity between the two branches."

International highlight

The organizational model provided by cooperatives also contributes "to the cooperative producer's access to the most demanding markets, by ensuring standardized production, predictable delivery, as well as a whole infrastructure that contributes to greater production efficiency and product quality. In this sense, we can highlight the main products: poultry meat, soy complex, unroasted coffee and pork, which are internalized in every country in the world, especially China, the EU and the US," Jordão says.

The coordinator emphasizes the prominent role of cooperatives in the origination of exportable products. In this way, "as well as being representative in terms of direct exports, they are even more significant in indirect international sales. It should also be pointed out that, as well as helping to generate trust in international markets by differentiating the cooperative business model, the work of cooperatives brings about the organization and cooperation of various producers with different profiles, guaranteeing scale, quality and standardization."

The care taken by cooperatives to maintain a technical network of cooperative professionals who provide technical assistance and extension, encouraging the adoption of increasingly efficient, sustainable production practices that are in line with the countries' requirements, is also a differentiator highlighted by Jordão. This initiative makes "cooperatives suppliers of one of the scarcest attributes these days, trust, which materializes in certifications, product diversity and management and governance capacity, as well as presence through physical infrastructure in Brazilian port terminals," he acknowledges.

TOP 5 DE COOPERATIVAS DO RAMO AGRO *Source: OCB*

No. of cooperatives	*Number of cooperative members*	*Income from Agricultural Cooperatives*
MG - 189 cooperatives	RS - 266 thousand members	PR - R$ 154.1 billion in income
SP - 102 cooperatives	MG - 205 thousand members	SP - R$ 58.4 billion in income
RS - 88 cooperatives	PR - 192 thousand members	SC - R$ 56.9 billion in income
GO - 86 cooperatives	SP - 138 thousand members	MG - R$ 49.6 billion in income
PA - 74 cooperatives	SC - 90 thousand members	RS - R$ 47.3 billion in income

Biofuels:
with an eye on the international market, their maturity is proven by growth

The Brazilian biodiesel sector showed a historic performance in 2025, with production of around 9.84 billion liters of biodiesel, the highest volume ever recorded, surpassing the approximately 9.05 billion liters produced in 2024, according to data consolidated from official information from the National Agency of Petroleum, Natural Gas and Biofuels (ANP).

This outcome is celebrated by Jerônimo Goergen–chairman of the Association of Biofuel Producers of Brazil (Aprobio), as it proves the maturity and robustness of the industrial park "to sustain this growth, with 58 authorized plants, 53 of which are in operation, and installed capacity close to 15.3 billion liters per year, which demonstrates that the country has sufficient production structure to meet higher volumes of mandatory blending. It also showed the production chain's ability to respond and the industry's compliance with strict quality standards, under ANP inspection and regulation, which reinforces market confidence and prepares the sector for higher diesel blends."

In addition to the historic production record in 2025, the sector has made progress with the regulation of the Fuel for the Future Law, a legal framework that organizes the growth of biofuels in the country. "The predictability provided by this framework is key for investment decisions and industrial planning in different technological routes," explains the chairman of Aprobio.

Among the achievements, Goergen lists the sector's progress "in building an international agenda to expand the presence of Brazilian biodiesel abroad, taking the national model of integration between agriculture, industry and sustainability to global forums. He pointed out that "Aprobio's institutional role has also brought a clear agenda for strengthening the sector, with a focus on regulatory predictability, expanding markets and valuing the quality of Brazilian biodiesel."

Goals

For 2026, this growth is expected to continue. "Market projections indicate a demand of around 10.5 billion liters, which could exceed 11 billion liters if the mandate progresses to 16% biodiesel, or B16. With regulatory predictability, the sector is in a position to continue expanding production, investments and efficiency," predicts Aprobio's president.

The goal is also to expand the international presence of Brazilian biodiesel, characterized by a production model integrated with agribusiness and sustainability. The forecasts listed by Goergen are also based on the technological evolution of biodiesel in Brazil, which is taking place in an integrated way in the production chain, since biodiesel doesn't just depend on the plant, but on a complete production and distribution system that guarantees performance and reliability.

Data from Aprobio–according to its chairman–proves that "the sector has invested in improving the quality of biofuel to enable higher blends with operational safety. This involves improvements in industrial processes, laboratory control, additives, logistics and storage." In Brazil, biodiesel production is present in all Brazilian regions and in 14 states, with production leading in the South and Midwest, according to regional data provided by the ANP. In the wake of the approval of the Fuel for the Future Law, companies have announced a series of investments in new plants, as well as in soybean crushing units.

There have also been advances in the diversification of raw materials and production efficiency, seeking greater sustainability and competitiveness, as well as the use of circular economy resources such as animal fats and used cooking oil. "Many experiences have already been recognized in the market with higher blends, from 20 to 100% use of biodiesel, involving large truck manufacturers. Biodiesel is a ready-made and very important solution for the world's energy transition," says Goergen.

The performance and expectations of those responsible for production support and inputs

An economic sector that has organized itself structurally and institutionally over the years, whether through the formation of cooperatives or professional associations, agribusiness depends on technology in machinery, equipment, and implements; as well as on inputs, chemical and biological s, and seeds. Some of these representative institutions, with varying degrees of scope, also present their results in this Panorama Brasil – Agribusiness.

ABAG stands out as an organization that brings together the entire chain, from the field to industry, distribution, and services, playing a fundamental role in strengthening the agro-industrial system and fostering relationships with the government, the private sector, trade associations, and educational institutions. This entity seeks to establish, within Brazilian agribusiness, an organization dedicated to sustainable development, bringing the sector–and all its strategic stakeholders–closer to the national and international economy.

Machinery and equipment

Other institutions are more specialized or segmented, such as the Brazilian Association of Machinery and Equipment (Abimaq), which, to facilitate dialogue with the sectors represented within the metalworking industry–comprising more than 9,000 domestic manufacturers–has sector-specific chambers. In relation to the agricultural sector, three stand out: two are directly linked to infrastructure (see corresponding chapter) and deal with grain storage equipment (CSEAG) and irrigation equipment (CSEI).

A third forum specifically brings together the agricultural machinery and implements industry: the CSMIA. In 2025, the sector's revenue reached R$ 66.7 billion, 7.4% higher than in 2024, reports Pedro Estevão Bastos, chairman of Abimaq's Sectoral Chamber of Agricultural Machinery and Implements. According to him, throughout 2025 "there was a modest increase in sales, but still far from what we consider a normal market of around R$ 75 billion and even further from the 2022 record of R$ 99 billion."

The outlook for 2026 points to "a slight decline in sales, around 5% due to falling international grain prices, the declining dollar exchange rate–which depresses agricultural product prices–and interest rates considered high by producers," warns Bastos, listing among the main causes of this forecast "high interest rates for financing and investment- , coupled with credit requirements that have increased considerably over the past year. The government has extended debt repayment terms for farmers in some regions. The surge in bankruptcy filings in the agricultural sector does not contribute to resolving the problem, and there are no measures that can resolve the systemic problem of default in the agricultural sector in the short term."

Animal Nutrition

The Brazilian animal feed industry has maintained growth and resilience, responding efficiently to macroeconomic and health pressures. Backing up his statement, Ariovaldo Zani, CEO of the National Union of the Animal Feed Industry (Sindirações), cites the sector's figures for 2025, when feed production reached approximately 90 million tons, with estimated growth of between 2% and 3% compared to the previous year, despite fluctuations in the costs of inputs such as corn and soybean meal.

Zani explains that "demand for animal feed has kept pace with the growth of animal protein exports, particularly chicken meat—which is destined for countries such as China and the European Union—driving domestic production," and forecasts that the sector's expansion trajectory will continue through 2026, supported by technology, nutritional efficiency, and regulatory adaptation. This expectation takes into account "the global environment, marked by geopolitical instability, health pressures, and regulatory changes, which is likely to bring challenges and opportunities for the sector in the coming years."

In this regard, to achieve the projected results by 2026, Zani identifies three pillars as decisive for the industry and the entire animal protein supply chain: Efficiency in procurement, formulations, and the management of inputs and processes, since in a volatile environment, precision and planning define competitiveness; sustainability, with regard to clear environmental metrics, traceability, and transparency, in response to the demands of markets, investors, and consumers, which are intensifying; and integration among industry, producers, government, academia, and all links in the chain, given challenges that are too complex to be tackled in isolation and that require collective intelligence.

The stability and strength of global demand for protein are also noted by the CEO of Sindirações, since, even in a turbulent environment, "the world continues to look to Brazil with confidence, not only because of the quantity we produce, but also because of the quality, competitiveness, and reliability of our supply. This is only possible because our integrated supply chain is modern, professional, and attuned to global trends. A chain that understands that productivity and sustainability go hand in hand, not in opposite directions."

Listing Brazil's main competitors in the global animal nutrition market—the United States, China, and some members of the European Union—the CEO of Sindirações emphasizes the need for Brazil, following the example of these countries, "to continuously advance in scale, technology, regulatory predictability, and efficient logistics—factors that drive global competitiveness."

Fertilizers

Fertilizer deliveries to the Brazilian market are directly linked to grain harvest results and, in line with the growth recorded in 2025, totaled 49.11 million tons, a 7.7% increase compared to 2024, according to the National Association for Fertilizer Distribution (ANDA). Domestic production of intermediate fertilizers also increased, closing the year at 7.22 million tons, a volume 2.5% higher than the tonnage produced in 2024.

Imports remained the primary source of supply. In 2025, Brazil imported 43.32 million tons of intermediate fertilizers, a 4.8% increase compared to 2024.

According to Elias Lima, chairman of the board of Anda, "In 2025, even in the face of a challenging scenario marked throughout the year by climatic instability, fluctuations in logistics costs, and an economic environment still under pressure, the sector maintained its commitment to rural producers. Fertilizer deliveries occurred in a regular and organized manner, ensuring predictability for crop planning. This performance was fundamental to ensuring productivity in the field and contributing to the achievement of a record harvest, reinforcing the strategic role of the input chain for Brazilian agribusiness."

Pesticides

According to a survey by Kynetec Brasil commissioned by the National Union of the Plant Protection Products Industry (Sindiveg), the Brazilian agricultural pesticide market is expected to close the 2025 cycle with 6.1% growth in the Potential Treated Area (PAT), reaching approximately 2.6 billion treated hectares. The indicator used in the survey—as noted by Eliane Kay, executive director of Sindiveg—considers not only the cultivated area but also the number of applications made and the quantity of products used in the tank, reflecting the intensity of technological management in the fields.

"The increase is mainly associated with the need for management to control pests, diseases, and weeds, particularly in crops of great importance to the country, such as soybeans, corn, and cotton, which account for a significant portion of the applications carried out in the field. The projection corresponds to the third estimate of the survey, and the official finalization of the data is expected to occur in April, following the consolidation of information regarding the soybean harvest," explains Kay.

In this context, the outlook for 2026 remains tied to continued demand for crop protection technologies, given the dynamics of Brazilian crops, high pest pressure in tropical environments, and the need to ensure productivity and food security in a scenario of growing agronomic complexity.

According to the executive director of Sindiveg, the achievements of 2025 include significant advances in the institutional and regulatory environment, such as the implications of the new Pesticides Law and the progress of discussions regarding the legal framework for bio-inputs—"initiatives that contribute to modernizing the sector's regulations and expanding the tools available for plant health management in the country." There are also gains in the tax arena, such as a decision by the Federal Supreme Court confirming the constitutionality of tax incentives applied to agricultural pesticides in the ruling on Direct Unconstitutionality Actions (ADI 5553 and 7755), reinforcing legal certainty and recognizing the role of these policies in ensuring production competitiveness and food security.

Another milestone involves the consolidation of crop protection technologies as an essential tool for ensuring production stability in Brazilian crops. "The expansion of the treated area reflects the growing adoption of solutions aimed at the efficient control of pests, diseases, and weeds, allowing producers to face increasingly complex agronomic challenges," reports Kay.

To the achievements of 2025, the executive director of Sindiveg also adds the dissemination of best practices and technical training, such as expanded access to the course "Correct and Safe Use of Pesticides," conducted in partnership with the National Cooperative Learning Service in the State of São Paulo (Sescoop-SP), and "positive performance in food safety indicators, such as the most recent results from Anvisa's Program for the Analysis of Pesticide Residues in Food (PARA), which recorded the best result in the historical series."

Biological Products

The size of the global market for bio-inputs is the subject of numerous studies, and Reginaldo Minaré, executive director of the Brazilian Association of Bio-inputs (Abbins)—an entity that brings together bio-input industries and farmers who have opted for production for their own use and the purchase of ready-to-use solutions —to demonstrate the segment's potential, uses an analysis by Mordor Intelligence, which indicates that the market for agricultural biological products is expected to grow from US$ 29.87 billion in 2025 to US$ 31.88 billion in 2026, with a forecast of reaching US$ 44.12 billion in 2031.

"Within this overall market, Brazil represents a significant share. It grows approximately 15% per year and already generates more than R$ 5 billion annually," notes Minaré, adding that "in this market, microorganisms play a fundamental role; they constitute the most robust component of the bio s contained in the portfolios of the bio-inputs industry."

As the representative body of a still-young sector—which only recently, with the publication and entry into force on December 23, 2025, of the Bio-Inputs Law, has become regulated and provides legal certainty for those participating in the bio-inputs market, despite the need for complementary regulations currently being drafted by MAPA—Abbins works toward a strong and well-distributed tropical regenerative agriculture across the country, which, as Minaré explains, consists of "an agricultural concept focused on improving soil quality and practices adapted to our context. It will represent a revolution for agriculture."

As a key task, Abbins' executive director cites "raising awareness among universities in agronomy, veterinary science, biology, and other fields to include more class hours dedicated to bio-inputs and tropical regenerative agriculture in their curricula—a challenge for the coming years. The consolidation of domestic legislation will provide the legal certainty necessary for the industries represented by Abbins to further capitalize on the international market for bio-inputs."

2

TECHNOLOGIES FOR THE 21ST CENTURY CHALLENGES

- Goals for the 21st Century.
- Certifications and awards for agribusiness.
- Recognition of Brazilian coffee.
- Forest Code, legislation, environmental licensing, and agricultural policies.
- Recovery and preservation of areas.
- GHG removal and carbon sequestration.
- Integration of crops, techniques, and technologies.
- Regenerative Agriculture and ILPF.
- Precision agriculture.
- Bioeconomy, biodiversity, biocompetitiveness, and Biofuels.
- Successful initiatives.

TECHNOLOGIES, LEGISLATION, AND POLICIES FOR THE 21ST CENTURY CHALLENGES

The goals are challenging, and Brazilian agriculture is prepared to fulfill its role

The 21st century carries a significant legacy from the past, which, with some variations, is common to all—whether at local, regional, or even global level. Interconnected challenges affect life on the planet and, for that very reason, are difficult to address, but technology and agriculture offer ways to mitigate their effects.

More than just saving the planet, the 21st century demands that conditions be maintained to ensure the survival of the population and a hyperconnected society that is under constant pressure, which affects the citizens' mental health (increased cases of anxiety, depression, and burnout), and faces antimicrobial resistance due to the emergence of superbugs that can render common antibiotics ineffective.

The main bottlenecks are related to the climate crisis and biodiversity collapse ; reduction in inequality and social fragmentation through the implementation of social justice measures; geopolitical tensions and the new world order.

The points of friction present in this multipolar reality also stem from disputes over drinking water, critical minerals for batteries, and arable land. In cyberwarfare, the battlefield has also expanded, and attacks are directed at digital infrastructure, power grids, and banking systems, paralyzing nations.

The Mercosur-European Union agreement and the US tariff war impact Brazilian agribusiness, and not in a positive way

In this context, universal access to technology and education is interdependent and significantly affect employability and job retention in an era of labor shortages.

Technology, incidentally, defined as a typical 21st-century revolution , was shaped in the last century and underpins the current moment, marked by generative Artificial Intelligence, advanced automation, and debates on technological ethics, with repercussions in the labor market (replacement of human labor in repetitive tasks, professional retraining, and emergence of new professions); misinformation, with fake news and deepfakes, a decline in the trust in institutions and the democratic process, as well as privacy invasions and cybersecurity issues.

Another characteristic experienced by 21st-century inhabitants is the interconnection of problems, complicating the equation. For example, climate change leads to resource scarcity, which causes forced migration, which in turn fuels nationalism and geopolitical tensions.

To address these key pillars underpinning the crises, agriculture and technology applied to agribusiness – from pre-farm to post-farm operations – occupy a unique position on the global stage and contribute to the solution, to a greater or lesser extent. In fact, in some cases, agriculture plays a dual role: it suffers the effects and actively participates in the solution –without considering that, due to a lack of understanding of the issue or ideological biases, it is often listed among the villains.

The path forward involves decarbonizing energy sources and reducing global warming; adapting to extreme weather events (droughts, floods, hurricanes); and preserving existing species to prevent mass extinction and the resulting food security threats that endanger global ecosystems.

According to the Brazilian Agribusiness Association (Abag), the decarbonization agenda is strategic for the future of agribusiness: "We are certain that the sector is already part of the climate solution, and practices such as no-till farming, crop-livestock-forest integration, restoration of degraded areas, and use of biofuels should be highlighted – initiatives that increase productivity while reducing emissions and expanding carbon sequestration."

This agenda–ABAG assures–strengthens the image of Brazilian agribusiness abroad, adding value to products and expanding market access. Thus, sustainability ceases to be merely a differentiator and becomes a strategic factor for the sector's expansion and competitiveness in the global scenario.

The approach of the year 2030, defined by the United Nations (UN) as the deadline for the Sustainable Development Goals (SDGs), is a source of concern, as it is no exaggeration to anticipate that the results of the global assessment scheduled for that date will fall short of the targets, whether regarding climate–reducing global greenhouse gas emissions by 42% to limit warming to 1.5°C, which requires massive global investments, estimated at around US$4 trillion for the energy transition – or in terms of eradicating extreme hunger.

In this context, the agricultural sector–especially in Brazil–transcends its role as a domestic economic engine and assumes the role of a strategic player in resolving the dilemmas afflicting all of humanity.

Sustainability is one of the strategic pillars of Brazilian agriculture, and organizations such as ABAG have been actively working to promote the sector, balancing efficiency and environmental preservation within the context of tropical agriculture. Specifically, ABAG "has promoted studies, debates, and initiatives that highlight Brazil's unique strengths, such as intensive use of technology, integration of production systems, and ability to produce with lower environmental impact compared to other regions of the world. We only need to recall the work done at COP30 in Belém (PA)."

Given the significant role it plays in institutional coordination and in representing the sector at national and international forums, emphasizing the importance of considering full carbon balance and sustainability of systems as a whole, ABAG contributes to strengthening the credibility of the agricultural sector and expanding recognition of its best practices.

THE PRODUCER'S VOICE
FLÁVIA GARCIA CITITI, POSITIVE AGRICULTURE MOVEMENT, MANAGER OF FAZENDA JACARATIÁ

I am passionate about Brazil. I joined the agricultural sector 10 years ago and fell in love with it. In agriculture, we all know that our struggles are the same. We operate in the only industry in the world that has a component we cannot control: climate.

In our case, the farm's origins were in livestock. At a certain point, we saw medicinal plants as an opportunity to integrate crop farming into a new production system. From this vision, a micro-distillery for the production of essential oils was born, running parallel to livestock farming.

That's what agriculture is all about. And the world depends on Brazil for food, yet Brazilians undervalue this.

My intention is for the whole of society to fall in love with the greater good of this country. That is why I am creating a movement called Agro Positivo, because we Brazilians have a PhD in knowing everything that is wrong with this country, but we need to show the real face of agriculture.

Testimony given during the Integration and Biocompetitiveness Forum: The Brazilian Solution, organized by ABAG and ILPF Network, on March 2, 2026,

CERTIFIED AND AWARD-WINNING AGRICULTURAL PRODUCTS

Quality, origin, and sustainability confirmed and recognized

Certification of agricultural products in Brazil is a robust system that combines strict health standards, traceability, and protection of cultural heritage, incorporating sustainability and regeneration into its scope. But there are other tools capable of proving the quality of Brazilian agricultural production: awards that demonstrate international recognition of a country that is not only a giant in terms of volume but also a producer of extremely high value-added and sophisticated products.

The process for obtaining these recognitions requires investment in the alignment of production with the standards of the Ministry of Agriculture, Livestock, and Supply (MAPA) or the certifying body; on-site inspections, conducted during technical visits and audits; and registration in official systems such as e-SISBI or SGSIA (for artisanal labels).

For consumers, these achievements serve as a seal of quality, as they guarantee that the product meets global standards of excellence. For producers, they translate into profitability, as an international award seal on the label of a Brazilian cheese or olive oil can increase the product's price by up to 40%.

Governance and Ethics - In March 2026, MAPA awarded the Agro+ Integrity 2025-2026 Seal to 52 companies and cooperatives. Recognized by OECD as one of the best global practices for combating corruption and promoting sustainability in the private sector.

IG, IP, DO, and other acronyms embody best practices

When it comes to seals, the main ones recognize Origin, Artisanal Quality, and Sustainability. Coordinated by the National Institute of Industrial Property (INPI) and MAPA, these seals of origin or Geographical Indication (GI) guarantee that a product possesses unique qualities due to the location where it is produced. Today, more than 100 Brazilian products deserve this designation, and since 2021, the government has unified the visual identity to facilitate consumer recognition.

Indications of Origin (IP), which certify and bring renown to the region where production takes place, such as Vinhos do Vale dos Vinhedos and Queijo da Canastra, are followed by Designation of Origin (DO), a more rigorous process that certifies the product's characteristics – flavor, aroma, texture – as unique to that geographic environment, including natural and human factors, such as Coffee from Cerrado Mineiro Region.

Artisan Quality seals, awarded to producers of cheese, salami, honey, and other products, allow these items to be sold throughout Brazil without the barriers posed by rigorous industrial inspections. They are divided into the ARTE Seal, which breaks down the barrier to marketing limited to the city or state of origin and authorizes interstate sale of artisanal food products made using traditional recipes and methods, provided they have undergone official inspection (SIM, SIE, or SISP); and the Artisanal Cheese Seal, a specific variant focused on promoting the diversity of Brazilian cheeses, ensuring food safety and cultural value.

The Sustainability and Regeneration seals, in turn, have gained momentum with the advancement of the ESG agenda and regenerative agriculture. They are:

- **Brazil Certified Seal (Integrated Production):** focused on good agricultural practices, traceability, and reduced use of agrochemicals, it is commonly found on fruits such as apples, grapes, and mangoes;
- **Social Biofuel Seal:** identifies biodiesel produced with raw materials from family farms, ensuring social inclusion;
- **Regenerative Seal (Rainforest Alliance):** specific to regenerative agriculture, it emerged in 2026, initially for coffee, and audits soil health and biodiversity protection; and
- **Green Seal (Federal Government):** implemented on a large scale in 2026, it certifies products and services with low carbon emissions and high environmental responsibility.

SisOrg, or "Orgânicos Brasil" label, exclusively aimed at products grown without use of pesticides or genetically modified organisms, joins these labels. It is obtained through audits conducted by private certification companies and/or Participatory Guarantee Systems (PGS), a method whereby producers monitor themselves through a network.

ARTE Seal

In the case of ARTE Seal, human "know-how" is the distinguishing factor, and therefore the product must meet four basic requirements: raw materials grown by the producer or of known origin; predominantly manual techniques; traditional, proprietary recipe; and health inspection record (whether SIM – Municipal, SIE –State, or SISP), which also requires approval of the production facility regarding aspects such as hygiene and workflow.

In other words, the producer must know exactly where the milk, meat, or honey comes from; must not use anything in production that could be considered as result of an industrialized process; the ingredients must be natural; and the methods must respect regional culture.

The World of Certifications

Brazilian agribusiness offers a wide range of certified products, from large-scale export items to regional artisanal delicacies. In 2026, traceability and sustainability had become the most important criteria.

Alongside coffee (see box), wines and sparkling wines from Vale dos Vinhedos (RS) and high-altitude wines from Santa Catarina, as well as cachaça from various regions such as Salinas (MG) and Paraty (RJ), they all bear a seal of origin.

Cheeses from Canastra, Marajó, and Coalho, as well as artisanal cheeses from Santa Catarina and São Paulo; cured and smoked meats, such as colonial sausages, salamis, Parma-style hams, and coppas, mainly from the South; and specific honeys, such as that from Boa Vista do Ramos (AM) and Aroeira (MG) are among the animal-based products offered.

Fruits and products derived from extractive industries are gaining ground in this sector. Examples include export fruits, such as mangoes from São Francisco Valley (with Designation of Origin seal), apples from São Joaquim, and melons from Mossoró, cashews from Serra do Mel (RN), which obtained its GI in 2026, and cocoa beans from southern Bahia and Linhares (ES), among others.

Animal Welfare and Carbon Neutrality

In the field of animal protein, the presence of certifications is also growing. 2026 brings significant progress in this segment with the evolution of Animal Welfare Certifications and "Carbon-Neutral" seals (such as Embrapa's Carbon-Neutral Beef), which are now required by major supermarket chains and for exports to the European Union.

In this case, the benefit for the consumer lies in a QR code on the product label that directs the interested party directly to the report from Embrapa or the Ministry of Agriculture, even showing a map of the farm where the item was produced.

International Awards

Brazilian agribusiness is experiencing a special era in terms of international recognition. Recently (from 2025 to early 2026), the country consolidated its position not only as a giant in volume but as a producer of extremely high value-added and sophisticated cheeses, wines, sparkling wines, and olive oils.

Among the international recognitions is its status as a global power in cheese competitions, with cheeses produced in Santa Catarina standing on equal footing with French and Italian varieties.

Two products stand out in this group: Queijo Morro Azul (Pomerode, SC), which, after winning the title of Best Cheese in Latin America at the World Cheese Awards in 2025, was listed by Culture Magazine in January 2026 as one of the best cheeses in the world, and is the only Brazilian representative; and Neblina Cheese (Valença, RJ), which won bronze medal at the 2025 World Cheese Awards, standing out among nearly 5,000 global samples.

International certifications and awards attest to the sophistication of the country's agricultural sector and its strict adherence to stringent global standards

The year 2025 was historic for Brazilian viticulture, especially for winter wines (double pruning technology). At the 2025 Decanter World Wine Awards, Brazil won 145 medals, including a first-ever gold for Minas Gerais with the 2023 Isabela Syrah (Maria Maria Winery), which received 96 points, the highest-scoring Brazilian label in the history of this competition, the largest in the world.

Olive oils from Mantiqueira Mountains and Rio Grande do Sul have also risen to the top of global rankings. Mantikir Coratina olive oil (MG) was named the third-best olive oil in the world at Terraolivo 2025 competition (Israel), trailing only producers from Spain, while Sabiá olive oil (SP/RS) continued its successful run in international competitions in 2025, winning the award for Best Blend in the Southern Hemisphere.

AGI comemora 10 anos de Brasil e de liderança em armazenagem

A AGI, empresa canadense fundada em 1996 e líder global em soluções para manuseio, armazenagem e processamento de grãos, atua no Brasil desde 2016, quando inaugurou sua unidade em Cândido Mota (SP).

Comprometida com a agricultura sustentável e conectada, a empresa investe em inovação e tecnologia sempre com o foco de contribuir com o aumento da produtividade, da segurança e da eficiência do agro. Para isso, mantém portfólio completo com silos, transportadores, secadores e sistemas de automação, além de soluções digitais para fazendas, indústria e operações portuárias.

"As soluções são desenvolvidas de acordo com as necessidades do produtor rural e da indústria, sempre priorizando segurança e sustentabilidade para quem opera, para quem armazena e para a indústria que movimenta o Brasil e o mundo", comenta Robson Engers, diretor Sênior de Operações Brasil e Latam.

A meta para os próximos anos – assegura Engers – é seguir como "referência em sistemas de armazenamento e movimentação de grãos para o futuro do agronegócio, proporcionando soluções inovadoras, seguras e ecologicamente corretas. Hoje, estamos presentes em praticamente todo o Brasil e nos principais portos nacionais e internacionais, atuamos também na indústria de etanol, esmagadoras de soja, indústria de fertilizantes, rações animais em grande escala, bem como segmento de pet food."

VANGUARDA DA INOVAÇÃO

De acordo com Engers, a AGI "está sempre na vanguarda da inovação, com equipe de engenheiros altamente qualificados buscando sempre proporcionar as melhores soluções em pós-colheita e movimentação de grãos, no Brasil são mais de 100 engenheiros dedicados e ainda contamos com suporte da engenharia global, presente hoje em mais de 100 países."

Com essa base estabelecida e com os equipamentos certos, a AGI compõe os sistemas necessários para facilitar a movimentação dos insumos para o campo e, em seguida, a movimentação dos grãos cultivados ao longo da cadeia global de abastecimento alimentar.

Na base de sua missão está "eliminar a perda de alimentos e a fome através do desenvolvimento de soluções de armazenamento, manuseio e processamento que fortalecem e protegem a cadeia global de suprimento de alimentos."

Coffee: a case (quite) apart

Coffee, like some other crops, constitutes a world of its own on a global scale, and the certification process generally seeks to attest to its origin or sensory quality via the SCA score from the Specialty Coffee Association, an international scale of 0 to 100 points that evaluates the sensory quality of coffees.

Coffee is the undisputed champion of certifications in Brazil, with more than 22 Geographical Indications (GIs), such as Chapada de Minas (recognized in early 2026), Cerrado Mineiro, and Alta Mogiana.

The Geographical Indication (GI) certification confirms that production takes place within an area defined by the Geographical Indication and that the producer is affiliated with the association or cooperative that holds the seal for that region.

The GI requires a quality report, issued for the coffee lot after physical (defects) and sensory (cup tasting) analysis; for specialty coffees, the score is typically above 80 points on the SCA scale.

In this case, proof of traceability is also required, with a field notebook detailing management, harvesting, and post-harvest processing.

It is worth noting that the seal is applied to each bag or package, which receives a QR code or numbered seal, a symbol of the guarantee of origin for the end consumer.

In terms of awards, Brazilian coffee from the South of Minas stands out year after year, and in 2025, it reinforced its dominance at the 2025 Cup of Excellence, the "Oscar" of coffee: Rio Verde Farm, in Conceição do Rio Verde, won in the Experimental category with a score of 91.68. The award-winning lot was sold at an international auction for record prices.

In addition, the Mantiqueira region of Minas Gerais secured 21 of the contest's top prizes, cementing the Geographical Indication (GI) as a synonym for exceptional quality.

Zero Carbon

A strategic initiative aimed at measuring the greenhouse gas (GHG) balance in Brazilian coffee farming and exploring the sector's potential in the carbon market, the Carbon Project is led by the Brazilian Coffee Exporters Council (Cecafé) and has the support of institutions such as Esalq/USP and the Institute of Agricultural and Forest Management and Certification (Imaflora) for its development.

These partnerships, emphasizes Marcos Matos, director-general of the Council, ensure "the scientific rigor of field measurements," and contribute to the studies conducted and the program's advancements, such as the Negative Carbon Balance: "Technical studies carried out in the producing regions of Minas Gerais and Espírito Santo demonstrated that Brazilian coffee farming, when adopting good agricultural practices, sequesters more carbon than it emits."

Results - There are differences between the gains with Arabica and Conilon coffee. In the case of Arabica, during transitions to more conservationist management through the adoption of good agricultural practices, this number can reach -10.5 tons of CO2/ha/year; while for Conilon, carbon additionality increases considering land use change, from pasture to coffee production, with the adoption of sustainable practices. These coffee plantations show a carbon balance of -8.24 tCO2eq/ha/year, a result that includes the sequestration of 12.22 tCO2eq/ha/year retained in the soil and a total of 3.98 tCO2eq/ha/year emitted during the production process.

On the rural properties evaluated in the study (Arabica/Conilon), Matos explains, there are also 338.67 tons of CO2eq stored in the form of preserved areas (Legal Reserves - RL and Permanent Preservation Areas - APP), reinforcing that, in Brazil, coffee production and environmental conservation are interconnected. Thus, "based on these results, a preliminary study was conducted to evaluate the feasibility of a Grouped Carbon Credit Program. Cecafé advanced in feasibility studies with partners such as StoneX and Allcot to assess the creation of a program that allows generating positive results for coffee growers," highlights the Council's director-general.

Among the resulting benefits of the program, Matos notes the strengthening of Brazilian coffee's image in light of the new requirements of the European Green Deal and ESG criteria, "ensuring that the product meets socio-environmental due diligence rules. As mentioned, in partnership with the Brazilian Mission to the European Union, Cecafé continues to monitor the CBAM (Carbon Border Adjustment Mechanism)."

Giving an example, the Cecafé leader talks about a public consultation held in 2025 regarding the inclusion of agricultural products in this new "carbon-related tax," and explains: "Through the actions of Cecafé's Carbon Program, the goal is to strengthen tropical metrics, publish carbon balance data in scientific journals, among other actions, to avoid undue charges due to a lack of knowledge about the reality of coffee production in Brazil."

Beyond the Carbon Agenda, via CBAM monitoring, Cecafé operates on several fronts in adapting to demanding standards, ESG criteria, and regulatory rules within the European Union, focusing on the European Union Deforestation Regulation (EUDR) and the Corporate Sustainability Due Diligence Directive (CS3D); as well as monitoring the agrochemical landscape (maximum residue limits), among other topics, to ensure the supply of sustainable coffee, with the presentation and proof of socio-environmental criteria as adequate, conclusive, and verifiable technical evidence to European importers and authorities.

Applied technology - These actions – comments Matos – include the use of traceability platforms, socio-environmental monitoring, verification programs and agrochemical residue analysis, producer training, technical and scientific studies related to the carbon balance of coffee farming, communication campaigns, among other actions to ensure compliance and competitiveness in exports.

The initiatives of this Council in favor of Brazilian coffee also include the publication of monthly export reports, information on coffees that possess superior quality or some type of sustainability certification and good social and environmental practices (Fairtrade, Rainforest Alliance, Organic, etc.).

The main initiatives and platforms mentioned by Matos include:

- Cafés do Brasil Socio-environmental Monitoring Platform: developed in partnership with Serasa Experian to allow exporters to monitor the socio-environmental compliance of rural properties, ensuring that EUDR requirements are met, considering the country's relevant legislation and deforestation analysis.
- EUDR Special Page (Landing Page): Cecafé launched a centralized portal with technical information, legislation, and tools to guide the sector on the new EU import rules.
- Informed Producer Program: offers training via a Distance Learning (EAD) platform to teach producers and exporters how to adapt to socio-environmental requirements and European regulations.

Role of the CNC

Silas Brasileiro, president of the National Coffee Council (CNC), adds to these actions cited by the director-general of Cecafé the advancement in practices such as conservationist management, recovery of degraded areas, efficient use of inputs, and carbon sequestration initiatives, highlighting the Water-Producing Coffee Program - National Program for the Preservation of Water Resources, Revitalization of Springs, and Preservation of Riparian Forests, an initiative directed at preserving water resources, environmental recovery, and improving production quality.

"In the sustainability agenda, the Water-Producing Coffee Program has consolidated itself as a national reference, promoting environmental conservation, as well as the revitalization of riparian forests and reforestation, promoting water security, climate resilience, and well-being for coffee-farming families," celebrates Brasileiro, citing that the initiative is underway in southern Minas Gerais (Cooxupé and Minasul/Sicoob Credivar), the Cerrado Mineiro (monteCCer), Espírito Santo (OCB/ES, Sicoob Central ES, Cafesul, Cooabriel, and NaterCoop – in partnership with the Reflorestar Program of the state government of Espírito Santo), and will soon be in the Mogiana Paulista region (Cocapec); and that several other regions are in negotiations.

The implementation of this structural CNC initiative involves cooperatives associated with the CNC and strategic partners from the coffee sector, including the Ministry of Agriculture, Livestock and Food Supply (MAPA), the National Water Agency (ANA), the Inter-American Institute for Cooperation on Agriculture (IICA), Embrapa Café, the OCB System, Sicoob Nacional, Emater, Incaper, the Paranaíba River Basin Committee, ABHA - Water Management, Municipal Governments and Water User Associations, the Federal University of Espírito Santo (UFES), and the Federal University of Uberlândia (UFU).

Heading programs like this, in Brasileiro's opinion, is a way for the CNC to exercise its central role "as the institutional articulator of Brazilian coffee farming, representing cooperatives and promoting alignment between the different links in the production chain, in permanent dialogue with entities such as ABIC, ABICS, Cecafé, CNA, and other sector organizations," after all, "our operations encompass the defense of public policies, support for the adoption of sustainable practices, the promotion of innovation, and active participation in national and international forums, contributing to the strategic positioning of Brazilian coffee on the global stage."

To these actions, the CNC president adds efforts in strengthening cooperatives and bridging the gap between producers, the government, and the market, seeking solutions that expand the competitiveness, resilience, and sustainability of the activity, and reinforces: "Our commitment is to ensure that Brazilian coffee farming continues to be a strategic sector for the country, competitive and sustainable, capable of generating income, promoting development, and excellently meeting the demands of an increasingly demanding market."

LEGAL AND MINISTERIAL INSTRUMENTS

The Forest Code is a competitive advantage

These instruments complement the Brazilian Forest Code (Law No. 12,651/2012), recognized even by the Climate Policy Initiative (CPI) as one of Brazil's most important environmental public policies and one of the most rigorous and advanced in the world, especially regarding protection of native vegetation on private properties. with potential to contribute significantly to achieving climate goals, conserving biodiversity, and developing a green economy and nature-based solutions.

The Forest Code's promotion of sustainable, low-carbon agriculture harmonizes economic development with protection of natural resources and is manifested, for example, in the restoration of degraded areas and sustainable forest management. Even while imposing restrictions on land use, it is cited as a driver of modernization and increased productivity in Brazilian agribusiness by encouraging the expansion of agricultural activities in already cleared and degraded areas.

This regulatory framework introduces unprecedented provisions globally, such as the requirement that rural producers preserve a fixed percentage of their land (Legal Reserve) without direct financial compensation—a rarity in other major agricultural powers. Despite some divergent views on its implementation, it seeks to balance environmental preservation with agricultural production.

Its importance can also be gauged by the monitoring tools developed by civil society, such as the Forest Code Implementation Monitor, managed by the Climate Policy Initiative and the Pontifical Catholic University of Rio de Janeiro (CPI/PUC-Rio).

This monitor, which is essentially a research agenda entirely dedicated to this law, brings together, in one place, information and analyses on the protection rules set forth in the law; instruments for managing and monitoring native vegetation; procedure for environmental regularization of rural properties; regulation of the law's instruments; relevant judicial decisions; legislative activities affecting the law; and the progress and challenges of the law's implementation in Brazilian states, with data, maps, graphs, and indicators showing how this legislation is being implemented in the country.

Environmental Licensing Law Creates a New Landscape

The General Environmental Licensing Law (Law No. 15,190/2025), enacted on August 8, 2025, and effective as of February 4, 2026, reorganizes environmental licensing and introduces significant changes in the criminal sphere, such as the creation of the Corrective Operating License (LOC) and the tightening of penalties for activities carried out without license, among other aspects that affect the legal landscape for companies, public officials, and investors.

Eight points stand out regarding the implications for agribusiness.

1. Exemption from environmental licensing for the cultivation of temporary, semi-perennial, and perennial species of agricultural interest; extensive and semi-intensive livestock farming; small-scale intensive livestock farming; and agricultural and livestock nature research that does not pose biological risk, provided that prior authorization is obtained from competent authorities.

2. Simplification of licensing: medium-scale intensive livestock activities and projects may be licensed through a simplified procedure based on adherence and commitment.

3. Classification as public utility: small-scale dams for irrigation purposes are considered public utility activities.

4. Corrective Operating License: for regularization of activities in operation without environmental license.

5. Environmental conditions: must be directly related to the negative environmental impacts of the project itself (prevention, mitigation, and compensation); must be necessary, proportionate, and technically justified; may not be used as a generic public policy tool unrelated to the identified impact.

6. Change of license ownership: must be completed within 30 days, and no additional conditions may be imposed if the activities remain the same.

7. Automatic license renewal: for projects with low or medium potential and small or medium scale.

8. Changes to the Atlantic Forest Law: the requirement for authorization by the state agency, with prior consent from federal or municipal environmental agencies, for removal of primary and secondary vegetation in an advanced stage of regeneration has been removed; the requirement for authorization from municipal environmental agency for the removal of vegetation in a medium stage of regeneration in urban areas has been removed.

Agricultural Zoning for Climate Risk: the success of the harvest

Formalized in 1996 as an official agricultural policy tool by the Ministry of Agriculture, Livestock, and Supply (MAPA), Agricultural Climate Risk Zoning (ZARC) is a normative risk management tool developed by the Brazilian Agricultural Research Corporation (Embrapa), responsible for technical implementation, coordinating the research network that performs calculations, collects meteorological data, and tests plant behavior; and managed by MAPA, which implements public policy, validates Embrapa's studies and transforms them into official standards, and publishes administrative acts (ordinances), giving the force of law to ZARC.

Prior to its implementation, the country had already conducted studies on climate and agriculture, but without the depth achieved by ZARC, as this tool uses mathematical and statistical models to calculate the probability of a successful harvest.

Thus, ZARC is a risk management tool (technical) that supports a public policy (strategic) and is enforced by ministerial ordinances (regulatory/legal).

Evolution

It all began with wheat cultivation, as the goal was to reduce the high loss rate that public agricultural insurance (Proagro) faced at the time due to planting at inappropriate times.

Over the course of these three decades of existence, ZARC has evolved. In addition to being initially extended to soybean and corn crops and, later, to many others –today there are more than 40 – it led to Decree No. 9,841/2019, establishing the National Program for Agricultural Climate Risk Zoning, and consolidating the governance between MAPA and Embrapa.

Today, the system has evolved to version ZARC 4.0 and now includes Soil Management Levels. This allows farmers who adopt best soil conservation practices (such as the No-Till System) to have different planting windows, recognizing that well-maintained soil is more resilient to the climate. What's more: it has contributed – and continues to contribute – to Brazil's transformation from a country that "relied on luck" into a data-driven agricultural powerhouse.

Access to information has also been made easier and is free, thanks to the creation of ZARC - Plantio Certo app (available for Android and iOS) or through MAPA's dashboard.

ZARC has provided a significant benefit to Brazilian agriculture. Considering only the reduction in agricultural losses due to "predictable" climatic factors, it is estimated that zoning generates savings of approximately R$ 1 billion per year for the public coffers by avoiding the financing and insurance of crops with a high risk of loss.

Costs and Insurance

A central pillar of the Federal Government's Agricultural Risk Management Policy, ZARC serves as the technical arm of this policy, allowing the government to direct resources (credit and insurance) to areas where the chance of harvest is real, thereby preventing the waste of public funds on crops doomed to failure. In other words, reduction of agricultural losses and guarantee of the sector stability are among its objectives. Furthermore, by planting at the right time, fertilizer use and seed effectiveness are optimized, reducing and preventing waste.

Since it is governed by administrative ordinances, it has a regulatory aspect and penalizes non-compliance: if a producer fails to comply with what is defined for their municipality and crop, they automatically cease to meet the rules governing rural credit and agricultural insurance.

In other words, based on ZARC data, banks can deny credit to those who plant at the wrong time, particularly in programs such as Proagro (insurance for small and medium-sized producers), the Rural Insurance Premium Subsidy Program (PSR) –mechanism established by the government to subsidize private insurance payments – and Safra Plan, rural credit provided by the federal government at controlled interest rates.

How It Works

More than just telling users what to plant, when, and where, the tool calculates risk by taking into account three main variables: soil types, classified according to water retention capacity (clay content); crop cycles, categorized as early, mid, and late; and climate history, through analysis of time series spanning over 30 years of rainfall, temperatures, frost risks, and winds.

Based on the analyzed data, ZARC classifies planting periods into three risk levels: 20% risk (high probability of success, 80% or 20% risk); intermediate risk (30%); and the maximum acceptable limit for official zoning (40%).

Recently, Embrapa and MAPA have evolved the system into the so-called ZARC Management Levels, which includes, in addition to clay content in the soil, root depth and straw management; expected productivity, that is, the window in which the plant reaches its maximum potential; and continuous updating of the system in response to climate change, so that the system reflects new patterns of drought or irregular rainfall.

Climate Plan: a strategic roadmap for carbon sequestration

With the launch of the Climate Plan on March 16, 2026, Brazil established clear targets for the 2035 horizon: reduction from 59% to 67% in its emissions by 2035, based on 2005 levels; and consolidation of Brazil as leader in energy transition, with sustainable aviation fuels (SAF) and green hydrogen. It also aims to pave the way for Net Zero (net-zero emissions) by 2050, detailing how each sector (industry, transportation, agriculture) will make its contribution to meeting the goal.

Defined by experts as the most ambitious document in the country's history to address the climate crisis, it is more than a letter of intent; it can be seen as a strategic roadmap that positions agribusiness as the protagonist in the carbon sequestration landscape and generates economic opportunities (green jobs). Noteworthy is the joint effort of 25 ministries in the Interministerial Committee and the fact that its development took into account the participation of over 24,000 people through digital public consultations, aiming to reduce social fragmentation and increase Climate Justice.

The plan is divided into two main pillars: mitigation, involving eight sectoral plans and focused on reducing emissions in Agriculture, Energy, Industry, Transportation, and Cities; and adaptation, which comprises 16 sectoral plans focused on protecting the population and the economy from impacts on health, food security, risk and disaster management, and Indigenous peoples.

For this fund alone, in 2026, the government announced the release of R$ 27.5 billion via BNDES (Brazilian Development Bank), with subsidized interest rates for solar energy projects, electric bus fleets, industrial retrofits, and, crucially, for restoration of degraded pastures.

ABC+ Plan and the carbon market

Brazilian agriculture plays a direct role in carbon sequestration and climate crisis mitigation, reversing its reputation as source of emissions to become a key part of the solution, through specific policies such as the ABC+ Plan (Sectoral Plan for Adaptation to Climate Change and Low Carbon Emissions in Agriculture and Livestock 2020 – 2030, developed and coordinated by the Ministry of Agriculture, Livestock, and Supply – MAPA – with guidelines from the Ministry of the Environment – MMA) and the carbon credit market.

The ABC+ Plan is often cited as one of the most advanced policies for low-carbon agriculture, focusing on no-till farming and restoration of degraded pastures. Even with funding that grows year after year, it remains limited in volume, performance incentives, and expansion; yet it makes a contribution, as it accounts for 1.6% to 2% of the total rural credit, thereby complicating and bureaucratizing producers' access to resources.

An evolution of the ABC Plan (Low-Carbon Agriculture), the ABC+ Plan's main investment line is RenovAgro (Program for Financing Sustainable Agricultural Production Systems), which, in the 2025/2026 harvest, together with related sustainability lines, reached approximately R$ 8.1 billion, compared to R$ 7.68 billion in the previous harvest, a volume about 12% higher than that allocated in the 2023/2024 harvest, which was R$ 6.88 billion.

The Carbon Credit Market, in turn, envisions the transformation of Brazilian farms into oxygen factories, where preservation of Legal Reserves and Permanent Preservation Areas (APPs) serves as globally tradable financial assets. Established and regulated by Law No. 15,042 of December 12, 2024, through the Brazilian Greenhouse Gas Emissions Trading System (SBCE), its implementation is phased over four stages:

- Regulation: A period of 12 to 24 months after the law takes effect (during 2025 and 2026) for the issuance of decrees that will define emission limits and monitoring rules.
- Emissions Reporting: Up to one year for companies (operators) to organize their measurement instruments.
- Monitoring: An additional two years dedicated to submitting monitoring plans and reports to the SBCE's managing body.
- Implementation: Start of the first National Allocation Plan (PNA), scheduled for the period from 2028 to 2029, with the distribution and trading of Brazilian Emission Allowances (CBE).

The study "Brazil's Strategic Role in the Carbon Market" produced by PwC Brazil, for example, analyzes that the enactment of Law No. 15,042/2024, along with the creation of the Brazilian Emissions Trading System (SBCE), positions Brazil in this market with potential to generate 370 million tons of carbon credits by 2030 – a volume nine times greater than the estimated domestic demand (from 17 to 72 million tons).

Economic and social potential of the carbon market for Brazil

1 GDP Growth

+2.24%
by 2030 with carbon pricing

2 Job creation and reduction of unemployment

1.5 million
million additional jobs

Unemployment rate
9.5% - 6.3%

3 Poverty reduction and greater income distribution

The average real income of the poorest 20%
1.80 to 2.12
(encreasing since 2015)

Share of national income
4.05% to 5.95%

4 Public revenues and offsets

R$ 69 to R$ 128 billion
in carbon revenues
(2021–2030)

+ R$ 2 Bilhões
from forest offsets
(restoration and conservation)

5 Lower mitigation costs (CAPEX avoided)

Over R$ 100 billion
in savings
from mitigation, even while meeting climate targets (2021–2030).

6 Internationally competitive carbon price

Estimated carbon price:

In Brazil
US$ 8.40
per ton of CO_2

Global average
US$ 70-100
per ton of CO_2

Source: Ministry of Finance (https://www.gov.br/fazenda/pt-br/acesso-a-informacao/acoes-e-programas/transformacao-ecologica/programas-em-destaque/mercado-de-carbono)

RECOVERY AND PRESERVATION

Brazilian agriculture as tool

Brazil can be considered an open-air technology laboratory focused on tropical agriculture, developing knowledge that can be exported to other tropical countries (such as those in Africa and Southeast Asia).

Notable examples in this context include precision agriculture, where sensors and drones can apply fertilizers drop by drop, reducing waste and environmental impact; and the use of traceability tools, such as blockchain, which combat misinformation, ensure traceability of exported products, and grant Brazilian meat and grains a "green seal" for the international market. Furthermore, it plays an effective role in replacing chemical fertilizers with Brazilian biological solutions.

With these contributions from Brazilian agriculture to the planet's sustainability, the country can become an agent of global food security, expanding its production capacity without encroaching on virgin forests, but rather by increasing productivity and restoring degraded areas, developing technologies, and applying good agricultural practices.

Crop-Livestock-Forest Integration (ILPF) is one such path, as it allows for the production of grains and meat in the same area. Furthermore, as one of the leading exporters of calories and plant and animal proteins, Brazil sustains the food supply of densely populated nations, helping to prevent hunger crises and food inflation that lead to political instability.

In the field of energy transition, Brazil is also a key player, as, in addition to having a recognized sustainable energy mix based on renewable sources, agribusiness forms the foundation of the "green matrix." In other words: while the world is rushing to decarbonize transportation, Brazil already has decades of experience and is now scaling up to new frontiers.

There is no shortage of examples in the production of new energy sources, and they go beyond ethanol and biodiesel, as the country leads the development of SAF (Sustainable Aviation Fuel) and Green Hydrogen from biomass; and uses sugarcane bagasse and animal waste (biogas) to generate clean energy, operating in bioelectricity and contributing directly to the net-zero emissions goal.

According to the report "Degraded Pasture Areas and Conversion Potential," prepared by Itaú BBA, the country has approximately 28 million hectares of degraded pasture with potential to be converted into productive areas, which could generate up to R$ 904 billion in land appreciation and increase national grain production by up to 52%, without the need for deforestation.

The number of hectares showing some degree of degradation identified by the financial institution aligns with the findings of the 2024 study "Potential for Agricultural Expansion in Degraded Pasture Lands in Brazil," published in the scientific journal Land and led by researchers from Embrapa Digital Agriculture (Embrapa Agricultura Digital), and Embrapa Territorial, which specifically mapped 28 million hectares of land with "extremely high suitability" for grain production.

The picture becomes even clearer when considering assessments conducted by various Embrapa units, such as Embrapa Pecuária Sudeste, Embrapa Cerrados, Embrapa Gado de Corte, Embrapa Agricultura Digital, and Embrapa Territorial.

These studies indicate that between 44% and 50% of Brazilian pastures show some degree of degradation, representing, in absolute terms, about 70 to 80 million hectares (out of a total of approximately 160 million hectares of pastureland in the country) with some level of agronomic degradation (with weeds and exposed soil, hindering livestock feeding) or biological degradation, which occurs when the soil loses nutrients and carbon, even if there is still some vegetation present. Specifically, about 28 to 30 million hectares are classified as having a severe level of degradation.

The good news is that even in the most affected areas, there is high potential for immediate conversion to grain farming without the need to clear new areas. Furthermore, most of it is recoverable using technologies already available.

However, the investment required is literally in the billions. The financial institution's report estimates that transforming the 28 million hectares of degraded pastures into agricultural areas will require investments – including machinery and infrastructure – that could range from R$ 188 billion to R$ 482 billion, depending on the level of degradation and the available infrastructure. These figures show that the average investment per farmer ranges from R$ 7,000 to R$ 17,000 per hectare, depending on the severity of the degradation and whether the farmer already owns the necessary machinery.

Soil-Conserving Technologies

Among the results of its work, Embrapa highlights the Poupa-Terra effect (soil-conserving), a set of technologies capable of increasing production without the need to expand the cultivated area, which has been directly impacting soybean production in the state of Pará for several years now, for example.

Embrapa's research also involves the development of cultivars (BRS) with genetic improvements for various crops, focusing on productivity, disease resistance, and climate adaptation. Among the key species are soybeans, corn, beans, rice, wheat, coffee, grapes, cassava, potatoes, tomatoes, açaí, citrus fruits, and forage crops (brachiaria), covering grains, vegetables, and fruits.

The results compiled by the National Supply Company (Conab) in the 1970s, for example, demonstrate the gains achieved through Embrapa's research. At that time, the average soybean yield was 1,487 kilograms per hectare. In 1975, the average soybean yield required 1 hectare to produce 2,000 kilograms. In the 1980s, thanks to technological advances, the same amount began to be produced on approximately 0.86 hectares. In the 1990s, the required area fell to 0.68 hectares. By the 2000s, less than half a hectare was needed, and in the 2020s, just 0.44 hectares.

"If we consider Brazil's current soybean production of around 170 million tons, had the average productivity of the 1970s been maintained, a production area of around 115 million hectares would have been necessary. In the last harvest, the national soybean area was 47.6 million hectares. In other words, about 67 million hectares were saved to achieve the same production," notes analyst Rogério Borges of Embrapa Soja.

The technologies developed, rather than merely reducing the area needed to produce the same volumes, have driven productivity gains over time. And the numbers are clear: "To achieve today the average productivity of the 1970s, less than half the area used during that period is required," emphasizes Borges, demonstrating the importance of technology in the sustainable growth of Brazilian agriculture.

Agriculture's contribution to GHG removal

Agricultural activity is entirely and completely dependent on soil characteristics and climatic variables. Thus, soil is a strategic asset, a living system in which physical, chemical, and biological quality form the basis of productivity. Conversely, soil degradation (erosion) combined with extreme weather events (such as heavy rains) is the combination that causes the most economic and environmental damage to Brazilian agriculture today.

Soil management, as in the No-Till system, sequesters carbon, contributing to the achievement of environmental goals and the mitigation of the greenhouse effect. Soils with good structure ensure water security by allowing water infiltration, recharging aquifers, and ensuring that plants survive short dry spells. Furthermore, soils with high biological activity and nutritional balance require fewer synthetic fertilizers, increasing the producer's competitiveness.

The climate, in turn, with ZARC's support, determines the exact time to sow to prevent critical phases (such as flowering) from coinciding with droughts or frosts, thereby reducing climate risk, which is the leading factor in crop loss in Brazil.

In summary, while the soil provides nutrients, the climate (solar radiation and temperature) defines the crop's yield ceiling through photosynthesis. In other words, the Soil-Climate-Plant interdependence is confirmed, as these factors must, for success, be analyzed together to prevent evapotranspiration and increase crop adaptation and resilience.

In the case of evapotranspiration, climate imbalance occurs due to rising temperatures, which accelerate soil water loss, requiring the application of more aggressive soil conservation techniques to maintain moisture. Crop adaptation and resilience are addressed through the development, primarily by Embrapa, of cultivars adapted to acidic soils (Cerrado) and semi-arid climates, proving that genetics must be aligned with the physical and climatic limitations of each region.

Actions to promote carbon sequestration and retention by agriculture and livestockin the soil also involve issues linked to the ABC+ Plan, such as transforming degraded soils, previously used for pastures, into productive areas, improving the local microclimate and avoiding the clearing of new areas of native vegetation; regenerative agriculture and Agroforestry (ILPF), with the use of trees in the agricultural system, improving thermal comfort (climate) and nutrient cycling (soil).

Carbon emissions and sequestration: in the outcome, less is more

CCarbon, the Center for Carbon Studies in Tropical Agriculture based at USP in Piracicaba, was founded with a strategic mission: help agriculture, livestock, and forestry intensify efforts to reduce emissions and, above all, enhance the removal of gases from the atmosphere, after all, as Carlos Eduardo Cerri – Full Professor in the Department of Soil Science at "Luiz de Queiroz" School of Agriculture, University of São Paulo (ESALQ/USP), and director of the Center for Carbon Studies in Tropical Agriculture at the University of São Paulo (CCarbon/USP) – asserts – "it is essential to understand that our sector is the only one capable of performing what is known as carbon sequestration, removing the gas from the air and fixing it in plants and soil."

The researcher – one of five Brazilians on the British news agency Reuters' list of the "Top World's Most Influential Climate Scientists"– points out that in Brazil, the pattern of emissions is very different from that of the rest of the world: "While globally 75% of emissions come from fossil fuels, here, the combination of deforestation and agricultural activities accounts for the vast majority. That is why international attention is focused on us, and our challenge at CCarbon is precisely to develop innovative solutions for all Brazilian biomes, from the Amazon to the Pampas."

Academic precision leads Cerri to point out that there is a terminological issue when the topic is Low-Carbon Agriculture. For him, this term "is, technically, a misnomer, although it has become popular for marketing reasons. What we are actually seeking is high-carbon agriculture, where this element is present in abundance in plants and soil, and not in the atmosphere. Carbon is the basis of life; it is in the corn we eat and the cotton we wear. Therefore, our goal is agriculture with low carbon emissions but high biogeochemical storage capacity."

Appropriate metrics now

On this topic, if that were the only difficulty, the solution would be close at hand. However, the main issue that needs to be addressed so that agriculture practiced in Brazil is valued by the market requires overcoming the bottleneck of measurement. "Science has known how to measure carbon for decades, but the current challenge is scalability. Rigorous methods are expensive and time-consuming; when the private sector tries to oversimplify to scale up carbon credit generation, uncertainty increases and credibility may diminish. At CCarbon, we are seeking the scientific middle ground: maintaining rigor without making the cost prohibitive for areas spanning thousands of hectares," acknowledges Cerri.

An important point emphasized by Cerri regarding the scalability of scientifically accepted metrics, is that they generally apply to small areas or experimental scales, while production units span thousands of hectares, and the result from one hectare cannot simply be multiplied. In other words, in addition to being costly, technical-scientific measurement is time-consuming.

Still regarding metrics, there are more barriers to overcome and shortcomings to correct so that Brazilian agriculture receives the international recognition it deserves. This concerns the source of the data used as the basis for Brazilian measurements.

It is the full professor of the Department of Soil Science at ESALQ/USP who warns: "Often, emission factors generated in Europe are used to evaluate tropical soils. In the Netherlands, for example, the soil is homogeneous, and the cold reduces the metabolic activity of microorganisms. Here, the dynamic is intense and never stops. When we use data borrowed from other countries, the result almost always works against us, since our biological efficiency under tropical conditions is higher than what these models suggest. In other words, we're using data that aren't suitable for our situations and data that usually penalize us. When we measure here, using our own data, it becomes clear that emissions here are lower than there."

And by addressing this bottleneck, new opportunities may arise; after all, in the tropical belt, many other countries face or will face the same challenge. This is one of CCarbon's objectives, as highlighted by Cerri: to share and exchange – with some adaptations – technologies and methodologies with countries in this tropical belt. As example, he mentions Australia, "from which Brazil imports knowledge and adapts it regarding sugarcane, while we transfer to them the development we have in the bioenergy sector, where we are among the most advanced in the world."

Another aspect is also highlighted by the director of CCarbon: focusing on carbon balance and not just on carbon footprint, since the footprint metric, widely used in industry, "focuses only on what was emitted to generate a product. For a factory, this makes sense, since it only emits. In the field, it's a two-way street: we emit, but we also remove. The balance is like a bank account: we want more coming in than going out. In the case of carbon, a negative result is our goal, as it means we sequester more carbon than we release into the atmosphere. This favorable balance for the environment is what ensures the true sustainability of systems such as no-till farming and integrated crop-livestock-forestry (ICLF)."

Among the immediate opportunities, the interviewee highlights the restoration of degraded pastures, since "a degraded pasture is a disservice: cattle expend more energy moving around than converting feed, and the soil releases carbon into the atmosphere. By restoring these areas, we create a virtuous cycle: healthy soil produces higher-quality grasses, the animal reaches slaughter weight much faster – drastically reducing methane emissions per kilogram of meat and produced – and we also free up space for other crops. It is estimated that if we restore half of Brazil's degraded pastureland, we will have more than enough land to expand soybean, corn, and forestry production with zero deforestation."

Looking to the future but acting now is an important recommendation, especially since the deadlines set by the UN SDGs for 2030 will need to be revised. For this reason, institutions such as CCarbon and the Intergovernmental Panel on Climate Change, in which Cerri has participated for over a decade, are outlining scenarios for 2050 and 2060, since nature's timeline differs from humanity's; a practice adopted today takes years to consolidate a new carbon stock in the soil.

"To reap the benefits of a harmonious system and an attractive carbon credit market down the road, we need to step up our efforts now. As the logic of planting goes: if you don't plant the tree today because it takes time to grow, tomorrow you'll still have no shade. We need to have started yesterday to ensure the resilience of our production system in the coming decades," warns one of the world's most influential climate scientists.

Integration boosts agricultural production while preserving the environment and generating income

In practice, this means integrated production systems, regenerative soil management, use of biological products, and environmental preservation within rural properties. The evolution of these concepts and technologies is growing and helps Brazil directly or indirectly feed hundreds of millions of people in different regions of the planet, consolidating its strategic role in global food security.

Even so, as Fernando Nauffal Filho, a consultant at the Agribusiness Research Development Foundation (Fundepag), points out, there is "a great deal of misinformation about how Brazilian agricultural production takes place, even abroad." The predominance of an urban population, with more than 80% of Brazilians living in cities, contributes to the distance between society and the countryside, which often leads to superficial perceptions of the production processes and environmental practices adopted in rural properties."

More than just a theory, integration is a practice that is becoming increasingly popular, even lending its name to methodologies for preservation and restoration of areas.

In Nauffal Filho's assessment, the country is at the forefront of sustainable practices applied to agriculture, especially with the advancement of regenerative agriculture. "The use of techniques such as no-till farming, inoculation of microorganisms, biological agents, and proper soil management reduces costs, decreases dependence on imported inputs, and contributes to emissions mitigation," he states. According to him, photosynthesis itself is one of the main allies in the fight against climate change, reinforcing the role of well-managed agriculture.

The Fundepag consultant also notes that the international market has been incorporating increasingly stringent environmental requirements, which makes sustainability a factor in competitiveness. "Today, meeting environmental criteria is not just a matter of image, but of market access and income generation. Producing sustainably allows farmers to add value and keep the forest standing," he notes, emphasizing: "In addition to large-scale production, experts highlight the importance of expanding communication about how Brazilian agriculture operates and accelerating the dissemination of technology, especially among small-scale producers."

Integration

During the Integration and Biocompetitiveness Forum: The Brazilian Solution, organized by ABAG and ILPF Network on March 2, 2026, Gustavo Spadotti, general director of Embrapa Territorial, reinforced the leading role of Brazilian science in advancing production systems: "We have Brazilian science, created by Brazilians, which today serves as a global benchmark. We have overcome genetic barriers in soybeans, promoted genetic improvements in livestock, and advanced productivity within a scientific and technological platform that connects research, the field, and the market."

According to the researcher, the circular economy acts "as a structural pillar of integration, and there is no one-size-fits-all solution for integrated systems." This view was echoed by Willian Marchió, executive director of ILPF Network, who stated that "adopting an integrated system requires a shift in mindset and technical planning. Achieving integration is not simple, but the results are extraordinary."

As example, Marchió highlighted that "ILPF Network's sustainable model is based on productive intensification with diversification of activities within the same area, promoting pasture restoration, improved soil fertility, increased carbon sequestration, animal welfare, and greater efficiency in the use of inputs."

In the same discussion, Monica Pedó, Sustainability Programs Manager at John Deere, assured that the industry is integrating "agronomic, digital, and operational knowledge to advance machinery development with greater efficiency and profitability for producers."

Regenerative agriculture: a growing practice

Sustainable production systems, sustainable intensification systems, and regenerative agriculture are synonyms for techniques that seek to restore ecosystem health while producing, unlike conventional agriculture, which focuses on productivity alone.

Leading these methodologies is Embrapa, which places recovery of soil at the center of regeneration. In this sense, it takes into account soil health and Biological Nitrogen Fixation (BNF), and its flagship regenerative initiative is the Crop-Livestock-Forest Integration (ILPF) system, which, by rotating crops and livestock, mimics nature's diversity, restoring degraded pastures and sequestering carbon.

These pillars of regeneration also serve as drivers of applied research. In the context of Soil Health, Embrapa has developed Soil Bioanalysis (BioAS) technology, an audit tool for regenerative agriculture defined as one of Embrapa's greatest innovations in recent years and which positions Brazil as a pioneer in the practice, as it was the first country in the world to include biological indicators in large-scale routine soil analyses.

This technology is the foundation of regenerative agriculture because it allows us to understand whether the soil is alive (biologically speaking) or merely serving as a chemical medium. It enables farmers to stop "guessing" and start measuring practices such as no-till farming and the use of biological agents to confirm that they are actually working. It is scientific proof that life is returning to the soil.

To do this, Embrapa-certified laboratories equipped with specific reagents analyze surface soil samples collected by farmers and compare the results with a database of reference soils from native forest areas in the same region.

The tests measure the enzymes arylsulfatase – linked to the sulfur cycle, which indicates the health of the microbiota in breaking down nutrients – and beta-glucosidase, related to the carbon cycle, which signals how quickly organic matter is being processed, with higher levels of organic matter retaining up to 20% more water.

These two enzymes function as bioindicators: if their levels are high, it means the soil is biologically active and healthy, focused on regeneration. If they are low, the soil may be chemically "perfect" in test tubes, but it is biologically dead or in the process of degradation, making it dependent on expensive fertilizers and vulnerable to droughts.

The benefits this technique brings to the farmer essentially include resilience to summer drought and increased fertilizer efficiency, since biologically active soils retain more moisture and help the plant grow deeper roots; on the other hand, biology unlocks phosphorus and potassium that are retained in the soil, allowing the plant to absorb more while using less and reducing dependence on imported inputs (NPK). This is reflected in production volume and the producer's bottom line, as crop losses are much lower during droughts.

Soil health, or the Soil Quality Index (SQI), is reflected in land prices, as healthy soil is a more valuable asset, ensuring sustainable long-term productivity. Furthermore, a high SQI transforms cropland from a CO_2 emitter into a CO_2 sequester.

Research on Biological Nitrogen Fixation (BNF), on the other hand, focuses on reducing the use of chemical fertilizers through the use of bacteria that capture nitrogen from the air – a historic milestone for Brazilian soybeans.

These recommended practices reinforce Brazil's leadership in tropical agriculture on the global stage. Based on the principle that "what is not protected cannot be regenerated," Embrapa promotes no-till farming, a technique that keeps the soil constantly covered with mulch, preventing soil disturbance and erosion; use of bio-inputs, with a view to gradually replacing pesticides and synthetic fertilizers with microorganisms and biological control agents; and pasture management, which prevents overgrazing, allowing the grass to recover its roots and aid in water infiltration.

Acesse
esgcooxupe.com.br

Cooxupé: ESG actions integrate from producer to final customer

A national reference in coffee farming and cooperativism, Cooxupé has been structuring its ESG actions – an acronym for Environmental, Social, and Governance, concepts that represent a set of criteria to evaluate companies beyond financial return – in a highly integrated way with the business, with initiatives spanning the entire coffee chain, from the producer to the final customer, which are made available on a specific website www.esgcooxupe.com.br.

One of the main pillars, reports Luiz Fernando dos Reis – Commercial Superintendent of Cooxupé –, is the Generations Sustainability Protocol (Protocolo de Sustentabilidade Gerações), which guides cooperative members in adopting good environmental, social, and economic practices. This protocol includes topics such as soil and water conservation, biodiversity protection, responsible use of inputs, traceability, legal compliance, and respect for labor rights.

Furthermore, "the cooperative member is accompanied by the Sustainable Production team, which acts directly on this journey, identifying opportunities for improvement and supporting the continuous evolution of the properties. It is worth noting that the Generations protocol undergoes third-party auditing, has equivalence with the sustainability code of the Global Coffee Platform (GCP), with MAPA's Good Agricultural Practices Program, and is included in the Standards Map, a tool of the International Trade Centre (ITC) that maps sustainability standards and the official technical regulations established by MAPA to ensure coffee quality," summarizes Reis.

Actions on the environmental front include projects aimed at cooperative families and internal actions within the cooperative; waste management initiatives, highlighting the disposal of coffee by-products, such as the reuse of green coffee dust in the production of organomineral fertilizers.

The results are many, such as the fact that, over the last six years, 52% of the coffee received by Cooxupé was under some certification or verification protocol.

"We act as a bridge, translating good practices such as traceability, transparency, and socio-environmental compliance into attributes that the market values. This is what allows us to access differentiated markets and programs that offer premiums," summarizes Reis, since, "in the end, the value is not just in the coffee, but in the entire consistent process behind it. In some cases, this translates into direct premiums, in others, into more stable commercial relationships and access to more demanding markets."

Regenerative agriculture, climate, and decarbonization

Regenerative agriculture and the conservation of natural resources have gained prominence in this cooperative, with incentives for practices such as sustainable soil management, recovery of degraded areas, and protection of springs. Among the projects are Cooxupé Regenerative Coffee Farming (Cafeicultura Regenerativa Cooxupé), Minas D'água, Delivering Clean Water (Entregando Água Limpa), and Water-Producing Coffee (Café Produtor de Água).

Specifically focused on climate and decarbonization, there are projects for measuring and reducing greenhouse gas emissions and encouraging practices that increase carbon sequestration in the soil, which includes collaboration to build a carbon balance calculation tool alongside Unicamp (University of Campinas).

"Our team is being trained to apply this tool in the field, supporting cooperative members in building action plans aimed at reducing emissions," informs Reis, highlighting the role – and recognition – of Brazilian coffee farming as part of the solution to mitigate climate change. As a perennial crop, combined with proper soil management and the adoption of good agricultural practices, it contributes to increasing the carbon stock in production systems.

Regenerative coffee farming, for Cooxupé cooperative members, is an evolution of the coffee grower's daily activities, developing an even more strategic view of the soil, the climate, and the future of production. The goal is "to produce coffee in an increasingly efficient way, but also more balanced, resilient, and prepared for future generations," defines the Cooperative's Commercial Superintendent.

"Everything starts with the soil. We encourage frequent analyses so that management is increasingly technical and balanced, ensuring productivity today, but also building fertility over time. In this sense, Cooxupé directly supports the cooperative member with its own laboratory for soil, leaf, and water analysis, offering this support at cost," after all – as Reis details – "soil cover is one of the main pillars, whether with cover crops or with the management of spontaneous vegetation between the rows, and it contributes to protecting the soil, improving water infiltration, maintaining moisture, and increasing organic matter, creating a more alive, resilient environment with a greater capacity to store carbon."

System integration, with the reuse of coffee by-products, such as husks, which return to the soil as a source of nutrients, complements the actions and applies the logic of the circular economy to the farm itself. This is supported by continuous technical assistance and the Generations Protocol, which guides and monitors this evolution in a practical way in the producer's day-to-day life.

There are also initiatives such as the Regenerative Coffee Farming project, which deepens these concepts by introducing tree corridors within the plantation, increasing carbon and biodiversity, helping with the area's biological balance, reducing the need for inputs, and opening up new value-generation opportunities, such as carbon credits.

Social and governance pillars

In the social pillar, the cooperative has a strong presence in training and technical assistance, promoting continuous training on good practices in labor relations, property management, and sustainability. Also noteworthy are actions aimed at valuing the producer, family succession, and strengthening rural communities. The cooperative supports the development of practical booklets aimed at the rural audience and holds events such as Knowledge Days (Dias de Conhecimento), which include lectures on labor relations, clarifying and guiding on labor regulations in the field. Regarding governance, Cooxupé operates with a focus on transparency and compliance, ensuring that its processes are aligned with market demands and national and international legislation; it uses the GRI standard in its Sustainability Report; participates in global initiatives and maintains partnerships with clients and international organizations, continuously strengthening its ESG commitments.

"In general, Cooxupé's ESG strategy is not isolated, but integrated into its operation and value generation for the cooperative member, connecting sustainability to quality, competitiveness, and market access," notes Reis.

Return on investment

The projects are offered free of charge to cooperative families, as part "of our role of technical support and sustainable development of the productive base," clarifies Reis, informing that there are also specific services charged, at cost, "with the goal of ensuring access to essential technical tools without burdening the producer, such as the use of our soil, leaf, and water analysis laboratory."

The remuneration of this investment "comes from value generation, and this starts in the field, but it does not end there. What the producer builds in the field, with sustainable and regenerative practices, needs to reach the market clearly and recognized," emphasizes Cooxupé's Commercial Superintendent, and warns: "At Cooxupé, we have a very strong work communicating the sustainability of Brazilian coffee farming and the high standards we follow, connecting this reality to the demands of clients, especially in the international market."

ILPF: a strategy for producer empowerment

ILPF is among the existing systems, and it is a production strategy that combines different production systems – agricultural, livestock, and forestry – within the same area, whether through intercropping, succession, or crop rotation, generating benefits for all activities.

Other examples include ILF (Agriculture-Forest Integration), IPF (Livestock-Forest Integration), and ILP (Agriculture-Livestock Integration). In any of these combinations, the methodology contributes to the recovery of degraded areas, increased productivity, and carbon sequestration.

The practice sustainably intensifies land use, protects and fertilizes the soil, promotes savings in inputs and consequent cost reductions, and simultaneously increases productivity within the same area, diversifying production and sources of revenue.

At the same time, the system is environmentally friendly, with low greenhouse gas emissions, and enables carbon sequestration, making the activity more resilient to climate change. Agricultural crops such as grains (soybeans and corn) and fiber crops (cotton) can be used in ILPF.

The livestock component primarily involves beef or dairy cattle, while the forestry component involves silviculture, with a focus, for example, on eucalyptus planting.

Furthermore, by promoting an increase in soil organic matter through the integration of agricultural and livestock activities, the System, in any of its forms, contributes to greater carbon absorption – in addition to the fact that planted forests also sequester carbon.

ILPF Network: 20 years and many achievements

With the goal of expanding the ILPF System through the dissemination of knowledge and technology transfer, the ILPF Network was formed in 2006 as an association resulting from a public-private partnership between Embrapa, Cocamar cooperative, and companies Bradesco, John Deere, Soesp, Syngenta, and Timac Agro.

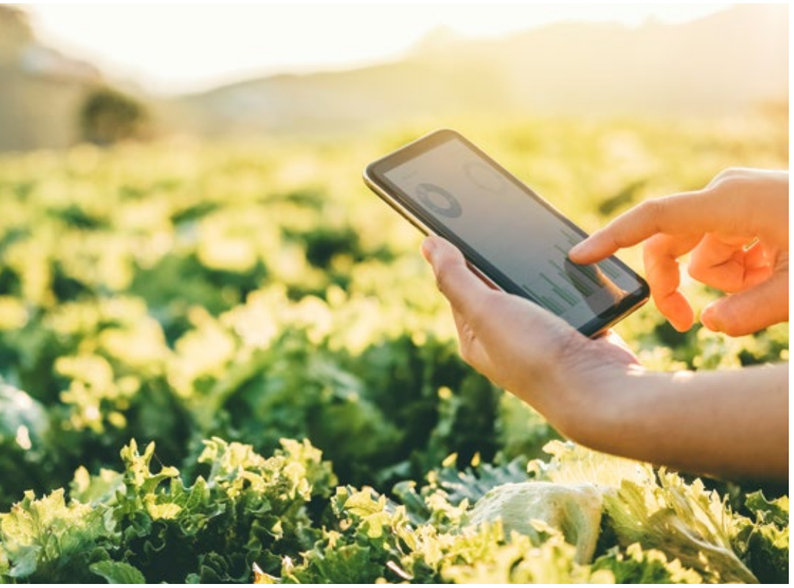
As Francisco Matturro, executive president of ILPF Network, explains, "in 20 years, the area covered by ILPF has jumped from zero to about 21 million hectares, with potential for the system to be implemented on more than 150 million hectares of pastures that exhibit some level of degradation."

The benefits listed by Matturro directly benefit rural producers, as – he assures –"Crop-Livestock-Forest Integration means emancipation of the producer. How so? Because there is short-term income from grain and cereal crops. There is livestock in the medium term and the forestry component in the long term."

ICLF (Integrated Crop-Livestock-Forestry) optimizes land and input use, uniting productivity and profit with low GHG emissions and greater climate resilience in the field.

As Francisco Matturro emphasizes, sustainability is only sustainable when the three pillars move forward together. "There is no environmental sustainability without economic sustainability. Producers need to see results to continue investing, preserving, and driving development in the regions where they operate," he states, explaining that "Brazil possesses unique characteristics that make it possible to produce more in less land, through soil cover, preservation of springs, and protection of riparian forests, which improves both productive and environmental efficiency."

"There is still significant room to expand technical knowledge and provide quality information to both producers and urban society, reducing misinformation and bridging the gap between the countryside and the city," adds Matturro.



Examples

Contrary to common belief, ILPF can be adapted to small, medium, and large properties across all Brazilian biomes.

Matturro highlights the transformation that ILPF has brought about, particularly in terms of cost reduction, productivity gains, and income diversification on two emblematic rural properties that have adopted the System.

At Santa Brígida farm, in the municipality of Ipameri (GO), the average yield of soybean crops grown in rotation with cattle has jumped from 2.7 tons per hectare to 4.4 t/ha over the course of about 20 years. "In the case of corn, the yield rose from five tons per hectare to 11 t/ha during the same period," notes Matturro.

At Campina farm, owned by Nelore Mocho CV group and located in Caiuá (SP), after eleven years of ILPF, as explains ILPF Network president, " the property now has five harvests per year: soybeans, corn, forage crops, calves, and the fifth marked by the straw left on the ground for the next cycle. This is in addition to the forestry component."

Under this agenda, ILPF Network develops programs called Integras in the states of São Paulo, Rio de Janeiro, Goiás, Paraná, Rio Grande do Sul, and Mato Grosso through technical cooperation agreements with state agriculture departments. In addition to these, at national level, it maintains Integra ABCZ, in partnership with the Brazilian Association of Zebu Breeders (ABCZ).

Integras programs include an extensive agenda of activities for knowledge dissemination and technology transfer among technicians, producers, and partner institutions through field days, lectures, training sessions, technical meetings, mentoring, etc., guided by the socioeconomic and environmental opportunities offered with the adoption of the ILPF System.

The programs also provide for coordination with financial institutions and strategic partners to facilitate access to financing lines with more attractive credit terms aligned with sustainable practices for rural producers implementing the ILPF System, as well as to promote access to differentiated markets, such as the low-carbon beef market.

Precision and digital agriculture: recognized efficiency

A path to efficiency, precision and digital agriculture is an irreversible reality in a country with internationally recognized technical expertise, production scale, and innovation capacity to lead this process globally. The challenge now is to expand access, integrate solutions, and transform data into value for the entire supply chain. This observation by Marcio Albuquerque, president of the Brazilian Association of Precision and Digital Agriculture (AsBraAP), is complemented by the 2025 assessment – a year that, he asserts, "established precision and digital agriculture as a strategic pillar of Brazilian agriculture."

Precision agriculture transforms by enabling greater production with fewer resources: fewer inputs, less environmental impact, and higher profitability. "It improves planning, reduces waste, increases operational efficiency, and raises the level of professionalism in rural management. It is a structural shift in how we produce food, fiber, and energy," explains the AsBraAP president.

Today, also in terms of precision and digital agriculture, Brazil ranks among the world's most advanced countries, "especially when considering scale, crop diversity, and tropical systems," asserts Albuquerque, noting that with the presence of technologies that underpin the discipline across various sectors – such as grains, sugarcane, and fibers – the country serves as a global benchmark. He emphasizes: "Our unique strength lies in applying technology across vast areas and in complex environments –something few countries can achieve."

The future lies in increasingly autonomous, intelligent, and integrated systems, in agriculture guided by real-time data, with increasingly precise and sustainable decisions. In this context, Albuquerque highlights "the use of artificial intelligence and machine learning, high-resolution remote sensing, the Internet of Things (IoT), agricultural robotics, autonomous machines, and predictive models based on climate and agronomic data."

Brazilian agriculture's conquest and retention of international markets also benefit from precision and digital agriculture, as the discipline serves as the technological foundation that supports and ensures growing compliance with technological requirements for traceability, quality, production efficiency, and environmental compliance, as well as data, transparency, and sustainability.

By enabling the measurement, reduction, and offsetting of emissions, it helps optimize fertilizer use, reduce fuel consumption, increase land-use efficiency, and support systems such as no-till farming and crop-livestock-forest integration, "making a concrete contribution to the agricultural decarbonization agenda," says Albuquerque."

Furthermore, precision and digital agriculture enable the adaptation of technologies to highly variable tropical conditions. It allows for a better understanding of soil, climate, and plants in complex environments, transforming scientific knowledge into practical application in the field. This strengthens Brazil's leadership in tropical agriculture.

Assessment and Outlook

"We have observed consistent growth in the adoption of tools such as yield maps, variable-rate application, telemetry, digital management platforms, and use of data for decision-making," explains Albuquerque, emphasizing that, "even in a scenario of tighter margins, producers have sought efficiency. For 2026, the outlook is for qualitative expansion: greater integration between systems, increased use of artificial intelligence, advances in automation, and expanded access to technologies for medium-sized producers."

In this context, the AsBraAP president highlights some key achievements: maturity of producers, who have come to view precision agriculture as an investment rather than a cost; data integration, with greater use of platforms; institutional recognition, with the topic increasingly present in public policies, credit lines, and sustainability agendas; progress in technical training and professionalization of specialized service provision.

International recognition of Brazil's expertise in the sector and the leading role of Brazilian innovation is further evidenced by the hosting of the 17th International Conference on Precision Agriculture (ICPA), organized by the International Society of Precision Agriculture (ISPA), taking place outside North America – specifically in Brazil – in parallel with the Brazilian Congress on Precision and Digital Agriculture (ConBAP), organized by the Association.

Connectivity in the field, however, remains a bottleneck, with a known solution but a complex equation to solve, as it requires a combination of "public policies, partnerships with operators, use of private networks, low-orbit satellites, and hybrid solutions. Connectivity must be treated as essential infrastructure for food production, just like roads and energy," summarizes Albuquerque, adding other aspects that still hinder access to the evolution of precision and digital agriculture: technical training and open standards for system integration.

Bioeconomy, biodiversity, biocompetitiveness: Brazil's solutions for the planet

Agribusiness makes Brazil a major green power, with unparalleled competitive advantages: diversified energy matrix, favorable climate, water availability, and enormous biodiversity. These characteristics, which give the country the capacity to meet demands related to food security and the energy transition, also allow Brazil to lead bioeconomy.

Many initiatives, best practices, technologies, and innovations enhance the competitiveness of Brazilian agriculture and complement the aspects presented earlier in this chapter. These include application solutions for pesticides and dual ethanol-diesel technology for heavy equipment, aimed at reducing diesel consumption while expanding the use of ethanol.

Integrated systems unite science and biodiversity to raise sustainable productivity with technology and biocompetitiveness.

However, much work remains to be done to transform these initiatives into strategic priorities, expand the adoption of sustainable practices and the integration of systems and technologies, promote public policies, increase productivity, and strengthen the entire supply chain through science-based practices.

"Biocompetitiveness is the natural consequence of an integrated, scientific, and well-structured system," said Luiz Carlos Corrêa Carvalho, vice president of ABAG, during the Integration and Biocompetitiveness Forum: The Brazilian Solution, organized by the entity in partnership with ILPF Network on March 2, 2026. According to him, Brazilian agriculture is facing a new reality that demands technical expertise and institutional innovation: "We are facing a new scenario, and to consolidate this new cycle, we need technical capacity, a more modern financial system aligned with the demands of the field, and, above all, integration among the links in the production chain. The integration of systems is the fundamental path to ensuring scale, sustainability, and competitiveness for Brazil."

The integration of systems, combined with Brazilian biodiversity and utilizing concepts from bioeconomy and biocompetitiveness, makes feasible the increase in productivity while reducing environmental impact and achieving significant results through the application of technology, modernization, and the scale offered by the industry, combined with science and research.

Below, Panorama Brasil Agronegócio presents some examples of bioeconomy in practice, as well as an article by Thiago Falda, Executive President of the Brazilian Association of Bioinnovation (ABBI), on the topic, presenting results, achievements, expectations, and needs.

ARTICLE

The Brazilian Bioeconomy in Transition:
Advances, Challenges, and Prospects

BY THIAGO FALDA –ABBI EXECUTIVE PRESIDENT - BRAZILIAN ASSOCIATION OF BIOINNOVATION

The year 2025 marked a decisive set of milestones for strengthening bioeconomy in Brazil, repositioning the country as a global leader in sustainability, biotechnological innovation, and energy transition. Regulatory progress, the structuring of public policies, and the consolidation of new governance frameworks laid the groundwork for a more predictable and competitive environment, driving investments and accelerating the adoption of low-carbon technologies.

The regulation of the Fuel of the Future Law symbolizes one of these structural changes. Decree No. 12,614/2025 established the National Decarbonization Program for Natural Gas Producers and Importers, defining biomethane mandates, responsibilities, and operational guidelines, while ANP resolutions improved the mechanisms for certifying origin. In the aviation sector, ProBioQAV advanced through MME Ordinance No. 879/2025, aligning the Brazilian market with international Sustainable Aviation Fuel (SAF) requirements and setting blending targets that will reach 10% by 2037. These developments consolidate legal certainty and signal demand, essential for the expansion of biorefineries and attraction of capital.

On the international stage, COP30 – held in Belém (PA) – marked Brazil's strategic repositioning. The country led the launch of the Bioeconomy Challenge, a global initiative aimed at standardizing metrics, expanding blended finance instruments, and harmonizing sustainability certifications. Another milestone was the presentation of the Biofuels Roadmap, a structural framework for technological pathways, standards, and targets for low-carbon fuels, reinforcing the country's role as a hub for transport decarbonization. At the same time, the National Bioeconomy Commission (CNBio) took an institutional leap forward with Resolution No. 7/2025, which established the National Bioeconomy Development Plan (PNDBio), comprising eight missions and 180 strategic actions to be implemented by 2035.

Despite these advances, the sector still faces significant bottlenecks that hinder its scalability. Among them we can include tariff and non-tariff barriers for bioproducts, lack of regulatory harmonization, absence of a universal taxonomy, limited international standardization of emissions certifications, and low valuation of environmental and social attributes. Structural challenges also persist: shortage of highly skilled labor, scarcity of non-reimbursable funds for research and development, and lack of a national R&D program specifically focused on the technological bottlenecks of bioeconomy.

Biotechnology serves as the central foundation of this transformation. Genetically modified plants and edited microorganisms offer higher productivity, resilience to climate stresses, pest resistance, and reduced use of chemical inputs. Bio-inputs and biological nitrogen fixation technologies decrease dependence on synthetic fertilizers and help decarbonize agriculture. At the same time, modern fermentation pathways enable the production of biochemicals, industrial enzymes, advanced fuels, and renewable materials, paving the way for new value chains.

In this ecosystem, Brazilian agribusiness emerges as a strategic force, accounting for approximately 25% of the national GDP. The country is a leader in the adoption of genetically modified crops, with adoption rates exceeding 90% for soybeans, corn, and cotton. Bioeconomy reinforces this leading role by delivering gains in efficiency, sustainability, and competitiveness. Technologies such as resistant seeds, beneficial microorganisms, and regenerative production systems strengthen the soil, minimize emissions, reduce costs, and foster an innovation ecosystem that integrates universities, companies, and agtech firms.

The development of bioeconomy depends directly on robust mechanisms for financing and incentivizing innovation. The FNDCT (National Fund for Scientific and Technological Development), through the 'Mais Inovação' program, disbursed over R$ 1.17 billion in 2024, supporting projects across the six missions of Nova Indústria Brasil. Public calls dedicated to sustainable aviation, bioeconomy, renewable energy, urban mobility, health, and agro-industrial chains, attracted thousands of proposals and approved strategic projects for the country's technological and industrial advancement. The Lei do Bem (Law of Good) remains another fundamental pillar, offering tax incentives to companies investing in R&D and fostering sectors traditionally linked to bioeconomy, such as food, pharmaceuticals, pulp and paper, and agroindustry.

At the same time, BNDES has intensified its role in green neo-industrialization: by June 2025, the bank had already approved R$ 220 billion in financing under the Nova Indústria Brasil program, of which R$ 21.9 billion was earmarked exclusively for innovation – the largest amount in the historical series. Of this amount, R$ 7.7 billion was directed toward projects in the biofuels sector, driven by the New Climate Fund. Infrastructure modernization and the strengthening of agricultural supply chains also received significant attention, with over R$ 5.8 billion approved under the Warehouse Construction and Expansion Program (PCA).

The trajectory of bioeconomy as a political and commercial agenda has advanced significantly in recent years. Although the concept is relatively recent, its foundations date back to decades of technological evolution – from fermentation processes to genetic engineering. The global milestone occurred in 2009 with OECD's report *The Bioeconomy to 2030*, which repositioned the topic as an economic strategy. In Brazil, institutionalization gained momentum starting in 2024 with the National Bioeconomy Strategy, followed by the work of CNBio and the prioritization of the topic within the G20.

The bioeconomy's impact on Brazil's decarbonization is decisive. In a country where nearly half of emissions are related to land-use change and only 18% to the energy sector, bioeconomy emerges as an indispensable pathway to achieving climate goals, which include reducing emissions by 53% by 2030 and reaching carbon neutrality by 2050. According to an ABBI study, integrated bioinnovation pathways could mitigate 550 million tons of CO_2 equivalent by 2050, generate $284 billion annually in industrial revenue, and attract over $132 billion in cumulative investments.

The diversification of production chains also includes emerging markets, such as alternative proteins, which surpassed R$ 1 billion in revenue in Brazil and is growing supported by plant-based technologies, fermentation, and cultured meat. This segment represents a natural extension of Brazilian agribusiness, expanding opportunities for value-added, sustainability, and innovation.

Against this backdrop, bioeconomy is establishing itself as a strategic driver to unite economic competitiveness, reindustrialization, energy security, and environmental preservation. Brazil possesses abundant biomass, scientific expertise, agroindustrial infrastructure, and growing political support. The challenge now is to accelerate the implementation of already established policies, overcome historical bottlenecks, and scale up biotechnological solutions – consolidating the country as a global leader in the low-carbon economy.

Regulation of the biofuels sector contributes to development

"The expansion of Brazil's biofuel sector is driven by the regulatory framework that has been established, which provides legal certainty and predictability," says Jerônimo Goergen, chairman of the Brazilian Biofuel Producers Association (Aprobio). It will have a direct impact on regional development, job creation, and value addition to agricultural supply chains, reinforcing biodiesel's role as a link between energy and agribusiness.

Brazil, which ranks second globally—according to analyses by the International Energy Agency—alongside the United States, with Indonesia positioned as the largest producer and consumer of biodiesel, stands out for "the combination of agroindustrial scale, a significant industrial base, and structured decarbonization policies," emphasizes Goergen, listing among the positive aspects of public policies for the sector the blending mandate—particularly the one defined in the Fuel of the Future Law—which creates a foundation of demand and scale for the sector.

For the chairman of Aprobio, "The ANP regulation upholds quality standards and market confidence. However, bottlenecks still exist, particularly regarding the stability of the blending schedule and the need to combat distortions in the fuel market. Aprobio has been working institutionally to strengthen integrity mechanisms, expand dialogue with the government and consumers, and ensure that the advancement of biodiesel occurs with technical and economic safety.

RenovaBio (National Biofuels Policy)—a Brazilian policy established by Law No. 13,576/2017, to stimulate the production and consumption of renewable fuels, such as ethanol, biodiesel, and other biofuels—is an instrument for decarbonizing the transportation energy matrix, fulfilling the goals of the Paris Agreement, which covers various sources, such as sugarcane, corn, soybeans, palm, and others, thus promoting energy security and sustainability. Among other aspects, it allows certified biofuel producers to issue decarbonization credits (CBIOs), which are purchased on the financial market by fossil fuel distributors to meet their targets, thereby compensating clean fuel producers.

Another federal certification is the Social Biofuel Seal (SBS), granted to biodiesel producers who source a percentage of their raw materials from family farms, ensuring social inclusion and regional development. It requires contracts, technical assistance, and the payment of minimum prices to farmers. Today, more than 70,000 families benefit from the program.

Biodiesel directly contributes to the country's emission reduction targets by replacing part of the imported fossil diesel in the energy mix, utilizing existing infrastructure, and generating an immediate impact, as outlined in the Paris Agreement.

The gradual expansion of the mandate amplifies this effect, while integration with other biofuel pathways strengthens the national energy transition strategy. The sector works to ensure quality, traceability, and efficiency, demonstrating that decarbonization can go hand in hand with economic competitiveness and regional development.

Bioeconomy in practice: three inspiring projects

The Brazilian Geological Survey's (SGB) Geobiodiversity Project, Melhoramentos' initiatives to preserve forests, springs, and species of fauna and flora; and Agropalma's experience are projects that demonstrate the benefits of bioeconomy, biodiversity, and biocompetitiveness, proving the role of Brazilian agribusiness in reducing GHG emissions and sequestering carbon in the soil.

Reality shows that bioeconomy is gaining increasing prominence in global discussions on sustainable development, and in Brazil, "it is understood as a development model based on the sustainable use of biological resources, integrating science, technology, and traditional knowledge to generate economic value while promoting environmental conservation and social inclusion," summarizes Túlio Dias Brito, Agropalma's Sustainability Director.

There is no shortage of approaches, but they are not always replicable, no matter how simple they may seem– which does not mean they are easy. "The initiative is marked by a consistent bioeconomy agenda based on the sustainable use of renewable resources, integrating environmental conservation, innovation in biomaterials, and value creation for surrounding communities," states Rafael Gibini, CEO of Melhoramentos.

Bioeconomy: a comprehensive equation that brings together biotechnology, bioindustry, and production chains linked to sociobiodiversity.

In other words, the complexity of the subject is proportional to its scope; after all, the concept involves different dimensions: from biotechnology and bioindustry to production chains linked to socio-biodiversity.

For this reason, according to experts, Brazil's potential is undeniable, just as the potential of the Amazon, for example – a context in which Agropalma operates. But this potential is also present in major urban centers, such as the states of São Paulo and Minas Gerais, where Melhoramentos is headquartered and focuses its operations, also delivering highly significant results.

SANSUY

Investimento em portfólio de produtos e ampliação da capacidade produtiva marcam os 60 anos

Diversificação de atuação em segmentos do mercado nacional e internacional, ao lado de investimento constante em novas tecnologias para melhor atendimento do mercado de acordo com a demanda fundamentam os valores da Sansuy desde o início de sua operação em 1966.

Fundada por imigrantes japoneses dedicados à agricultura, a atividade inicial envolvia a fabricação de mangueiras de PVC flexíveis. A forte conexão com o agronegócio brasileiro, com diversas soluções para as atividades rurais, foi mantida ao longo dessas seis décadas, consolidando a empresa como uma das principais transformadoras e fabricantes brasileiras de produtos manufaturados de laminados e lonas, base de PVC.

Hoje, fornece diversos produtos, tais como cobertura e armazenamento de grãos, milho, soja, algodão e cavaco de madeiras, geomembranas para impermeabilização e armazenamento de água para irrigação, biodigestores para produção de biogás, diversas opções de tanques estruturados para criação de peixes e produção de biofertilizantes, produtos para armazenamento de água potável, como cisternas rurais, tanques flexíveis adaptados a veículos automotores para transporte e tanques flexíveis estacionários de diversas capacidades de líquidos.

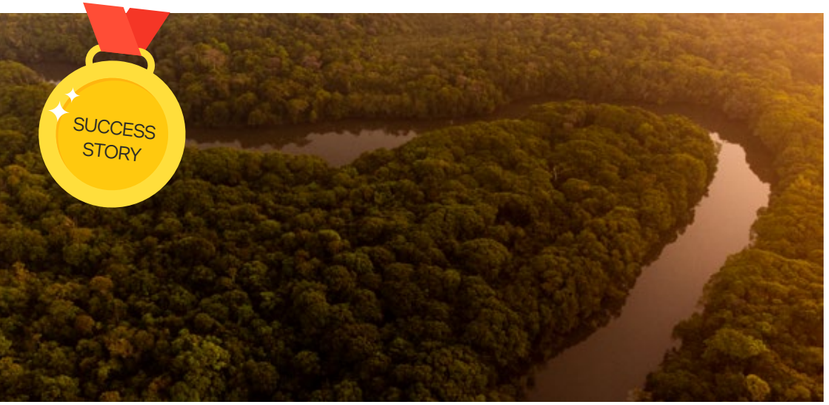
A empresa tem soluções de produtos manufaturados de PVC para o mercado de logística e transportes, oferecendo galpões lonados de diversas dimensões, lonas para cargas envolvendo transportes em implementos rodoviários, ferroviários e fluviais, produtos voltados à diversas áreas, como agrícola e mineração.

A Sansuy registra participação importante no mercado automotivo, envolvendo fornecimento de produtos para revestimentos de bancos, portas laterais e quebra sol, para montadoras e sistemistas homologados pelas montadoras, desde tratores, caminhões, caminhonetas, colhedeiras, semeadeiras, pulverizadores, automóveis, ônibus, furgões etc.

Destaque também para a atuação no mercado de lazer e decoração, com produtos para revestimentos de piscinas e paredes, e no mercado de calçados fornecemos materiais para confecção de calçados desde linha infantil, juvenil e adultos.

Desafios fazem parte do dia a dia dessa empresa e não impediram a continuidade de investimentos estratégicos, atendendo as novas demandas de mercado, meta que também vem norteando as ações em 2026, quando a empresa está direcionando recursos para aumento da capacidade produtiva e oferta de novos produtos para diversos mercados.

Dos planos da empresa, segundo sua Diretoria, além da busca contínua de "manter a referência e liderança nos segmentos de mercados que atua, com desenvolvimentos e crescimento sustentável", faz parte "criar continuamente lideranças para consolidar o processo de sucessão, aprimorando os diferenciais dos produtos e serviços, reconhecidos pelos clientes, como inovação, tecnologia, qualidade, durabilidade e segurança, além de atendimento com comprometimento e responsabilidade."



CASE 1

Integrated bioeconomy connects innovations from the field to industry

Founded in 1982 in the municipality of Tailândia, in Pará, Agropalma has a long-standing and long-term commitment to sustainability and the socioeconomic development of local communities. For over two decades, the company has implemented pioneering projects that combine productivity, environmental conservation, and socioeconomic development, proving the viability of the bioeconomy in the Amazon region.

A major milestone of this commitment is the strict no-deforestation policy, adopted since 2002, when, in addition to environmental stewardship, Agropalma innovated in the social pillar by launching the Family and Integrated Farming Program, focused on strengthening local communities and small-scale producers.

Another highlight is Somar, implemented in 2023 in partnership with the Earthworm Foundation Brasil and with support from Peabiru Institute. The initiative seeks to establish a transparent and collaborative dialogue between the company and stakeholders, with the goal of promoting forest and biodiversity preservation, as well as the region's economic and social development through relationships built on trust and joint solutions to local needs.

Integration

André Gasparini, Agropalma's Sales, Marketing, and R&D Director, explains that "Agropalma's approach to bioeconomy is integrated, connecting innovations from the field to the industry. One of our greatest recent achievements was the replacement of fossil fuels with wood biomass in boilers at our refinery in Limeira (SP), enabling an estimated reduction of over 13,000 tons of CO_2 per year."

The initiatives listed by Gasparini go even further, as, still within the industrial scope, he highlights "the resumption of our biodiesel production with the inauguration of a new plant in Pará. The plant is the first in the state to use 100% enzymatic technology, transforming waste and byproducts from palm oil extraction and refining process into clean energy. This initiative reinforces our commitment to the circular economy and will prevent the emission of approximately 39,000 tons of CO_2 per year into the atmosphere."

In the field of biotechnology, it is worth noting the opening of the clonal seedling laboratory in Belém (PA). "With investments already exceeding R$ 18 million, we are developing high-performance seedlings that consume 18% less potassium and reduce total fertilization costs by 10%," sums up the company's Sales, Marketing, and R&D Director, adding to these initiatives agricultural efforts that consolidate the use of "Nature-Based Solutions in our planting areas in Tailândia (PA), where we cultivate leguminous and nectar-producing species among the palm trees to nourish the soil and attract beneficial insects to the crops. "We also maintain our own laboratory for breeding a native species of predatory bug released into the field for biological pest control, such as the defoliating caterpillar."

These innovations go hand in hand with initiatives to boost the local economy, "ensuring the purchase, at fair prices, of 100% of the fruit grown by the families in our family farming program –they also receive access to the best planting materials and agricultural inputs, as well as advice, technical support, and ongoing training on sustainability practices and legal requirements," emphasizes Gasparini.

According to Brito, the company operates "a production chain based on renewable resources and seeks to reconcile agricultural production, forest conservation, and local development. Over the years, we have also established traceability systems and adopted internationally recognized socio-environmental certifications, which help bring transparency and credibility to our operations. In a way, this combination of responsible production and land conservation aligns directly with the principles that guide bioeconomy today."

In the quest to integrate bioeconomy initiatives, the challenges are constant and varied. Agropalma's Sustainability Director lists climate issues among the main challenges faced by the sector in northern Brazil, "which have caused severe droughts and instability in rainfall patterns. These extreme conditions directly impact operations, leading to a drop in palm oil productivity."

"To address this challenge, we carried out an internal reorganization to ensure the company continues to fulfill all its contracts and maintain uninterrupted deliveries to customers, demonstrating strong resilience in the face of climatic adversities. Additionally, we use management techniques, such as intercropping nectar-producing and leguminous species, which contribute to soil moisture retention and the balance of the agricultural ecosystem," explains Brito, noting that "our investment in genetic improvement with clonal seedlings has also been fundamental, as it allows us to grow plants with greater adaptability and drought tolerance."

A thorough understanding of the territory, the populations that inhabit it, and the available biological assets is Brito's recipe for developing projects that respect ecological limits and value local social characteristics. From there–he assures–certain elements tend to be decisive for these projects to take root. Sound technical and environmental planning, compliance with legislation, and the development of business models that can generate economic value and foster inclusion in a sustainable manner are among these elements.

Agropalma's Sustainability Director also highlights the integration of scientific knowledge, innovation, and traditional wisdom: "In many cases, local communities already possess deep knowledge about the territory's natural resources, and this dialogue can generate very interesting solutions. Finally, I believe that bioeconomy projects gain momentum when they can establish transparent supply chains with traceability and clear metrics for socio-environmental impact. This has been increasingly valued by the market and consumers. At its core, bioeconomy represents precisely this search for new paths of development that reconcile income generation, nature conservation, and the strengthening of local economies."

Sustainability is (also) about people

At Agropalma, sustainability is a business premise, assures Agropalma's Sustainability Director. He backs up his statement by noting that "through our Forest Protection Program, we have preserved 64,000 hectares in the Amazon region, which corresponds to approximately 60% of the company's total land area, allocating around R$ 2 million per year to forest surveillance."

Furthermore–Brito adds–biodiversity preservation is also the result of partnerships such as the one maintained for over 18 years with Conservation International, which contributes to the monitoring of more than 1,000 species of wildlife and has already helped protect around 40 endangered species.

The executive also highlights social initiatives, such as the Family Farming Program, a project that "demonstrates that sustainability is also built with people. Today, the initiative has more than 500 partners, including family farmers and integrated producers, promoting consistent and lasting growth in these families' incomes."

The bioeconomy's main contribution is to demonstrate, in practice, that the economic development of agribusiness and the preservation of the forest can go hand in hand.

Agropalma's experience in the Amazon proves that oil palm, when cultivated based on science, environmental respect, and community inclusion, can become a key tool for restoring degraded areas, boosting local economies, and sequestering carbon.

By investing in and leading this business model, the private sector contributes to consolidating Brazil's environmental leadership, demonstrating that Brazilian tropical agriculture is a true engine of sustainable innovation and generation of shared value.

AGROPLAMA
RESULTS AND OUTLOOK

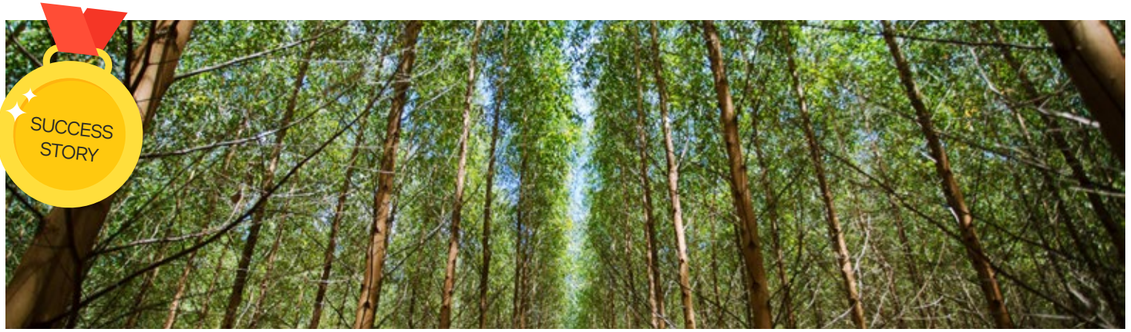
In 2025, the sector produced 78.4 million tons of palm oil, and the global outlook for the 2026 harvest is quite positive. According to USDA data, global production is expected to increase by 3% compared to the previous harvest, which should raise the total volume to over 80 million tons.

Domestically, Agropalma is keeping pace with this trend, maintaining a consistent production rate while reinforcing traceability and sustainability as strong pillars supporting this evolution.

Bioeconomy is the key pillar enabling Agropalma to operate as a carbon-negative company. The oil palm crop itself acts as a powerful climate mitigation tool: each cultivated hectare absorbs approximately 6.32 metric tons of CO_2 equivalent per year. Considering the plant's 25-year productive lifespan, this sequestration can reach 158 metric tons of CO_2 per hectare.

Complementarily, our industrial operations are advancing in energy efficiency. One example is the reactivation of our biodiesel plant in Belém, which could prevent the emission of 39,000 tons of CO_2 equivalent per year.

The combination of these initiatives supports our goal of reducing operational emissions by 50% by the end of 2030.



CASE 2

Native forests and high conservation value forests generate income and benefits for the surrounding area

Approximately 50% of the areas are dedicated to environmental preservation, including native forest areas, PPAs (Permanent Preservation Areas), and high conservation value forests, which corresponds to 79 million m² of a total of 152 million m² (or 15,200 hectares) of forested areas in the states of São Paulo and Minas Gerais. This is the reality of Melhoramentos, a company founded in the mid-1890s with the noble goal of bringing progress and improvements to the city of São Paulo (SP). Today, it is a publicly traded multi-business company that controls companies in forestry cultivation and management, high-yield pulp fiber manufacturing, publishing, and real estate development sectors.

Of the protected area, 27.3 million square meters are classified as High Conservation Value Forests (HCVF). In addition, the company protects 819 water springs in its properties and maintains Parque Levantina Private Natural Heritage Reserve (RPPN). Ongoing monitoring has already cataloged more than 200 species of fauna, demonstrating the effectiveness of the Atlantic Forest biome's preservation.

The value of Melhoramentos' environmental assets guarantees it more than 3 million tons of carbon stock in its forests. However, Gibini acknowledges that, "although the company rigorously quantifies its carbon emissions and removals (having recently completed its first audited Scope 3 inventory), current public information does not detail the active trading of carbon credits in the voluntary or regulated market. The current strategy focuses on using this positive carbon balance to offset emissions from its own production chain and add environmental value to its bioproducts (such as Biona), offering low-carbon solutions to other industries."

CARBON STOCK IN FORESTED AREAS (TCO2E)	
Stock in planted forest areas	1,588,373.74
Stock in areas of native vegetation	1,412,673.41
Total forest carbon stock	3,001,047.15

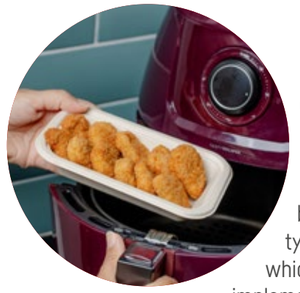
The company's programs are carried out in the two states where it has physical presence: São Paulo and Minas Gerais, at facilities in Caieiras (SP), Bragança Paulista (SP), and Camanducaia (MG). "The main difference lies in the industrial focus and the local characteristics of each facility," Gibini assures.

The company's forestry activities are certified by FSC (Forest Stewardship Council), an international recognition, obtained in 2011, that attests to exemplary practices in responsible management, conservation of native forests, and adherence to environmental and social criteria. It also maintains "B Corporation" certification, issued by the nonprofit organization B Corp, increasingly integrating the ESG (Environmental, Social, and Governance) agenda into its business model and risk management.

For example, as a recent development in its nursery and forest portfolio, Melhoramentos has entered the market for the sale of clonal eucalyptus seedlings, expanding production by 1 million units per year to meet internal demand and market needs, with expectation of more productive and fast-growing forests, adaptable to different climatic conditions.

The CEO of Melhoramentos comments that "one of the pillars of this strategy is the preservation of the natural foundation that sustains this production chain. The company voluntarily created the Private Natural Heritage Reserve in Mantiqueira Mountains, the fifth largest in the state of Minas Gerais and one of the largest in Brazil. This initiative ensures, in perpetuity, preservation of approximately 23 million square meters of Atlantic Forest, equivalent to about 2,300 soccer fields, contributing directly to the protection of springs, waterways, fauna, flora, and all local biodiversity. The maintenance of ecological corridors in the area has facilitated the reappearance of rare and endangered species, such as the southern muriqui, considered the largest primate in the Americas, recorded in Parque Levantina RPPN area."

At this company, forest management is fully integrated. Its reforestation activities (particularly Eucalyptus sp.) ensure the sustainability of the entire production process, which ranges from seedling production in its own nurseries, through planned planting, to timber harvesting and the production of high-yield fibers at its industrial facility.



Getting to this point also required overcoming challenges. According to Gibini, the main bottlenecks overcome throughout this process included "the need to balance high industrial productivity with environmental conservation, which was addressed through the implementation of mosaic planting, the use of monitoring technologies (drones and satellites), and full utilization of forest residues for energy generation (biomass), thereby reducing operational costs and waste."

Applied Bioeconomy

In this regard, initiatives in applied bioeconomy include, for example, Biona, which refers both to the company's factory dedicated to sustainable solutions and to the name of the line of compostable packaging developed by the company from cellulose fiber, replacing single-use plastic and promoting circular economy, with reduced environmental impacts throughout the production chain. They are compostable in 75 days, among other benefits, and the production capacity is 60 to 80 million units per year.

The company also adopts practices for full utilization of forest resources. Another key focus is the use of forest residues. The company transforms wood harvesting residues into biomass chips, used for thermal energy generation in partnership with Salmeron Energia, reducing dependence on fossil fuels. In addition, tree barks removed during the fiber production process is returned to the forest, playing an important role in soil conservation, moisture retention, and nutrient cycling, contributing to the maintenance of forest productivity and ecological balance.

Socioeconomic impacts on the surrounding area

Melhoramentos' initiatives generate direct social and economic impacts on the communities of Camanducaia (MG), Caieiras (SP), and Bragança Paulista (SP). In the area of education, the company has maintained the Alice Weiszflog Private Rural School for 78 years, which provides free education to children in the community from preschool through ninth grade, in partnership with Camanducaia municipal government, in addition to offering craft workshops for families.

The company also maintains the Alfried Theodor Weiszflog Community Library, with over 5,000 books, and conducts awareness campaigns, such as forest fire prevention; to boost income, it has created projects like Cata do Pinhão, which allows residents of the region to collect and sell pine nuts, generating sustainable supplemental income and valuing the resources of the standing forest; and Melhor Mel, which encourages the establishment of apiaries in partnership with local producers, stimulating honey production, pollination, and diversification of rural income.

MELHORAMENTOS
UNITS AND ACTIVITIES

Melhoramentos' main conservation actions include the creation of ecological corridors that connect forest fragments, allowing for the safe movement of wildlife; implementation of mosaic planting, which alternates productive areas with permanent preservation areas (APP) and legal reserves; maintenance of specific protected areas, such as RPPN Parque Levantina; and continuous biodiversity monitoring by biologists, which ensures the protection of endangered species, such as the southern muriqui monkey.

Forest management and FSC certifications are applied uniformly across all units, but each has its own focus. Camanducaia (MG) is Melhoramentos' main industrial and innovation hub. It is home to the high-yield fiber mill, the new Biona packaging plant, and Parque Levantina RPPN, in addition to hosting projects with significant community impact, such as Alice Weiszflog School and the Community Library.

Caieiras and Bragança Paulista (SP), on the other hand, are units with strong focus on forest management, silviculture, and environmental conservation. Projects such as Melhor Mel (apiaries) and forest fire prevention campaigns are implemented in these regions, adapting to the needs of local rural communities.

The impact of these actions is measured using rigorous environmental, social, and economic indicators through periodic audits to maintain FSC and B Corporation certification, in addition to publishing an annual Sustainability Report following the guidelines of the Global Reporting Initiative (GRI) and SASB indicators. Results are measured by metrics such as: volume of greenhouse gas emissions (recently including the audited Scope 3 inventory), tons of carbon stored in forests, number of protected springs, hectares of preserved native areas, and the impact on reducing the carbon footprint of new products.

The measurement of the projects' impact on carbon sequestration is conducted by the consulting firm Planton, following the guidelines of ISO 14067, ISO 14040, ISO 14044, and the GHG Protocol framework. This study, for example, demonstrated that Biona packaging emits 43.5% less CO2 compared to polypropylene (PP) plastic. In addition, the company's carbon removals far exceed its operational emissions.

What's more: in addition to traditional inventory controls, the company has adopted a forest monitoring and inventory system that uses artificial intelligence and Internet of Things devices, featuring digital maps integrated with cloud-based data collection and processing application, high-frequency automatic measurements, and mathematical models to support management decision-making – such as species selection, fertilization, and spacing.

CASE 3

Geodiversity highlights the sustainability of agricultural production under irrigated management

Assisting agricultural producers with information that can help improve their production, generating maps of irrigation suitability, soil resistance to various environmental impacts, and agricultural suitability. This is the objective of the Geobiodiversity Project of the Brazilian Geological Service (SGB), a mixed-economy enterprise whose name originates from the Mineral Resources Research Company, linked to the Ministry of Mines and Energy,

As detailed by Raimundo Almir Conceição –SGB researcher, and executive coordinator of the SGB Geobiodiversity Project – the project constitutes "a public policy tool based on the characteristics of rocks, soils, and topography applied to various purposes, including agriculture. The project is carried out throughout Brazil and in areas suitable for agriculture, such as fruit-growing and irrigation hubs."

In general terms, the irrigation suitability map is one of the outputs of geodiversity and serves as a planning strategy to assess the viability and sustainability of agricultural production under irrigated management. It also allows for verification of the availability of soils and water suitable for irrigation, aiding in agricultural land-use planning to meet the water demands of crops of interest to agribusiness and family farming.

The maps cover a region or several cities and already yield results, according to the project's executive coordinator. "With the support of agricultural engineers affiliated with universities or Embrapa, SGB is able to suggest some recommended uses," Conceição emphasizes, listing the findings and explaining that the Fruit Growing Hubs for Linhares, Jaguaré, and Sooretama are still in the final stages of completion and will be published shortly. In addition, SGB is studying the possibility of expanding to other agricultural regions of the country .

In Petrolina and Lagoa Grande, for example, most of the study area presents favorable or minimally viable conditions for irrigated management (about 75%). In the remaining areas, limiting factors include stoniness, lower effective depth of some soils, sandy texture, permeability constraints, and soils affected by salts.

In Caminhos dos Cânions do Sul Geopark, however, the soil generally has good agricultural potential, provided that the suitability of each area with its different soil types is respected, since "some areas with shallow soils or low fertility are more suitable only for pasture production," notes the project coordinator.

In Livramento de Nossa Senhora and Dom Basílio (BA) Fruit Growing Hub, meanwhile, the study focused on identifying rocks with potential for use as riprap; while in Baixio da Boa Vista region (BA), the area – comprising two municipalities (Itaguaçu da Bahia and Xique-Xique) – is home to Baixio de Irecê Project, also known as Baixio da Boa Vista, with a focus on Baixio de Irecê irrigation hub.

Definition

The definition of these areas is directly linked to the economic significance of these regions. Fruit growing is the focus of three hubs: Petrolina; Linhares, Jaguaré, and Sooretama; and Livramento de Nossa Senhora and Dom Basílio (BA), one of the most significant in the state.

In the first case, Petrolina, which "is one of Brazil's main fruit-producing hubs (grapes, mangoes, bananas, among others), is characterized by its significant role in exports and in supplying the domestic market outside of the harvest season in the South and Southeast regions," while Linhares, Jaguaré, and Sooretama Fruit-Growing Hub "concentrates the production of tropical fruits that supply the domestic market and local processing chains, generating income for small and medium-sized producers and boosting trade and logistics in the region," reports Conceição.

Caminhos dos Cânions do Sul Geopark, on the other hand, as Conceição explains, "combines protection of geological heritage with nature conservation, local development, and environmental education. In this case, one of the focuses is territorial planning and governance, promoting cooperation among municipalities, conservation units, universities, and the private sector for integrated management and responsible visits."

Since the project's main objective is the agricultural development in the semi-arid region, aiming to keep people on the land, increase the income of rural families, expand agricultural production, encourage the establishment of agro-industries, and make use of the region's fertile lands, making them productive through irrigation, Baixio da Boa Vista (BA) – reports the project coordinator – covers an area of approximately 1,000 km² divided into three zones based on land use: one designated for conservation; a second consisting of non-fertile lands; and the third and main zone, divided into plots for small-scale farmers, medium-scale farmers, and companies.

Return to municipalities

In agriculture, understanding the potential of land for irrigation is a strategy adopted to verify the availability of suitable soil and water for irrigation, making the use of this technology viable and optimizing investments. Thus, the project contributes to understanding the limitations and potential of land that may affect agriculture, such as water availability, vulnerability, and agricultural suitability.

3

INFRASTRUCTURE FOR THE NEW GREEN REVOLUTION

Infrastructure.

Science and Embrapa.

Storage.

Logistics.

Irrigation.

Connectivity.

Sustainability.

Labor.

To achieve the New Green Revolution, infrastructure needs improvements

Over the past 50 years, Brazilian agriculture – and the agribusiness sector as a whole – has made significant strides, exponentially increasing productivity, quality, profitability, and technological development. However, to meet the goal of feeding the world and comply with the Organization for Economic Cooperation and Development (OECD)'s call to increase current production by 40% within ten years, Brazil needs significant infrastructure improvements.

The main weaknesses include storage, irrigation, connectivity, and logistics, among other bottlenecks that affect the productivity and profitability of rural activities. The ways to mitigate losses and expand infrastructure in these areas are known, the technology is available, but investments are lacking.

There are many stakeholders in the process; that is, overcoming these challenges does not depend solely on rural producers having access to credit lines with attractive and feasible interest rates, but, as the Brazilian Agribusiness Association (Abag) points out, it requires an integrated agenda of investments, innovation, and consistent public policies, as well as legal certainty.

The solution combines science, general infrastructure, storage, transport modalities (or transport modes), irrigation, and connectivity.

Partnerships between public and private sectors, appropriate regulatory frameworks, and investment incentives are considered by Abag to be essential for accelerating infrastructure modernization and reducing losses throughout the production chain.

The assessment of storage, irrigation, and connectivity in this chapter of Panorama Brasil – Agribusiness is provided by industry stakeholders. In the case of sustainability –in addition to various examples highlighted throughout the publication's chapters, an industry-developed model serves as benchmark for efficiency in the circular economy.

Complexo Industrial Japy - Guaxupé MG

Cooxupé é referência no cooperativismo brasileiro e na cafeicultura mundial

Com mais de 90 anos de atuação, cooperativa é a maior exportadora de café arábica do Brasil

cooxupé

A Cooxupé caminha rumo ao centenário no cooperativismo brasileiro, com trajetória consolidada no mercado nacional e internacional. A força cooperativista vem dos mais de 21 mil produtores cooperados.

Em 2025, o faturamento da Cooxupé alcançou R$ 16,99 bilhões, gerando R$ 470,3 milhões em resultados e distribuição de R$ 185,6 milhões em sobras para as famílias cooperadas. Todos esses resultados são recordes.

No ano passado, a Cooxupé recebeu 6.075 milhões de sacas de café verde tipo arábica, das quais 4.8 milhões foram entregues por seus cooperados. A cooperativa é, também, líder brasileira na exportação de café arábica, segundo o CECAFÉ. Em 2025, os embarques somaram 6.078 milhões de sacas de café, sendo 4.8 milhões para as exportações e 1.2 milhão para o mercado interno. A Cooxupé exporta para 50 países em cinco continentes.

PERFIL DOS COOPERADOS

A agricultura familiar predomina o perfil dos cooperados da Cooxupé, sendo 97,6% dos cooperados são mini e pequenos produtores. Já os médios, grandes e megas representam 2,4% desse universo. A produção dos cafés vem das regiões do Sul e Cerrado de Minas Gerais, média mogiana do estado de São Paulo e Matas de Minas, englobando mais de 360 municípios.

MAIS SOBRE A COOXUPÉ

A estrutura de armazenagem é para mais de 6 milhões de sacas de café. Além disso, a cooperativa mantém laboratórios de controle de qualidade e análise de folha e solo; Centro próprio de Distribuição, três unidades industriais, incluindo o Complexo Japy.

GERAÇÕES: O PROTOCOLO DE SUSTENTABILIDADE DA COOXUPÉ

Implantado em 2022, o "Gerações" é o programa de sustentabilidade da Cooxupé, que inclui as diversas realidades dos produtores cooperados. O protocolo já foi validado pela Plataforma Global do Café (GCP) como equivalente ao seu Código de Referência de Sustentabilidade e, também, obteve o reconhecimento oficial do Ministério da Agricultura e Pecuária (MAPA) como Programa de Promoção de Boas Práticas Agrícolas. Em 2025, a Cooxupé foi eleita a campeã em Sustentabilidade pelo Prêmio Melhores do Agronegócio 2025.

TORREFAÇÃO PRÓPRIA

Em atividade há 41 anos, a Torrefação Cooxupé está presente no varejo de Minas Gerais, São Paulo, Rio de Janeiro, Mato Grosso, Paraná, Santa Catarina e Rio Grande do Sul.

HISTÓRICO

Fundada em 1932 como cooperativa agrícola de crédito, foi transformada na Cooperativa Regional de Cafeicultores em Guaxupé no ano de 1957, quando iniciou as atividades de recebimento, processamento e comercialização de café.

THEMATIC PAGES

- Family Farming
- Agroecology and Organic Production
- Food: safety, nutrition, and health
- Amazon
- Automation and Precision Agriculture
- Bioeconomy
- Meat
- Biological control
- Living with drought
- Biological nitrogen fixation
- Forests
- Geotechnologies
- Crop-Livestock-Forest Integration
- Matopiba
- Cultivar market
- Nanotechnology
- Food Loss and Waste
- Fisheries and Aquaculture
- Weeds
- Quarantine pests
- Restoration of Degraded Pastures
- Rural Sanitation
- Environmental services
- Food security, nutrition, and health
- Brazilian soils
- GMOs
- Agroecological zoning

Foto: Reprodução/Embrapa

Embrapa: a game-changer in tropical agriculture

It is no exaggeration to divide Brazilian agriculture into "before" and "after" the Brazilian Agricultural Research Corporation (Embrapa), a public enterprise linked to the Ministry of Agriculture and Livestock (Mapa), created in 1973 to develop the technological foundation for a genuinely tropical model of agriculture and livestock farming.

Mission given, mission accomplished – so much so that in 53 years, Brazil has gone from major food importer to one of the world's leading food producers. Keeping the machine running requires meeting the daily challenge of ensuring Brazil's food security and maintaining its prominent position in the international market for food, fibers, and energy. To this end, it employs over 7,700 staff members, of whom approximately 2,200 are highly qualified researchers, with 89.59% holding a Ph.D. and 10.05% holding a master's degree.

Nobel Prize in Agriculture

Among its researchers, many have received awards and are listed among the most influential in the world. One example is Brazilian scientist Mariangela Hungria, researcher at Embrapa Soja and full member and board member of the Brazilian Academy of Sciences, who, in 2025, was awarded the World Food Prize, recognized as the "Nobel Prize" of agriculture.

The World Food Prize Foundation, based in the United States, highlighted in its announcement that Hungria's discoveries helped Brazil become a global agricultural powerhouse. With over 40 years dedicated to research, Hungria is recognized for developing innovative technologies in soil microbiology, which promote the replacement of chemical products with biological ones while boosting productivity. She advocates biological nitrogen fixation, a process in which crops form a mutually beneficial association with soil bacteria that provide nitrogen, an essential nutrient for plant growth. It is estimated that the biological soil treatment technologies she developed for soybeans, beans, corn, and wheat have been used on more than 40 million hectares in Brazil, saving farmers up to US$25 billion per year in input costs, and preventing more than 230 million tons of CO_2 equivalent emissions per year. In 2020, she was ranked among the 100,000 most influential scientists in the world by Stanford University (USA).

With bachelor's degree in agricultural engineering from Esalq/USP, Mariangela holds a master's degree in soils and plant nutrition (Esalq/USP), a Ph.D. in soil science (UFRRJ), and has completed postdoctoral research at three universities: Cornell University, University of California-Davis, and University of Seville in Spain. Hungria was the first Brazilian woman to receive the award, which has previously been awarded to three other representatives from the country.

Proximity

Embrapa is global leader and maintains branches in every state; it is always physically close to production regions, with researchers and technicians focused on major crops. Among its activities, it also offers courses, hosts events, and maintains an unparalleled collection of publications, studies, thematic pages, projects, and products, processes, and services generated by the company, among many others.

The institution reflects the diversity found in Brazilian society and agriculture, taking on the challenge of promoting sustainability in this sector. It integrates technology transfer into its activities, whether through productive, market-based, or institutional arrangements, via the use of technological solutions; exchange of knowledge, through an interactive and dialogic process that facilitates the adaptation of developed technological solutions to specific contexts; and collective construction of knowledge, through dialogic engagement, grounded in observation of reality, systematizing information in search for technological solutions within the context of their application.

In carrying out its mission, through ongoing dialogue with producers, scientific organizations, and leaders from the government and civil society, Embrapa is guided by scientific excellence in agricultural research; quality and productive efficiency in crop and livestock production; environmental sustainability; social aspects; and partnerships with the productive sector, always enabling research, development, and innovation solutions for the sustainability of agriculture, for the benefit of Brazilian society.

In summary, these are 53 years of effective and efficient action in Brazilian agriculture, as leading player and essential partner in the generation and use of knowledge for the sustainable development of Brazilian agriculture through 2030.

Practical Results

Embrapa has developed hundreds of cultivars throughout its history, covering a wide range of crops such as soybeans, corn, beans, rice, wheat, and forage crops. There are 64 plant breeding programs, encompassing cereals, fruit trees, vegetables, legumes, forage crops, and forest species, focused on varieties resistant to adverse conditions –such as climate and pests – as well as high productivity, constantly promoting the release of new varieties for different regions.

For soybean breeding alone, Embrapa possesses one of the world's largest germplasm banks, with approximately 65,000 soybean types, which are essential for developing more productive and resistant cultivars. The research covers a diverse portfolio, extending far beyond grains, and includes fruits (grapes, passion fruit, cashews), cassava, forage crops for pasture (brachiaria, elephant grass), and forest species.

BRS-branded cultivars are widely adopted in Brazil, noted for their disease resistance, climate adaptation, and high productivity.

Foto: Luciola Magalhães/Embrapa

EMBRAPA UNITS

Headquartered in Brasília (DF), with offices abroad as well, Embrapa has more than 40 specialized research units organized by crop, soil, biome (Western and Eastern Amazon, Cerrado, Temperate Climate, Semi-arid, Coastal Plains), discipline, state, and region. Among them, in alphabetical order, are:

- Digital Agriculture
- Agrobiology
- Agroenergy
- Tropical Agroindustry
- Food Agroindustry
- Western Agriculture
- Agroforestry
- Cotton
- Food and Territories
- Coffee
- Rice and Beans
- Goats and Sheep
- Forests
- Beef Cattle
- Dairy cattle
- Vegetables
- Instrumentation
- Cassava and fruit growing
- Corn and sorghum
- Livestock in the Southeast
- Livestock - South
- Fisheries and Aquaculture
- Genetic resources and biotechnology
- Soybeans
- Soils
- Wheat
- Regional
- Grapes and wine

Storage: a historic and concerning deficit

In terms of storage, the Brazilian agricultural sector faces a complex duality: while the Brazilian grain harvest grows year after year, static storage capacity is not keeping pace.

The 6th Survey of the 2025/2026 Grain Harvest by the National Supply Company (Conab), released on March 13, 2026, estimates that Brazilian farmers are expected to harvest 353.4 million tons of grain in the 2025/2026 harvest. The result confirms the expected 0.3% growth compared to the volume obtained in the 2024/25 cycle, and if confirmed, even though seemingly small, it is sufficient to set a new record in the historical series. At the same time, the area allocated for planting is expected to grow by 1.7%, estimated at 83.2 million hectares, while the national average crop yield is projected to reach 4,250 kilograms per hectare in the current cycle.

This growth, however, is not matched by storage infrastructure. Data from Conab show that the country's static storage capacity ranges from 200 to 230 million tons, leaving more than 120 million tons of grain without adequate storage facilities.

One point that can be viewed as positive – though still insufficient – is the increase in storage volume on rural properties, which rose from 20.68 million tons in 2010 to 35.64 million tons in 2025, representing 72.13% growth over 15 years.

CONAB data also show that the increase in Brazil's on-farm storage capacity over the past 15 years has averaged 3.69% annually. Although this is higher than the country's average storage growth rate (2.86%), it still has limited impact on reducing the deficit.

As Paulo Bertolini, president of the Sectoral Chamber of Grain Storage Machinery and Equipment of the Brazilian Association of the Machinery and Equipment Industry (CSEAG-ABIMAQ), explains, this mismatch is historical and directly affects the dynamics of the physical market and price setting. "While production grows, storage capacity does not keep pace with this growth, and as a result, the deficit increases. Even with the industry adding about 5 million tons of capacity per year, the deficit continues to grow, as this growth is insufficient to cover the increase in production."

An advocate for storage close to production, preferably near the farm – as is the case in countries like the United States – Bertolini highlights the benefit of rural producers' autonomy, allowing them to "determine their marketing flow, store part of their production, and wait for more favorable market conditions to make the sale, which impacts their financial results." He laments, however, that even with growth over the years, on-farm storage capacity represents only 16.8% of the national static capacity.

Lack of financing and high interest rates are, in Bertolini's view – who is also president of the Brazilian Association of Corn and Sorghum Producers (Abramilho) – the main bottlenecks. According to him, "the equipment industry is technologically mature and currently operates with an average of 30% idle capacity, which is sufficient to quickly meet an increase in demand."

The situation is exacerbated by banks' reluctance to grant credit, not only due to the risks involved but also because of rising defaults and judicial reorganizations in the agricultural sector. In addition, the Program for the Construction and Expansion of Warehouses (PCA) "is described as a complex financing scheme to secure, in addition to charging rates ranging from 8.5% to 10.5% per year, depending on the producer's profile," laments the CSEAG President, and adds: "Our sector has never faced such high interest rates for infrastructure investments as it does now."

Another factor mentioned by Bertolini as hindering investment is "the downturn facing the agricultural sector amid the global commodity price scenario, while input costs are rising for various reasons, including the Russia-Ukraine war and geopolitical tensions such as those between the United States and Iran. This scenario reduces profitability and farmers' appetite to invest in new silos and warehouses."

Given this historical reality, Bertolini does not believe in a short-term solution. He adds another point that is positive for the world but concerning for the storage sector: "Brazil still has about 40 to 45 million hectares of degraded pastureland that could be converted to agriculture without the need for deforestation." In other words, if storage capacity does not grow, the bottleneck could intensify, hindering Brazil's ability to fulfill "its role in combating world hunger, as it is the only country capable of increasing its food production to the necessary volume."

Exceptions exist

In a country with unique characteristics like Brazil, the Regional Coffee Growers Cooperative in Guaxupé (Cooxupé) stands out as a company with greater static storage capacity than it needs to store the harvest of its more than 21,000 members, who produce world-renowned coffees, exported to over 50 countries.

During the 2020 harvest, when an exceptional volume of approximately 8.2 million bags was received, support from strategic partners was necessary. Since then, "the cooperative has intensified its investments in infrastructure and operational efficiency, expanding its capacity and strengthening its readiness for production growth," recalls Deivison Ricciardi Ferreira, Cooxupé's Superintendent of Logistics and Operations.

As a result of this policy, Cooxupé now has an installed storage capacity of approximately 7.2 million bags, distributed across 24 storage facilities. These facilities are strategically located in the main coffee-producing regions, covering Southern Minas Gerais, Cerrado Mineiro, Matas de Minas, and Mogiana Paulista, ensuring logistical efficiency and proximity to members.

For an industry like coffee farming, where storage plays a strategic role, this storage capacity is a key differentiator and directly contributes to maintaining product quality and competitiveness in both domestic and international markets.

Storage at Cooxupé provides coffee farmers with a safe, reliable, and technically structured environment for preserving coffee quality, Ferreira assures, listing advantages that ensure transparency, reliability, and the added value of the cooperative member's product.

The main benefits for members include comprehensive insurance for stored coffee; guarantee of the product's original characteristics; complete traceability of lots; classification processes conducted impartially; strict pest control and continuous monitoring; and use of advanced management systems (WMS) and real-time tracking technologies, such as RFID.

In addition, the Cooperative is committed to preserving the quality of the coffee throughout the entire storage period, which "requires technical precision at every stage, from production to storage. This is a product whose value is directly linked to its physical and sensory characteristics," warns Ferreira, noting that the practices adopted include controlling room temperature and humidity; preventing the proliferation of insects and microorganisms; adequate ventilation to preserve the bean's characteristics; systematic pest control, continuous cleaning and monitoring procedures, as well as essential ongoing technical supervision, in order to ensure the integrity and quality of the product throughout the entire storage period."

Committed to operational excellence, the cooperative maintains continuous investments in infrastructure, including the expansion of its storage capacity and modernization of its processes, and is prepared to receive high daily volumes during the harvest season.

Starting in June – Ferreira explains – the flow of incoming shipments intensifies and may vary depending on the remaining volumes from previous harvests. It is also influenced by the fact that members are given the option to store their coffee at the cooperative on a voluntary basis, an option accepted by the vast majority, "due to the solidity of the structure, the quality of the services offered, and the relationship of trust inherent in the cooperative model."

GRAIN STORAGE: SPECIAL ATTENTION TO OPERATION AND MAINTENANCE

In addition to the shortfall in static storage capacity, the Brazilian agricultural sector faces other bottlenecks directly linked to operations and maintenance.

As Junior Saldanha, Steute's director of operations in Latin America, explains, operating a grain warehouse "is a highly technically complex environment, with risks that can be divided into equipment integrity, employee safety, and preservation of assets (the grain). The complexity increases when the environment is a classified area, since explosion risks are also present there."

The path outlined by Steute's director begins with compliance with standards—"which must be followed from the design stage and maintained throughout the equipment's service life, in its operation and maintenance, contributing to high asset availability, reducing downtime, and aiding in maintenance management stages"—and technical rigor in humidity and temperature control, as well as in structural integrity, by adopting appropriate and highly reliable equipment and sensors to ensure high production and storage availability.

The lack of these precautions during the storage period leads to specific losses of the grains stored there. However, in the event of an explosion, the damage is magnified, as it includes accidents that can be catastrophic and may lead to the loss of the asset: the warehouse structure.

"For an explosion to occur in environments with combustible dust, five elements are necessary: fuel (dust), oxidizer (oxygen), heat (ignition), dispersion (dust cloud), and confinement (silos or tunnels)," explains Saldanha, listing the strategies to mitigate these risks below.

"While preventive measures, aimed at preventing the problem from occurring in the first place, involve remote or on-site maintenance and inspections; protective measures aim to minimize damage and include the use of equipment and sensors appropriate for the operation and monitoring," notes Saldanha.

A third procedure is listed by the executive responsible for operations in Brazil and Latin America, in an effort to reduce the possibility of explosions, and involves training, since "keeping the teams that operate and perform maintenance in these environments technically and technologically up to date is also crucial to ensuring everyone's safety."

Real-time monitoring

Manufacturing in Germany and carrying out technical customizations and bespoke designs at Steute do Brasil, Saldanha lists items from this industry that contribute to the smooth operation and safety of facilities, such as emergency and misalignment switches, inductive and magnetic sensors, safety switches, as well as various models of limit switches.

"Steute excels at producing extremely robust and safe solutions tailored to every type of production or storage environment, including products for use in explosive atmospheres, as well as a wireless line that meets the growing demand in storage environments for real-time monitoring; automation and wireless communication solutions are becoming increasingly prevalent."

Logistics: gaps throughout the chain

Storage is the first stage of logistics. As such, the problems it faces are the beginning of a seemingly endless list and contribute to reducing the efficiency achieved by rural producers on their farms and by the industry that supports and develops the technology used by the national agricultural sector.

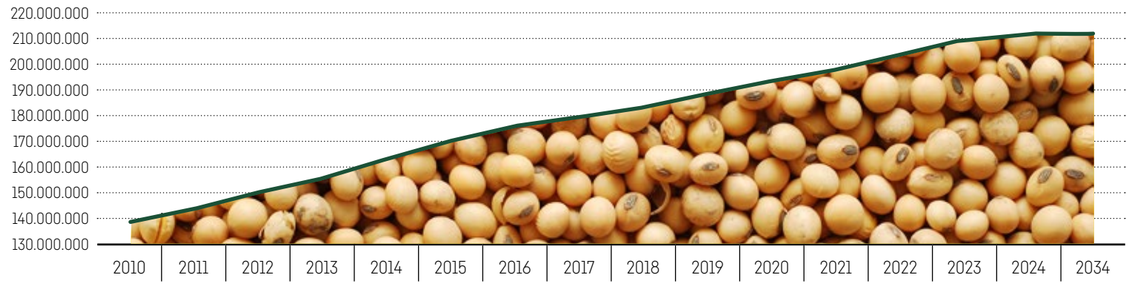
More than just storage, logistics impacts food security, as it is responsible for the distribution of the harvest, contributes to reducing – or not – losses, and can be a key factor in the stability of food prices.

The problems are well-known and recurring. The diagnosis is continually updated, but investments in logistics infrastructure (roads, railways, and ports) are not occurring at the necessary scale, and as a result, the problems are growing.

One of the main consequences of inefficient logistics is loss. Estimates vary by source, but on average, the figures are close to those obtained by Conab in a 2021 study: physical losses in post-harvest logistics for soybeans and corn in Brazil amount to approximately 2.63% of production, resulting in an economic loss exceeding R$ 2.04 billion.

There are other sources, such as Pensar Agro, affiliated with the Agribusiness Institute, which estimates losses of up to 15% of Brazilian grain production due to failures in the logistics system. Regardless of which source is correct, considering the size of Brazil's grain harvest – projected at 353.4 million tons for this crop year – even a 0.5% loss is a significant and ultimately impacts the producer's pocketbook and the consumer's table. What's more: Brazilian products lose out in quality, quantity, and price whenever they run into infrastructure and transportation problems.

Evolution of static capacity



Source: Conab

Agrologistics Yearbook

One of the most comprehensive surveys on logistics, particularly as it relates to agriculture, is presented in the Agrologistics Yearbook, an annual publication by Conab, featuring consolidated data on the logistics of agricultural product movement, exports and imports, storage trends, and the primary modes of transportation used by the Brazilian agricultural sector.

The Agrologistics Yearbook is primarily intended for the agricultural sector, particularly rural producers, their cooperatives, and associations, serving as research resource for scholars in the country's transportation sector, as well as universities and research institutions.

In the most recent edition, released in June 2025, in addition to storage, the document highlights ports, logistics corridors, and modes of transport. The analysis of ports and logistics corridors shows that ports of Santos (SP), Paranaguá (PR), and those located in the Northern Arc region (such as Itaqui, Barcarena, and Santarém) accounted for 81.2% of Brazilian soybean and corn exports in 2024, with the Northern Region alone accounting for 38% of this volume, highlighting the growing strategic importance of these ports for the country's agricultural logistics.

The Agrologistics Yearbook details the growing prominence of the Northern Corridor, driven by its proximity to new agricultural frontiers (especially MATOPIBA region), reduced logistics costs through the use of return freight for fertilizer imports, and investments in intermodal infrastructure.

The Conab document shows the rail sector expanding, driven by concessions and increased private investment. The highlights in this mode include the West-East Integration Railway (Fiol), the Central-West Integration Railway (Fico), Ferrogrão (connecting the Central-West to Pará), and the extension of the North-South Railway to the port of Vila do Conde (PA).

Waterway transport also holds great potential, with the Amazon Region accounting for nearly two-thirds of the country's river transport. Tocantins-Araguaia and Paraguay rivers, despite operational challenges (the need for dredging, landslides, and the restructuring of sections impacted by hydroelectric plants, which compromise navigability and the multiple uses of the waterways), have stood out as promising routes for the transport of grains and minerals.

However, among transport modes, road transport still predominates in Brazil, despite its well-known problems: high costs, especially over long distances, which are offset by the advantages of transport via shorter routes integrated with the Northern Arc.

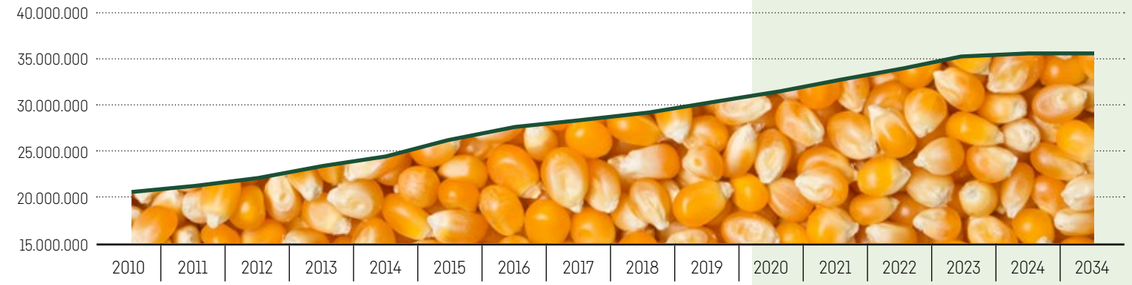
Poor Roads

In addition to fuel costs and vehicle wear and tear, road transport is directly affected by the general condition of Brazilian highways. Although the survey by the National Transport Confederation (CNT), released in December 2025, indicated an improvement compared to 2024, of the 114,000 kilometers evaluated – which include paved federal highways, plus the 15,000 kilometers of concessioned highways and the country's main state highways – 62% were rated as fair, poor, or very poor, whereas in 2024 that total was 67%.

The study highlights that privately operated highways showed the greatest percentage of improvements in their conditions. The proportion of poor sections on these roads fell by more than 60%. On public roads, the reduction was 23%. These percentages demonstrate the lack of government investment, or rather, the failure to meet established targets. In 2025, according to the confederation's executive director, Fernanda Rezende, the necessary investment was around R$ 50 billion, but only R$ 11.7 billion was invested.

According to the study, poor pavement quality increases the cost of road transport in Brazil by an average of 31%, resulting in annual waste of R$ 7.2 billion.

Evolution of static capacity - on-farm level



Source: Conab

Coffee suffers the consequences

All segments of the agricultural sector are affected by the data presented in both the Agrologistics Yearbook and the CNT survey, confirming the agricultural sector's perception.

The Brazilian Coffee Exporters Council (Cecafé), as detailed by Marcos Matos, the organization's general director, consistently reports to the government "the severe logistical challenges due to the exhaustion of port infrastructure, which has impacted coffee exports over the past few years, generating accumulated losses amounting to tens of millions of reais, driven by bottlenecks especially at Port of Santos."

A survey conducted by Cecafé among its members estimates that export companies recorded loss of R$ 4.631 million due to the non-shipment of 1,475 containers –equivalent to 486,303 60-kg bags – loaded with coffee in December 2025 due to outdated infrastructure at the country's main ports.

Cecafé's analysis shows that, on a monthly average, 55% of ships experienced delays or changes in port calls, and 1,824 containers filled with coffee – 601,819 bags – were not exported each month, causing Brazil to lose US$2.640 billion – R$14.670 billion – in foreign exchange revenue in 2025.

To make the picture even more telling, Matos includes December's figures in the survey, and the results indicate "that exporters incurred an additional expense of R$ 66.1 million due to the non-shipment of coffee over the 12-month period of 2025 as a result of this scenario."

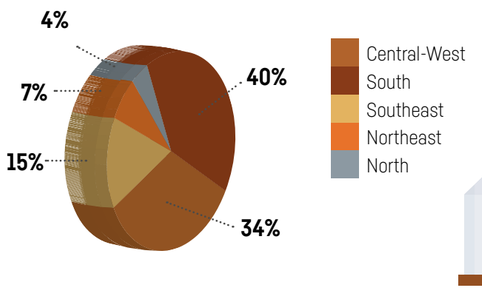
The source of these million-dollar losses, including additional storage, pre-stacking, and detentions, lies in the exhaustion of port infrastructure, ship delays (reaching 80% in March 2025), and high demand at peak season, which caused retention of thousands of containers. Added to this, there are truck queues, crowded yards, lack of berths, cargo rollovers, delays, and changes to ship schedules.

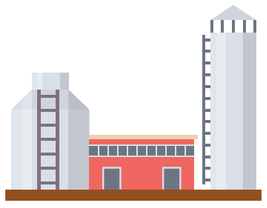
The director-general of Cecafé points out that, in conversations with leaders from other sectors, such as sugar and cotton, it was found that "these obstacles in port infrastructure for shipments affect not only coffee but all cargo that relies on containers."

Calling on government officials to "acknowledge this reality and the losses incurred in meeting these records," and to prevent the country from losing billions of dollars in revenue, Matos demands the implementation of "appropriate public policies to swiftly address the bottlenecks, by encouraging diversification of transport modes, expanding the supply of yard capacity and berths at port terminals, as well as deepening draft channels to accommodate large vessels, for example."

In his closing remarks, the director-general of Cecafé notes that Brazil "is the country that passes on the highest percentage of the Free on Board (FOB) value of exports to its coffee growers, averaging over 90% in recent harvests. Thus, the failure to ship coffee due to logistical bottlenecks represents not only lower foreign exchange revenue and losses for exporters, but also less income for coffee farmers, who work tirelessly, facing the challenges inherent in the industry – such as adverse weather conditions and high production costs – so that we can deliver the best and most diverse sustainable coffees to our customers across all continents."

Static capacity by region





Irrigation expands its reach and is consolidated as foundational tool

The year 2025 was a period of consolidation and strategic maturation for the sector. Following the more rapid expansion cycle observed from 2020 to 2022, driven by favorable commodity prices and increased producer capitalization, the market began to operate with greater selectivity in investments. Higher credit costs and structural limitations related to electricity and water concessions imposed a more technical pace on decision-making. This assessment is provided by Cristiano Del Nero, president of the Irrigation Equipment Sector Chamber of the Brazilian Association of the Machinery and Equipment Industry (CSEI-ABIMAQ).

"In summary, 2025 was a year of fine-tuning and strengthening of foundations. 2026 is likely to be a year of qualitative recovery, with growth sustained by technology, governance, and a long-term strategic vision," comments Del Nero, highlighting in this scenario the performance of the domestic industry – particularly CSEI member companies – which demonstrated maturity and resilience, maintaining consistent investments in innovation, connectivity, energy efficiency, and automation. In other words, "the focus is no longer just on expanding the area but now also includes modernizing systems, reducing operating costs, and increasing performance per millimeter applied."

Thus, even in a more challenging scenario, "irrigation continues to advance in terms of reach and technological sophistication. Brazil continues to expand its irrigated area, especially in mechanized drip and center-pivot systems, and this indicates that producers view irrigation not as a cost, but as a foundational tool for risk management and productivity," celebrates the president of CSEI, noting that, by 2026, the outlook is constructive and more consistent, and that "Brazil still has ample room for sustainable expansion of its irrigated area, considering its water, land, and climate potential."

The realization of plans for the development of the irrigated area – or its resumption, as Del Nero prefers to put it – depends on three main factors: more balanced financing environment; institutional and regulatory progress; and technological acceleration, with the consolidation of Irrigation 4.0

Regarding the first pillar – a more balanced financing environment – Del Nero calls for "greater involvement of private credit lines and structured financial instruments, complementing official credit." As for institutional and regulatory progress, he believes the focus should be particularly on strengthening energy infrastructure in irrigated hubs and ensuring predictability of concession processes.

Technological acceleration, with consolidation of Irrigation 4.0, brings with it reliance on connectivity, automation, remote sensing, climate data integration, and predictive management. This path is highlighted by the CSEI president as a means to reduce water and energy consumption per unit produced, thereby increasing systemic efficiency.

Outdated statistics

Although the sector's figures are growing, they still place Brazil far from its potential, opening up countless opportunities for industries in the sector. Statistics are public and use the Irrigation Atlas (ANA, 2nd edition, 2021 – based on FAO 2020) as technical reference, which indicates 8.2 million hectares equipped for irrigation in Brazil, considering all systems. Meanwhile, Embrapa survey, dated 2024, indicates 2.2 million hectares irrigated by 33,846 center pivots. Furthermore: the SNIRH Bulletin (ANA, 2023) shows that, in the 2021–2022 crop year, approximately 1.92 million hectares equipped with center pivots resulted in 3.7 million hectares harvested/planted, due to an average of 2.1 harvests per year.

Del Nero clarifies that even though these are the most recent published figures, they do not reflect the current context. In his view, "considering the growth rate observed through 2024 in center-pivot irrigation, which added more than 140,000 hectares in a single cycle, it is technically reasonable to state that the area currently equipped in Brazil may exceed that recorded in the latest publications. The official consolidated figure is 8.2 million hectares (2020 base), but the current reality tends to be higher, pending a comprehensive methodological update similar to that of the Atlas, published by ANA. In other words, we are growing, but Brazil still has room to advance."

Even with outdated statistics, the irrigated area in Brazil, according to 2020 data released by FAO (Food and Agriculture Organization), ranks the country among the top ten countries with the largest irrigated areas in the world, occupying 6th place with 8.2 million hectares (Mha), with China and India leading the way (about 70 Mha each), followed by the U.S. (26.7 Mha), Pakistan (20.0 Mha), and Iran (8.7 Mha).

Looking at these data, which place Brazil in a prominent position regarding irrigated area, Del Nero considers it essential to understand "what this ranking really means for Brazil. Despite its prominence in the global ranking, irrigation in Brazil is considered modest when compared to estimated potential, total agricultural area, and land area, in addition to favorable physical and climatic factors and water availability."

This landscape, in the view of the CSEI president, "is practically the opposite of the global leaders: many countries at the top of the ranking are already nearing the limit of their expansion potential. In other words, Brazil is already large, but still has room to grow, and this is a competitive advantage for the future, provided that expansion is carried out with proper water governance, energy, and financing."

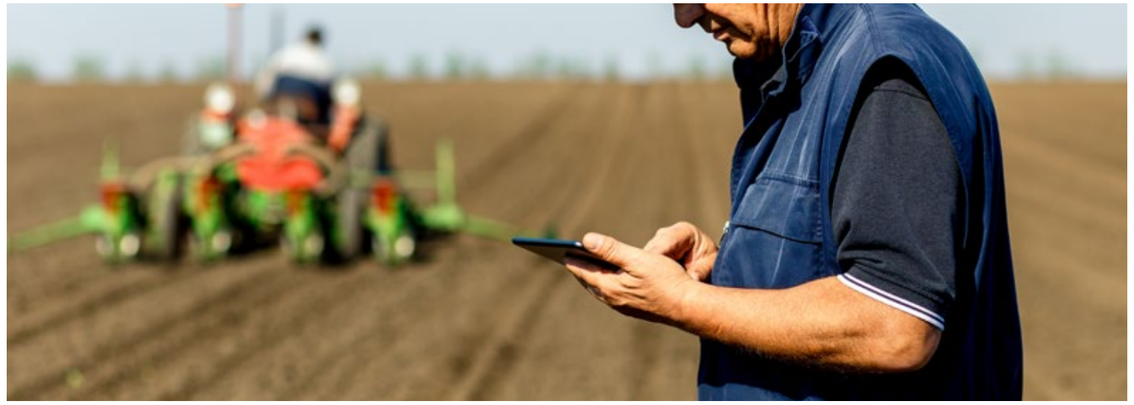
Del Nero leaves a warning here: "From an institutional standpoint, the ranking should not be interpreted solely as a measure of size, but rather as a reflection of responsibility and opportunity. For Brazil to turn potential into reality, we need to overcome structural bottlenecks (energy, water rights, financing, and connectivity) through clear rules and ongoing dialogue involving the government, the productive sector, and society. It is within this agenda that CSEI operates: to strengthen Brazilian industry and accelerate increasingly efficient, connected, and sustainable irrigation."

And, given the annual increases in irrigated area in the country – defined by Del Nero as strong and persistent in historical data over the past decades and intensifying in recent years – "the potential is being increasingly harnessed. This reinforces an important point for the national industry: the Brazilian irrigation market has a solid technical foundation and still has significant room for expansion, modernization, and increased efficiency."

Water, energy, and financing + connectivity

When it comes to irrigation, Brazil faces a classic trio of bottlenecks: water, energy, and financing. To this set, Del Nero adds a fourth element: connectivity. He explains that while water is allocated through permits and depends on more predictable processes –with data-driven management and incentives ensuring that allocations reflect actual and efficient use – and this improves basin governance and reduces waste; energy is a structural bottleneck, and without infrastructure and predictability in this sector, good projects "die" at the starting line.

Regarding financing, the CSEI president acknowledges the existence of specific lines of credit, "but access to and the cost of capital fluctuate by cycle." However, connectivity is essential so that technology does not lose its value: "Irrigation is shifting toward a digital model, in which the producer needs to monitor energy consumption, telemetry, maintenance, and remote operation. Without connectivity, the technology loses some of its value, which is why connectivity is now on the sector's agenda as critical infrastructure."



Connectivity: Technology's Ally in Agricultural Productivity, Quality, Profitability, and Sustainability

Although there are technologies available for connectivity in rural areas, the gap is enormous, and investments are inversely proportional. Initiatives, however, are not lacking, whether from the technology industry – which brings increasingly sophisticated machinery, equipment, and instruments to the field, capable of directly and in real time contributing to agricultural productivity, quality, profitability, and sustainability – or from the operators of these telecommunications systems.

There is even a Rural Connectivity Index (ICR), indicator developed by ConectarAgro, a non-profit civil association that aims to promote expansion of internet access in remote areas of Brazil, to connect people, machines, and instruments, enabling the Internet of Things (IoT) in agriculture. To this end, it proposes connectivity across the entire productive, arable area.

One of the technologies – or the predominant one – used for coverage is 4G, operating at a frequency of 700 MHz. Created to solve the common problem of lack of connectivity in rural areas faced by agribusiness, the initiative has already helped bring internet access to vast rural and remote areas in Brazil.

By connecting people, machines, data, and opportunities, ConectarAgro lays the foundation for efficient and regenerative agriculture; global food security; socio-productive inclusion of rural communities; and the adoption of digital technologies and sustainable practices – not necessarily in that order.

THE STORY OF HOW A QUESTION BUILDS A NETWORK AND CREATES A COMPASS FOR DEVELOPMENT

The initiative to create this association originated from a group of companies active in Brazilian agribusiness that, in October 2018, during a major technology sector event (Futurecom), decided to ask telecommunications providers: "Why is there no connectivity in rural areas?"

For ConectarAgro, "this question brought together, for the first time, historic competitors around a single problem: CNH, AGCO, Jacto, Solinftec, Climate FieldView (Bayer), Trimble, Nokia, and TIM sat down at the same table. The result was not a ready-made answer. It was an agreement: we needed to work together."

Thus, a multisectoral initiative was born with a clear objective: to understand and unlock rural connectivity in Brazil. Between Futurecom and Agrishow, the group developed a shared vision: that rural areas need simple, accessible, and public connectivity – that is, the same connectivity as that of cities – capable of connecting people, machines, and things.

The initiative was made official at Agrishow 2019, with the engagement of producers; companies aligned themselves, and the government got involved.

The formalization as an association took place in 2020 with ConectarAgro Network Association, a nonprofit entity with a clear mission: to promote rural connectivity as the foundation for the development of agribusiness and the country.

Until then, connectivity was measured solely by the number of people connected. With the creation of ConectarAgro, the conversation shifted to publicly discussing connected hectares, revealing that the main driver of Brazil's GDP was operating its productive area with virtually no connectivity. Competitors set aside commercial interests to build a collective legacy.

More than just encouraging large producers to invest in connectivity – driven by clear benefits such as fuel savings and operational efficiency – the Network has created a public guidance tool that translates the benefits of connectivity into terms that rural producers can understand. This is the Benefits Calculator, launched in 2021 and followed by an initiative from the National Telecommunications Agency (Anatel) with the Brazilian Connectivity Index (IBC) in 2022.

At the same time, through a partnership with the Federal University of Viçosa (UFV), ConectarAgro began developing the ICR – Rural Connectivity Indicator – embodying the principle that "If you don't measure it, you don't improve." It was in 2023 that ICR began to be developed with technical rigor and a systemic vision, based on public data, scientific methodology, and academic credibility.

Launched during Agrishow 2024, the ICR, more than just a signal map, began to consider economic, social, and environmental aspects, treating connectivity as strategic infrastructure for the development of Brazilian agribusiness.

By allowing any municipality, company, or institution to access the tool and visualize, based on scientific methodology, its rural connectivity, compare realities, and make data-driven decisions, ICR became a benchmark, and both private and public entities, such as ANATEL, began using it as a compass for development.

The year 2025 arrives, and, as defined by ConectarAgro Network, "the purpose becomes public policy; history reaches a symbolic and concrete milestone; and, in an unprecedented partnership, ANATEL begins to utilize ICR's methodology and principles within the IBC."

Evolution via Operators

TIM has been involved in the rural connectivity development project since the inception of the movement known as ConectarAgro, association of which it is a founding member. TIM has positioned itself as "the major enabler of digital ecosystems, leading the market with comprehensive solutions and applications for our customers' digital transformation, using data and artificial intelligence to add value and increase business productivity. We are absolute leaders in the field, the result of a consistent expansion strategy focused on scale and efficiency," states Alexandre Dal Forno, Director of Product Engineering at TIM Brasil.

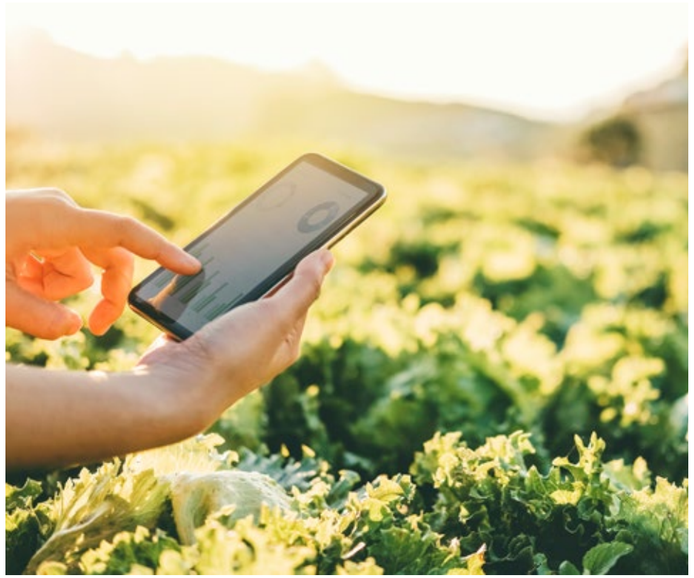
Vivo is another operator with strategic presence in the agricultural sector. Adriano Pereira, the operator's IoT, Big Data, and B2B Innovation Director, notes that 2025 marked a structural leap in rural connectivity promoted by Vivo, with achievements on key fronts: infrastructure scale, socioeconomic impact, and productive digitization. "In the field of infrastructure, Vivo positions itself as leader in the development of large-scale rural networks and has established itself through nationally recognized projects."

More than just connecting the producer, TIM – as its director acknowledges – connects "the entire production chain, from sensors in the soil to autonomous machines." The operator, leader in agribusiness, has the 4G TIM no Campo (4G TIM in the Field) project, which already covers 26.2 million hectares in Brazil, and demonstrates how, through technology, we can boost productivity in the field by transforming raw data from its customers into real-time operational intelligence."

Among the advances, Dal Forno lists "the expansion of coverage with NB-IoT, a fundamental technology for IoT, which already exceeds 53.1 million hectares and is present in 5,167 cities, enabling applications such as real-time monitoring, traceability, and optimized resource management."

From a digitalization perspective, there have been significant advances in the use of technologies embedded in machines, sensors, telemetry, weather stations, and mobile applications (LTE-M and NB-IoT), which are already beginning to transform the operational model of farms. Practical results have been recorded in terms of efficiency, with savings of up to 18% in spraying and fertilization, 6% in soil preparation, and 10% reduction in fuel consumption, according to POCs from Vivo Agro portfolio.

The technologies deployed by the two operators are similar and support an integrated multi-technology model: 4G at 700 MHz, the foundation of large-scale projects, ensures coverage and stability even in complex terrain; LTE-M supports mobile applications such as tractor and harvester telemetry; NB-IoT supports static sensors, essential for irrigation, soil, and weather monitoring. The natural evolution is the gradual arrival of 5G in private networks and innovation centers, enabling autonomous vehicles, higher sensor density, and real-time processing. This combination is already paving the way for fully data-driven agriculture.



Partnerships and proximity in the field

Collaboration is a key element of TIM's approach; partnerships with the agricultural machinery industry, producers, and research institutions allow for shared investments and the development of larger-scale projects. TIM Brasil's Product Engineering Director adds to this the company's proximity to rural producers: the company has agricultural engineers on its teams and maintains partnerships with some of the sector's leading groups, such as BP Bioenergy, SLC Agrícola, Jalles Machado, Citrosuco, Amaggi, Adecoagro, and Grupo Pedra Agroindustrial, among others.

A third ingredient is the combination of direct investment in infrastructure with a robust model of strategic partnerships. There are currently ongoing investments in network expansion, with a focus on applied technologies.

Social Impact

Connectivity in rural areas carries significant social impact. In the case of TIM, with the expansion carried out, it brought more than 2.6 million people in rural areas into the system, connecting 348,000 rural properties, as well as schools, health facilities, and public infrastructure. "To further contribute to the digitalization of rural areas, TIM covers, with 4G, more than 10,000 km of highways, along which production from rural areas is transported through contracts with concessionaires," acknowledges Dal Forno.

These figures are celebrated – Dal Forno assures – because of the company's recognition as "leader in 4G coverage and as the first operator to guarantee coverage of this technology in 100% of the country's municipalities, just as it was a pioneer in the use of the 700 MHz band, which allowed for expanded connectivity in rural areas."

As for Vivo, among the achievements reported by the operator's director, São Martinho megaproject stands out, with potential to cover 3 million hectares using 44 towers and multiple IoT-based technologies; Bevap expansion, which increased 4G coverage dedicated to agricultural and industrial operations to 30,400 hectares; and the decisive advance in the interior of São Paulo, with Batatais and Cevasa plants receiving a project for 712,000 hectares of coverage, with 12 new towers added to the four already in place, benefiting 14 cities, 430 schools, and 130 healthcare facilities, as well as 590,000 residents of rural areas and sections of Cândido Portinari Highway.

Thus, in addition to productivity gains, connectivity has brought significant social impact: "Thousands of people in rural communities, schools, and health clinics now have access to digital services – something made possible directly by Vivo's projects with companies in the sector that expand digital inclusion," emphasizes Pereira.

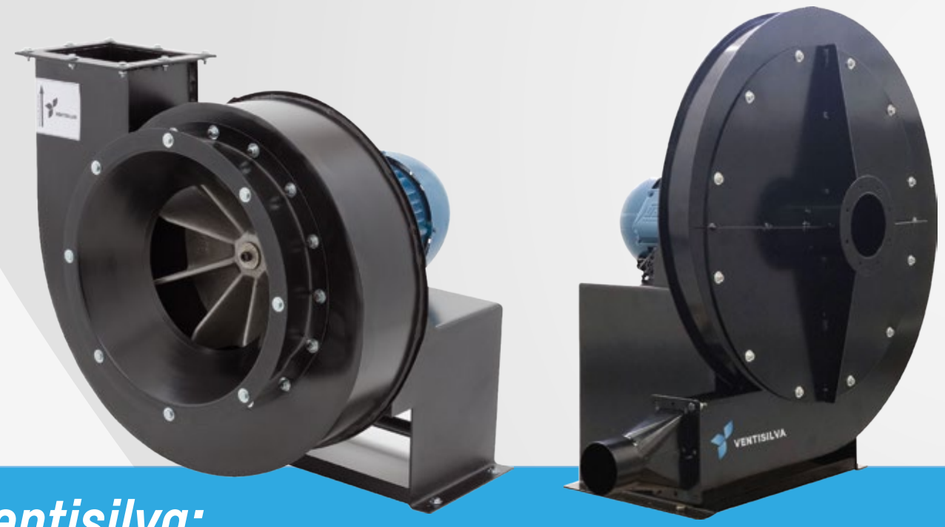
Partner projects demonstrate that rural connectivity generates social value by benefiting hundreds of schools and health clinics in historically underserved areas. As such, Pereira notes that the Brazilian countryside is moving toward a model in which connectivity, data, automation, and sensors form an essential infrastructure, just as important as roads or energy.

OUR CONNECTED NETWORK

Member companies that share the commitment to delivering quality connectivity to accelerate digital transformation in the field.

Members (7)
- TIM
- HUGHES
- NOKIA
- SOLINFTEC
- CNH
- SOL BY RZK
- SES INTELSAT

Supporters (5)
- Bit Eletronics
- Venko
- Farmers Edge
- Grupo Ferrante
- Furukawa
- Instituto Eldorado



Ventisilva:
Mais do que ventiladores e exaustores, a entrega é de segurança operacional

"São quase sete décadas de empresa, com a certeza da realização de um sonho", conta Ligia Mezher Silva, diretora da Ventisilva, e garante: "Todo sucesso, provém da dedicação, do esforço e da vontade de fazer a diferença e fabricar equipamentos de qualidade, duráveis e funcionais, convictos de que não entregamos apenas ventiladores ou exaustores; mas entregamos a segurança para uma operação ininterrupta, como acontece no agro."

Tudo começou há 68 anos, com os irmãos Getúlio Lino da Silva e Carlos da Silva, quando uniram suas expertises e partiram de uma eletrotécnica para uma fábrica de ventiladores. A meta era desenvolver um produto que realmente produzisse muito vento. A primeira opção, o Super Silva, com diâmetro de 1,5 m, cumpriu o objetivo e, após testes, os clientes aprovaram e estimularam o crescimento da linha, com a inclusão de ventiladores de mesa e coluna.

Nessa trajetória de quase 70 anos, sempre no bairro paulistano da Mooca, em 1967, houve a mudança do endereço original para uma sede maior e o desenvolvimento de equipamentos para bares e restaurantes, como cafeteiras, espremedores de laranja, estufas, marmiteiros e fornos.

Já em 1975, ingressa no mundo industrial, desenvolvendo produtos antipoluição, como coifas, tubulações, ciclones, filtros de mangas e cabines de pintura. Nos anos 1980, a Ventisilva passa a fornecer microventiladores para empresas fabricantes de computadores.

A entrada nos anos 2.000 se caracteriza pela conquista de selos e certificados de qualificação, como INMETRO, em 2004, e ISO 9001, em 2006, e implantação do método Kaizen na linha de produção. Essas iniciativas contribuíram para que a empresa passasse a oferecer 3 anos de garantia, o que, ressalta Ligia Silva, é "um diferencial importante, pois somos a primeira empresa do mercado a ter essa iniciativa para esses equipamentos."

Hoje, a linha de produtos conta com exaustores axiais, exaustores centrífugos, sopradores de alta pressão, ventiladores VP100 e VP Agro específicos para aviários e suinicultura.

A PRESENÇA NO AGRO

"Sempre tivemos grandes clientes deste setor, como Perdigão e Sadia (hoje BRF), Cargill, Bunge, Cosan, Marfrig, Aurora, etc., com o uso de microventiladores para máquinas e equipamentos agrícolas, blowers para secagem de fumo, ventiladores centrífugos para aeração de solo e exaustores para silos. Em 2022, a empresa ampliou a linha, com o desenvolvimento de ventiladores específicos e sopradores de grãos. Nos últimos tempos, a procura tem intensificado, inclusive para projetos especiais", comemora a diretora.

Empresa 100% brasileira, garantindo a reposição e manutenção permanente de peças, e administrada pela segunda geração da família, a empresa já tem em sua equipe membros da terceira geração, consciente da importância de manter os valores instituídos pelos fundadores: produtos de alta qualidade, feitos para durar, garantindo eficiência produtiva, menos parada de máquinas, pois, como diz o lema, "Quem busca continuidade e durabilidade que atravessa gerações escolhe Ventisilva."

Capillarity and cost: the equation must balance

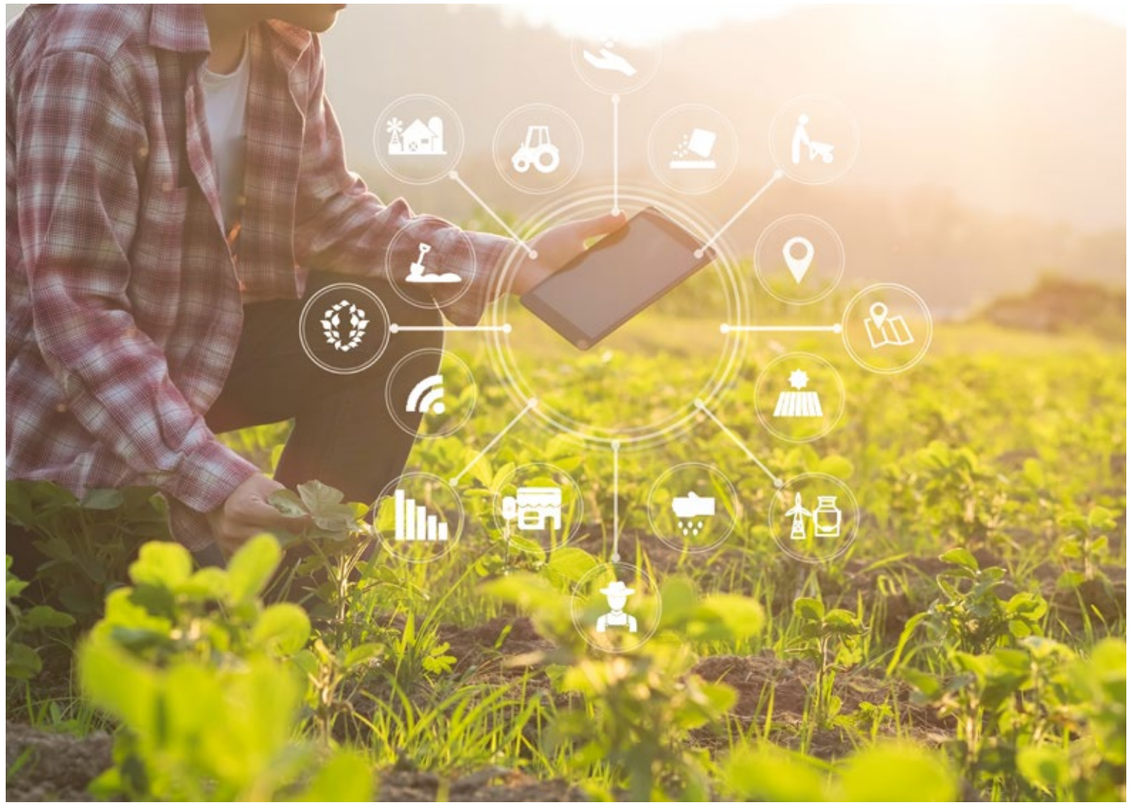
Positioning itself at the forefront of the rural connectivity movement, TIM, as its director explains, views the balance between coverage and cost of deployment as the main bottleneck, since "the low population density in many productive regions, combined with the country's vast territory, makes infrastructure expansion an operational and economic challenge. That is why we have created a business model that allows us to bring coverage to vast areas while maintaining financial sustainability for rural customers, making the use of technologies with greater reach a key factor."

To address these challenges, Vivo combines direct investment in infrastructure with technology partnerships that integrate its portfolio with machinery from any manufacturer, third-party sensors, irrigation systems, and agricultural platforms. The model is hybrid, meaning that Vivo builds and operates the network, while producers, manufacturers, and partners help expand the digital ecosystem.

Connectivity in the field is deficient: as of 2025, three out of every four rural properties (74.7%) lacked coverage.

In practice, as detailed by the operator's IoT, Big Data, and B2B Innovation Director, Vivo has expanded the Agro Coverage model with dedicated towers and long-range frequencies, such as 700 MHz, which enable massive projects, such as the one in São Martinho, for example. Data integration occurs through proprietary solutions, such as Smart Machinery, which consolidates information from machinery of any equipment brand. Smart Climate, meanwhile, addresses the challenge of detailed weather monitoring, with irrigation management, alerts, and data by field.

"Digitization also reduces input losses – today, up to 46% of pesticides can be wasted due to human error – and improves decisions regarding planting, spraying, and harvesting," Pereira notes, and he adds: "The expansion of rural connectivity has direct impact on productivity and sustainability, reducing water consumption (savings of up to 60% with climate-data-driven management), optimizing inputs, and enabling more precise planning of operations."



Sustainability is a shared responsibility

Brazilian agriculture is sustainable. There is no doubt about that. However, to remain sustainable, attention to detail, a cultural shift, and the evolution of best practices are necessary.

A pioneering initiative in Brazil for the reverse logistics of empty pesticide containers is frequently cited as an international benchmark and positions the country as a world leader in this field, both due to the system's organizational efficiency and the volume of materials properly disposed of: more than 900,000 tons of empty pesticide packaging sent for recycling or other environmentally sound disposal methods over 24 years of operation.

This is Campo Limpo System, which began operating in 2002, based on the principle of shared responsibility among industry, farmers, distribution channels, and government. The initiative stems from the creation, in 2001, of the National Institute for the Processing of Empty Packaging (inpEV), an institution whose goal is to represent the manufacturing industry and manage Campo Limpo System, a Brazilian reverse logistics program for empty pesticide packaging.

Often cited as one of the largest reverse logistics operations in the world, with results surpassing those observed in many countries with intensive agriculture, and an important example of the circular economy in agribusiness, the system operated by inpEV records indicators of processed volume, correct disposal rate, and territorial coverage that make it a global case study in the circular economy, studied by governments, entities, and international organizations interested in implementing similar systems.

Marcelo Okamura, inpEV CEO, points out that regulatory and logistical particularities in each country make it difficult to fully replicate the model, but even so, "Brazil has contributed through knowledge transfer, best practices, and technical cooperation, helping other countries develop their own agricultural packaging management systems. The success of the Brazilian model is mainly due to the combination of specific legislation, shared responsibility among the links in the chain, and strong engagement from rural producers."

Significant results

Over the course of more than two decades, Campo Limpo System has established itself as a global leader in reverse logistics within the agricultural sector. During this period, the program has built a comprehensive national collection network, which currently comprises more than 400 locations and serves millions of farms across the country.

The results recorded in 2025 by Campo Limpo System represent the highest annual volume of empty packaging disposal in its history, with 75,996 tons disposed of in an environmentally sound manner –increase of approximately 11% compared to 2024. With this result, Brazil has surpassed the milestone of 900,000 tons of packaging properly disposed of since 2002.

The expectation for 2026, as expressed by Okamura, "is to continue expanding the System's coverage, expanding the collection network, and strengthening environmental education and reverse logistics initiatives among rural producers. The outlook also involves increasing recycling rates and strengthening the circular economy through the transformation of packaging into new approved products."

Today, nearly 100% of pesticide packaging used is collected by Campo Limpo System, either at its collection units, or during field days and at input distributors;

Non-measurable results

The environmentally sound disposal of empty packaging contributes to the recognition of Brazilian agribusiness and agricultural production as sustainable and aligned with responsible waste management practices, circular economy, and environmental protection.

This type of initiative strengthens the country's image as a sustainable producer and helps meet environmental and governance (ESG) requirements that are increasingly prevalent in global food chains.

Campo Limpo System – emphasizes inpEV CEO – ensures proper disposal of 100% of the packaging received, promoting the recycling of the majority. In this way, the adopted model "contributes to making Brazilian agricultural production more sustainable, reinforcing the country's competitiveness as global leader in food production in a tropical environment.

Maintaining efficiency and curbing irregularities: challenges

Despite the progress made over the past decades, the sector still faces some challenges in maintaining and expanding the efficiency of reverse logistics for empty pesticide packaging in Brazil. Okamura lists three bottlenecks.

The first relates to logistics coverage in more remote regions, as the distance between rural properties and collection points can hinder some producers' access to the system. Another important point is the need for ongoing awareness-raising and guidance efforts among farmers, especially in areas of agricultural expansion or with new producers, to reinforce the importance of properly returning packaging.

Curbing irregular practices, such as the diversion of packaging from the official reverse logistics system, remains an ongoing necessity, as such situations compromise the traceability and environmentally appropriate disposal of materials, in addition to posing risks to the environment and public health.

The approaches adopted by inpEV include: constantly reinforcing guidance to producers on the importance of returning packaging exclusively through accredited collection points; investing in the expansion of the network of collection points across different regions of the country; conducting mobile collection operations, which bring the necessary infrastructure to more remote locations; ongoing environmental education and engagement initiatives in rural areas, involving farmers, distributors, and other links in the production chain, with the aim of strengthening adherence to the system and ensuring that packaging is disposed of in an environmentally appropriate manner.

Aos 20 anos, Genius inicia processo de sucessão familiar fiel à sua história

Fundada há mais de 20 anos com visão conectada à realidade do produtor rural e às necessidades do campo, a Genius, mantendo sua característica de gestão familiar, está atualmente em um processo de sucessão familiar.

Esse movimento envolve maior estruturação de processos, definição de responsabilidades e evolução organizacional, garantindo mais eficiência e preparando a empresa para um novo ciclo de crescimento.

Realizada de forma estruturada e gradual, permitindo uma transição consistente e alinhada com os objetivos estratégicos da Genius, a transição leva a gestão da empresa à segunda geração da família, traz uma visão complementar à trajetória construída até aqui, conectando tradição e inovação, e empossa Dra. Flávia Zortea Cardeal, como a primeira mulher a assumir a liderança da empresa.

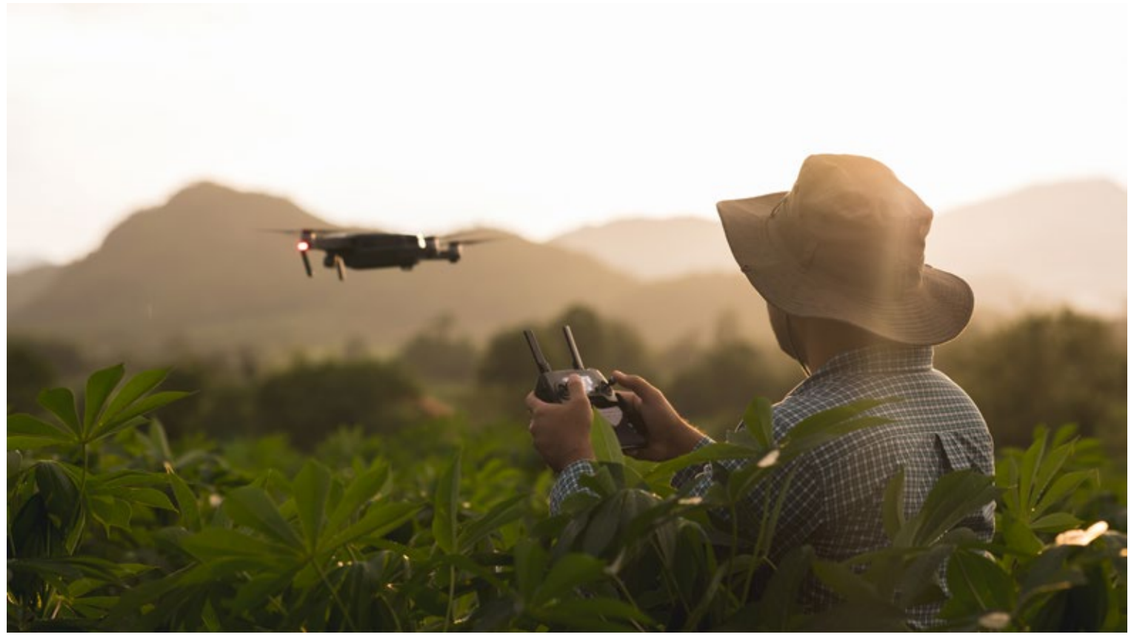
TECNOLOGIA

A origem da empresa está diretamente conectada à necessidade de desenvolver um equipamento focado em plantio direto para uso próprio de seu fundador, Eduardo Zortea. Os resultados obtidos por uma solução eficiente e adaptada à realidade do campo, conduzindo à criação da Genius: uma empresa construída "do produtor, para o produtor", com foco em excelência no plantio.

Ao longo desse período, a empresa consolidou sua presença no mercado com base em soluções robustas, proximidade com o cliente e conhecimento prático das operações agrícolas, tendo como base a competência técnica e o compromisso com o resultado, e esse continua sendo o principal critério dentro da organização.

De forma geral, o agronegócio e a indústria vêm evoluindo nesse sentido, com maior presença feminina em posições estratégicas, o que contribui para um ambiente mais diverso e preparado para os desafios futuros.

Correspondendo a esse movimento, a Genius vive hoje um novo ciclo de crescimento, que abrange a evolução de produtos, tecnologia, cultura e posicionamento de mercado. E mais: a liderança de Dra. Flávia Zortea Cardeal está diretamente conectada a esse movimento, conduzindo a empresa para um novo ciclo de crescimento, mantendo a essência construída ao longo de sua história.



Labor: Turnover and Technological Advancement

When it comes to technology, one theme is recurrent: the difficulty in training and retaining labor. In agriculture, another element comes into play: labor exodus, as it is widely acknowledged that young people are not drawn to staying in the countryside.

This situation also affects succession planning, strategic for the continuity of agriculture, particularly on family farms, but it is becoming a growing concern across the entire sector.

Various stakeholders are investing in mitigating this problem, such as the Brazilian Agribusiness Association (Abag), which contributes by fostering debate, promoting best governance practices, and encouraging professionalization in the field.

ABAG's recommendation is to treat succession as a planned process, with advance planning, defined roles, and preparation of successors. In this context, technology and rural connectivity are key drivers, as they enhance efficiency, attract new generations, and support more professional management.

The labor shortage, however, is not unique to the agricultural sector and – as ABAG asserts – cannot be attributed solely to the expansion of technology. In any case, to address this scenario, the sector has been investing in professional training and education, expanding technical courses, training programs, and partnerships with educational institutions. There is also a growing movement to collaborate with universities and research centers, with the aim of aligning academic training with the real demands of the field.

There are also organizations focused on training the sector's workforce, operating at regional, state, and national levels. With national reach, two organizations stand out, linked to the S System: the National Rural Learning Service (Senar) and the National Cooperative Learning Service (Sescoop).

Senar offers vocational education, technical and managerial assistance, and social development activities to Brazilian rural producers, serving thousands of Brazilians in rural areas annually at no cost, promoting skills development and increased income through in-person, distance learning, and hybrid initial and continuing education courses for approximately 300 professions across various agribusiness sectors; technical assistance with emphasis on management; and social promotion in the areas of health, education, culture, and citizenship.

Senar is affiliated with the Brazilian Confederation of Agriculture and Livestock (CNA), institution that also operates the CNA College, dedicated to training new professionals and those already working in the fastest-growing sector of the national economy. With a focus on management, increased competitiveness, and sustainability of rural enterprises, CNA College fosters the training of managers who can assist producers across the various aspects of an agricultural property, both on and off the farm.

Sescoop, in turn, is affiliated with the OCB System – the Organization of Brazilian Cooperatives – and addresses the challenge of training the workforce and cooperatives, in a context of rapid technological evolution in productive activities, supporting members and employees in the sector by equipping them with new skills and improving management practices.

Ivan Mafra, General Administration Manager at Sescoop, lists NegóciosCoop Program among the outstanding initiatives, since it conducts organizational assessments and develops action plans for cooperatives. Based on these analyses, opportunities for improvement are identified, and training is targeted at topics such as management, production efficiency, and market access.

Another important tool mentioned by Mafra involves CapacitaCoop distance learning platform, which offers free courses. "Production Strategies for Agricultural Cooperatives" is among the available tracks, addressing topics such as production organization, logistics management, and adding value to products. By expanding access to quality training, Sescoop directly contributes to increasing the efficiency and competitiveness of agricultural cooperatives.

Succession in the agricultural sector is a strategic issue for ensuring the continuity of productive activities and the long-term sustainability of agribusiness, emphasizes Sescoop's General Administration Manager, and it also draws the institution's attention. To make its contribution, the cooperative arm of the S System develops initiatives focused on training young people and strengthening new leadership.

"The Generation C and Women for the Coop committees encourage active participation of young people and women in cooperatives, promoting greater diversity in leadership and stimulating the engagement of new generations in business management and development," lists Mafra, adding other programs such as NegóciosCoop and CapacitaCoop platform.

NegóciosCoop helps cooperatives identify challenges related to succession and structure action plans to address them in a planned manner; while CapacitaCoop platform offers specific courses, such as Cooperative Succession, which contribute to raising awareness and preparing cooperatives and members to conduct this process in a structured and sustainable manner.

The OCB System recognizes the dissemination of technology as critical pillar in Brazilian agribusiness, a sector where more than 1,200 cooperatives operate, bringing together over 1 million members and working across different links in the production chains, offering access to inputs, technical assistance, and marketing channels. Rodolfo Jordão, coordinator of OCB System's Agricultural Division, expressing the cooperative institution's concern, highlights Brazil's scientific foundation and the growing agtech ecosystem, which coexists with inequality in the adoption of innovations.

"There is a lack of technical assistance in some regions, rural connectivity still does not cover the entire territory, and many producers face capital constraints when investing in new systems. To address this reality, training programs, strengthening of ATER, and initiatives focused on technical training and family succession aim to expand access to knowledge and prepare the workforce for an increasingly digitized agricultural sector," notes Jordão.

In this scenario, agricultural cooperatives, in addition to facing all the challenges listed, have played a decisive role by maintaining, for example, more than 9,000 technicians in the field, which positions cooperatives among the main disseminators of technology in rural areas.

Specifically regarding infrastructure in the agribusiness production chain, "this unique business model has been the major investor in the construction and expansion of rural infrastructure, with a focus on serving cooperative members, who individually would not be able to achieve economic viability or access agro-industrialization, rural storage, and other services inherent in rural structures," reports Jordão, convinced that "on all these fronts, cooperativism strengthens productive inclusion and helps sustain the growth of Brazilian agribusiness."

4

AGRO-TECHNOLOGY

Technology.

Machinery, equipment, and implements.

Chemical and biological inputs.

Seeds.

Animal protein.

Agriculture is (and uses) a lot of technology

The prominent position of Brazilian agriculture on the global stage is due to the scale of its production and the diversity of crops grown in tropical environment. This reality strengthens the challenges facing agriculture in the 21st century: to produce more, with greater efficiency in the use of resources and less environmental impact.

In this context, science and technology make an important contribution throughout the production cycle, with seeds and plant defense solutions that enable efficient control of pests, diseases and weeds in challenging climatic conditions, and with high-quality machinery, equipment, implements and components, many developed specifically for the characteristics of Brazilian soil and terrain.

Also noteworthy in this scenario is precision agriculture, which is evolving day by day despite difficulties in connectivity, for example, which are often remedied with investments from the equipment manufacturers themselves.

It can be said, without any exaggeration, that every gram of animal protein or grain, every cup of coffee or glass of milk, every head of lettuce or tomato, carries with it the work of many scientists, engineers, technicians and professionals from the most diverse areas, countless hours of research and massive investments in Research, Development and Innovation.

Machinery, equipment, implements and much more

In the specific case of machinery, equipment, implements and components, global and local companies are continually investing in new solutions and in improving and evolving existing ones. And every day there are new developments, manufactured in Brazil or imported, and new foreign brands are looking to place their equipment in the country, attracted by the size of the market. An important point in the case of imported machines is that they need to be tropicalized; the type of soil and the agronomic practice of no-till farming require machines adapted to our conditions.

Essential for modern agricultural operations such as planting, cultivation and harvesting, agricultural machinery stopped being iron on wheels many years ago, thanks to on-board technology such as telemetry, GPS and automatic pilots to ensure precision. These features have elevated the agricultural machine operator from a simple driver to a technology manager in the field, responsible for preparing, regulating and operating intelligent machines, focused on precision, preventive maintenance, and maximizing productivity, guaranteeing safety and technical efficiency in rural production.

In addition to these functions, operators also have to be safe and environmentally conscious, as they operate the machine safely, following technical standards to avoid accidents and protect the environment. These activities require constant training to keep up with the rapid technological evolution of agricultural equipment.

Tractors, planters, harvesters and sprayers are the mainstay of this sector, many of which have been developed for specific crops, and segmented according to the size of the farm and adapted to the climate and terrain in which they will operate. Investments in R&D&I are also aimed at reducing the use of inputs, such as fertilizers, pesticides and seeds; reducing harvest losses; and making operational gains for the producer with supplies, configurations and adjustments to the equipment.

Pedro Estevão Bastos - president of the Sectoral Chamber of Agricultural Machinery and Implements of the Brazilian Association of the Machinery and Equipment Industry (CSMIA-Abimaq) - recalls that digital agriculture is the technology presented to farmers with promises to increase productivity and efficiency in agriculture: “We are only just starting out on this journey and we still have a long way to go to fully take advantage of this range of available technologies.”

The many tools mentioned by Bastos include the internet of things, artificial intelligence, big data, machine learning, robotics and others. “The main trend for machines is to increasingly have on-board technology that captures data from the operation and the environment. These data can immediately interfere with the operation of the machine or can be used to supply databases that will be used to feed artificial intelligence, machine learning and analysis of the performance of agricultural operations, agronomic performance and finally the financial operation of the property,” he explains.

For the CSMIA president, the role of agricultural machinery has evolved into that of fundamental tools for carbon capture, such as no-till farming, which requires adaptation of the equipment so as to not affect the organic matter and carbon stored. He also adds “the technological innovations of precision agriculture that reduce inputs through sensors and variable rates. We also have machines adapted for ICLFS (Integrated Crop-Livestock-Forestry System) and recovery of degraded pastures, which are great sources of carbon storage in the field.”

To facilitate the purchase of machinery and equipment, some manufacturers have their own banks, while others have developed partnerships with various financial institutions. There are also barter and consortium options. But in recent years, servitization has grown, a business model that provides integrated product and service solutions, combining advanced maintenance, remote monitoring, data support and performance services, reducing risk for the producer.

LAWNS AND GARDENS ARE ALSO AGRO

There are an estimated 5 million families with properties of up to 10 hectares in Brazil, a condition that fits them into the profile of family farming or horticulture. For Mário Fortunato, vice-president of the Sectoral Chamber of Lawns, Forests and Gardens of the Brazilian Association of the Machinery and Equipment Industry (CSGF- Abimaq), this is a large market, as the equipment manufactured by companies linked to CSGF can be defined as a transition from hoeing to mechanization or, “the migration of the producer from manual work or animal traction to initial mechanization.”

The equipment that is seen as an intermediary between the large tractor and manual labor is the power tiller, which offers “a very significant impact on the productivity of this group of farmers, contributing to operations that were previously done with a hoe, or hand tools, or even animal traction,” - assures Fortunato - ensuring that the productivity gains are quickly perceived.

This entry-level mechanized equipment is mainly aimed at fruit and vegetable production and, most notably, coffee growing. The innovation in this segment, says the CSGF representative, is the robot lawn mowers, which “already operate autonomously, returning to the loading base on their own. These autonomous technologies are partly residential, but they also apply to professional environments and small farms, because of the lack of manpower and the high operating costs of these activities.”

Electrification

Generally operating with gasoline engines, these equipment have “a strong tendency to replace combustion engines with lithium batteries, although the weight provided by batteries is still a challenge”, summarizes the CSGF representative, stressing that “for a farmer who doesn’t have technical knowledge to adjust a carburetor, the battery is much simpler”.

His examples show other benefits and applications of battery-powered equipment: less technical maintenance and reduction in the common problems of fuel “rotting” in the tanks if the machine is left idle. In the case of tree climbing, an activity in which the professional works suspended in trees, “the use of batteries is essential, not least because combustion equipment requires starting and, high up in the tree, pulling the rope is very difficult. Up there, you need equipment that starts with a button.”

sansuy®

Vinitank
Tanques para piscicultura e aquaponia.

Vinibiodigestor
Biodigestores para produção de energia, combustível e adubo.

Vinimanta
Mantas para impermeabilização de aterros, tanques, lagoas e canais.

Viniliq
Reservatórios para armazenamento e transporte de água.

Vinilona
Coberturas duráveis para transporte que protegem a carga.

Vinilona Superfácil
Sistemas de enlonamento mecanizado para implementos agrícolas.

Vinigalpão
Galpões modulares em lona e com estrutura metálica.

Vinimazem
Galpões infláveis de rápida instalação e com faixas translúcidas.

Sansuy Super
Mangueiras de alta pressão para pulverização e irrigação.

NASCEMOS PARA OFERECER **SOLUÇÕES**

Ao longo de quase seis décadas, a Sansuy sempre buscou desenvolver soluções com qualidade e eficiência que contribuíssem para o agro, inserindo-se em todas as etapas da produção rural. Do plantio à irrigação, do armazenamento ao tratamento de resíduos, da geração de energia ao transporte, sempre atenta às necessidades do agronegócio brasileiro.

CERTIFIED
IATF 16949
ISO 9001

Saiba mais em:
agro.**sansuy**.com.br

Manufacturers and their innovations

Among the global companies with local production of agricultural machinery are John Deere and companies in CNH Industrial group, especially Case IH and New Holland Agriculture, as well as the brands linked to construction (yellow line).

In March 2026, John Deere presented more than 20 new products to the market, marking its biggest launch event in Brazil. Encompassing high-powered tractors and sprayers with precision application technologies, the novelties in the portfolio focused on planting and spraying, crucial stages for maximizing production potential. The company's portfolio also advanced in solutions aimed at small and medium-sized properties and for specific crops, such as sugar cane and fruit and vegetables, family farmers and livestock farmers.

High-power tractors from the 8R series were presented to the market that automatically release extra power in heavy operations, guaranteeing a constant pace of work. These tractors are combined with the 3100FT and DB transportable planters. There are also sprayers and solid nutrient distributors in the 400R series. The portfolio also includes versatile solutions for smaller properties, such as the 5M family of tractors, the 3041E tractor and the 1025E sprayers. Completing the range is the S4, which will become part of the line of intelligent harvesters launched in 2025. Also in 2026, John Deere will launch the 5M tractors, which will arrive on the domestic market adapted to Brazilian conditions, and produced locally.

For small and medium-sized properties, 12 to 17-row tractors and planters were presented, which work with precision even on uneven soils and bring the same technologies and innovations as those of the larger models, enabling quality planting, uniformity and adaptability of terrain, to ensure uniform emergence, which translates into productivity and financial return for the producer.

Advances in sprayers and solid nutrient distributors went beyond structural and engine renovation and added nutrient boxes with capacity of 6 m^3, tanks of 3,000 or 4,000 liters and booms of up to 40 meters, as well as operation at speeds of up to 40 km/h, with greater control of boom height, more precision in the steering system and the option of extended clearance.

For fruit and vegetable growers, family farmers and livestock breeders, John Deere is presenting the first custom-designed implements for the 3036 narrow tractor; an expansion of the GreenSystem tractor line; and new sprayers that guarantee extreme precision in small areas, with a stable pressure system that prevents pesticides from being wasted, and special 45° inclined nozzles that improve coverage and reduce the risk of the machine collision with fences during maneuvers.

Specifically for corn crop, the developments took into account the expansion in the production of corn ethanol in Brazil, requiring optimization of its production in the country. The CR corn platform, manufactured locally, is available in versions from 12 to 27 rows and is fully integrated with the brand's latest harvesters. This platform automates the opening of the detaching plates in real time, ensuring that the cobs are separated accurately and arrive intact at the harvester; it is equipped with an automatic rear axle speed automation system; and with a ratchet slip sensor and stalk deflectors.

Another of the year's launches is the S4 combine harvester, developed for corn, soybeans, rice, wheat, oats, barley and beans, which makes it easier to operate in areas with less room to maneuver and is capable of working on rough terrain, offering better performance in any soil condition.

With a focus on livestock farming, the new F8 series of forage harvesters allow fine adjustments to the crop to be worked on, achieving high quality silage, which results in excellent feed for the herd. The F8 series has a new engine, an updated cab with new monitors, new grain processors, an inoculant 2.0 system and updates to the silage sensing equipment that uses infrared sensor to read information from the corn or grass, such as dry matter, moisture, crude protein, starch, sugar and crude fiber, guaranteeing the best diet for the herd (HarvestLab).

Cristiano Correia, John Deere's Vice President of Production Systems for Latin America, and Global Vice President for Sugarcane, explains that for John Deere "technology is no longer a concept but profitability in the field. Our ecosystem of solutions is designed to generate real gains for all customer profiles: from small to large, everyone needs cost efficiency, high performance and connectivity."

Detailing his position. Correia says: "John Deere's role is to understand the needs of producers and the market and develop solutions that generate results. Today, each machine is the heart of an ecosystem that integrates data, connectivity and ongoing support. John Deere is no longer just an equipment manufacturer, but a connected intelligence company that brings real value. In Brazil, where scale, technological capacity and natural resources combine, innovation needs to be practical and prove, in execution, that it increases productivity, reduces costs and improves customer return."

The revolution in the portfolio of CNH Industrial brands - especially Case IH and New Holland - took place in 2025, with a strong agenda of product and service launches, comprising more than 30 new features, including new generations of tractors, sprayers and harvesters with greater levels of automation, connectivity, and the use of artificial intelligence.

Among the most prominent launches, Flávio Mazetto - CNH's Product and Portfolio Director for Latin America - highlights high-capacity harvesters, such as "the Case IH Axial-Flow AF10, considered the world's largest axial harvester, and the New Holland CR11, the world's largest double-rotor harvester, which represents the new generation of the brand's flagship line. These machines represent a technological leap forward in automation and operational efficiency, helping the producer to harvest more with less grain loss and better management of the operation."

The launch of new equipment aimed at high-efficiency agriculture and large areas; expansion of solutions for the sugar-energy sector through Civemasa brand; partnerships with research centers and technical institutions to develop technologies applied to the field; and investments in modernizing industrial processes and product engineering mark the activity of Marchesan, an agricultural implements industry that is strengthening its presence in the field and expanding its relationship with producers and dealers.

According to Luís Varella, Marchesan's marketing, communications and events manager, with the certainty that 21st century agriculture requires high efficiency, sustainability and intelligent use of data, the company continues to invest in equipment prepared for precision agriculture, more efficient seed and input distribution systems, reduction in the number of operations in the field and greater integration between implements and digital agricultural management systems, after all, "the future points to increasingly data-driven agriculture, with machines capable of generating agronomic information that helps the producer make decisions."

Another Marchesan's concern highlighted by Varella concerns the minimization of impacts on the soil, achieved through better weight distribution of the equipment, use of high flotation tires, precise depth control systems and operations that reduce the number of passes in the field. And he emphasizes: proper agronomic practices help preserve the structure of the soil.

Solutions for planting soybeans, corn, beans, wheat, sorghum and oats, as well as peanuts, are the focus of Genius, which, with its solutions, serves rural properties from small to large scale. According to Daniel Carribeiro de Oliveira, the company's commercial manager, the portfolio is constantly being updated and includes the incorporation of new technologies, connectivity and solutions that increase operational efficiency, such as self-transporting configurations. The goal is to offer more complete solutions to producers, accompanying their journey in the field and expanding the company's operations beyond planting itself.

The Commercial Manager adds that the company's proximity to the grower allows Genius to develop solutions that are aligned with the reality of the field, guaranteeing: "We continue to advance in the integration of new solutions aimed at the efficiency of control and management systems of operations, creating

bases so that more advanced technologies, such as AI, can be incorporated in a practical and useful way for the grower. At Genius, the aim is always to ensure that the technology applied brings real gains in productivity and efficiency in the field."

To achieve these goals, the grower needs to pay attention to the characteristics of the planter when choosing. The path indicated by Genius involves quality and uniformity in seed distribution, because "those who work with planters don't work with machines, but with the result of planting", explains Carribeiro, and goes on to list the other requirements: ability to adapt to soil conditions, ease of operation and adjustment, robustness and durability of the equipment, and cost of maintenance and availability of parts. He also stresses that factors such as "planting precision, connectivity, and real-time monitoring capacity are important, as they allow for greater control of the operation, predictability and better management of results in the field."

Jacto's 2026 novelties consolidate the digitalization of the field with a new family of displays, which offers intuitive interface and multiple operating modes to democratize precision agriculture, from basic steering via a light bar to advanced section control.

In the self-propelled spraying segment, Madeira reports the use of patented technology that increases the stability of booms, providing operational gains of up to 30% and greater droplet coverage, while the tractor sprayer with 24-meter booms stands out for its robustness and performance, serving small and medium-sized producers looking for efficiency in the application of pesticides. Jacto's fertilizer line also gains strength with a versatile tank solution for multi-brand machines, with the aim of reusing producers' resources.

Evolution in technology

Connected machines and digital platforms that allow monitoring of operations in real time, analysis of data, and optimize decisions are commonplace in the field, on properties of all sizes. The use of Artificial Intelligence is also growing. There are harvesters with advanced automation systems, which use sensors and machine learning algorithms to automatically adjust harvest parameters in real time. This allows for significant gains in efficiency and productivity, as well as the simplification of the operation for the producer.

Better soil management, reduction in field operations, greater efficiency in the application of inputs and reduction in fuel consumption, in the view of Marchesan's Marketing Manager, are factors that, together with conservation tillage technologies, contribute to preserving the physical structure of the soil and reducing emissions associated with agricultural operations.

Some technologies under development are capable of sensing soil properties in real time, such as moisture, organic matter and electrical conductivity, notes Varella, stressing that because they are still evolving, "in many cases, they are used in conjunction with external sensors and precision agriculture systems."

Mazetto also points out that the adoption of precision agriculture technologies and digital solutions is advancing steadily: "More and more producers are looking for tools to reduce operating costs, optimize the use of inputs and improve crop management, which reinforces the importance of technological innovation for the future of agribusiness."

This trend contributes to defining the (new) mission of the industry, as expressed by the director of CNH Industrial: "The role of the industry is precisely to develop solutions that help producers face these challenges, expanding connectivity, investing in training and offering technologies that increase the efficiency and sustainability of agricultural operations. Increasingly, we are a technology company applied to the field, developing solutions that integrate connectivity, artificial intelligence, automation and new energy sources."

In this context, manufacturers are constantly investing in technological evolution, including solutions for specific segments. One example is the computer vision system for mechanized sugarcane planting under development by John Deere, to be launched in 2027. Using sensors, cameras and embedded technology installed in the planter, the system monitors each planted row, identifies faults and variations in the distribution of seedlings and alerts the operator immediately, enabling corrections to be made during the operation.

Among the latest technologies for planting, John Deere highlights the APDF system (active pneumatic pressure in the rows), which ensures precision in seed deposition and consistent control of seeding depth even at speeds of up to 10 km/h. With row-by-row shutdown, it is possible to achieve up to 7% seed savings, while shutdown of up to 8 sections provides up to 6% fertilizer savings, resulting in lower operating costs and greater production potential.

The intelligent selective application system is another John Deere's development. The differential of this option is the application of products only where weeds are actually present, saving an average of 50% on the use of pesticides, with potential to reach up to 93%,

There is also an automatic gauge adjustment solution with memorization, which automates and optimizes the way the machine is driven during operation, providing up to 7% fuel savings with high performance; and a satellite connectivity solution, the use of which can be extended to other brands, which increases data transmission even in areas with poor coverage, ensuring more efficiency, greater precision in application and better control of the boom height.

There is also a liquid controller upgrade package for high-value crops, which automatically manages the application of inputs, adjusting doses in real time and activating sections as required. With this, the John Deere solution avoids overlaps, optimizes the use of products and guarantees traceability throughout the harvest.

The platforms used by CNH Industrial brands in Latin America, as Mazetto assures us, which "already make it possible to monitor more than 10 million hectares in real time", have also made great strides in the digitalization of the field, "expanding our connectivity and agricultural management solutions. One example is the application that brings together real-time machine monitoring, operational data analysis and farm fleet management on a single platform, allowing producers to monitor the entire operation from anywhere."

"We have structured our portfolio to consistently serve different ownership profiles, while maintaining the same commitment to performance in the field," assures Genius's commercial manager, informing that, in order to fulfill this purpose, the 100% Brazilian manufacturer has been expanding its portfolio with complementary solutions for planting, such as "implements aimed at soil preparation (de-compactors), material handling (bag winches and bulk trailers) and associated operations."

Specifically with regard to the evolution of planters, Marchesan's marketing manager highlights the configuration of distribution systems, which combine high-precision metering discs, optimized pneumatic or mechanical systems, pressure control of the planting lines and the structural stability of the equipment. According to him, these elements make it possible to maintain regular seed deposition even at higher operating speeds.

Robustness, operational simplicity and agronomic efficiency even in challenging operating conditions underpin the designs, which also take into account "different soil and operating conditions, with a focus on durability and low maintenance costs. At the same time, Genius has been constantly evolving in embedded technology, seeking greater precision in seed distribution and better performance in the field," says Carribeiro.

Signaling the evolution experienced by the company, Genius's Commercial Manager defines the current moment as "a structured cycle of evolution, sustained by investments in new products, technological advances and market expansion", and adds: "This moment accompanies the company's succession process, in which the new generation takes over management with a more up-to-date and strategic vision, preserving the values and the foundation built over more than two decades of operations in agribusiness."

High-performance technologies with a focus on spraying, fertilizing, harvesting and precision agriculture - assures Rodrigo Madeira, Jacto's product development manager - are the company's bet to bring producers "solutions to reduce operating costs, precision application of inputs with a focus on placing the product in the right place and in the right quantity; optimized harvesting processes with systems that allow harvesting with quality and less damage to the crop; connection of technologies that allow the machine's intelligence to be increased, technologies with a focus on ESG solutions for environmentally safe operations."

Precision agriculture

Another important achievement is in precision agriculture, with solutions that use sensors, algorithms and aerial images to make operations more efficient. CNH's Product and Portfolio Director for Latin America cites technologies that make it possible to map the crop, monitor weather and soil conditions and apply inputs in a localized manner. In some cases, it is possible to significantly reduce the use of pesticides and fertilizers, maintaining or even increasing productivity.

Mazetto mentions the use of "sensors and artificial intelligence to identify weeds in real time and spray only where necessary, making it possible to reduce the use of pesticides by more than 80%", as well as a digital platform under development to "monitor ideal soil parameters and carbon stocks, supporting more sustainable agricultural practices".

An important aspect highlighted by the companies is that their solutions can be integrated with machines from other brands, via control centers, for data management. This benefit includes sharing data with other software platforms, as well as with business partners or trusted advisors.

In the case of CNH Industrial - Mazetto mentions - an API is made available so that "our customers can access data to better manage their agricultural activities, optimize operations, standardize performance reports and, as a result, improve profitability."

In practice, as John Deere explains, "this allows the producer or operator to view and manage their entire fleet in a single environment, regardless of whether they work exclusively with John Deere machines or with mixed operation. The platform centralizes operational, agronomic and performance data, facilitating decision-making and increasing management efficiency in the field." The key point is that farmers have total control over their information and decide who they share it with and when.

In the livestock market, Jacto offers solutions for the application of phytosanitary products and plant nutrition, with a focus on optimizing the cost chain for the farmer and reducing input costs, with sprayers that have electronic systems to control the equipment's transmission and power system and allow fuel consumption to be reduced by up to 35%, confirms the company's Product Development manager.

In addition, Madeira mentions overlapping technology in the pesticide application process, with nozzle-by-nozzle control solutions that "save up to 10% on inputs and water, and can be associated with localized application technology, in which sensors identify weeds and the system makes the localized application of the input, generating savings in the application process, in other words, a set of solutions that connects the equipment with solutions for the customer and the environment."

Autonomous machines represent a natural path of evolution, but they still depend on advances in connectivity infrastructure, operational safety and regulation. In the short term, what we are seeing is a trend towards assisted automation, in which technology assists the operator, making operations more efficient and safer," predicts Varella.

The use of management platforms compatible with multiple systems is "strongly adopted by Marchesan, since it allows operational data to be integrated with different agricultural management software", says the Marketing manager, stressing that "this interoperability is important for the producer to have freedom to choose the digital tools used on his property."

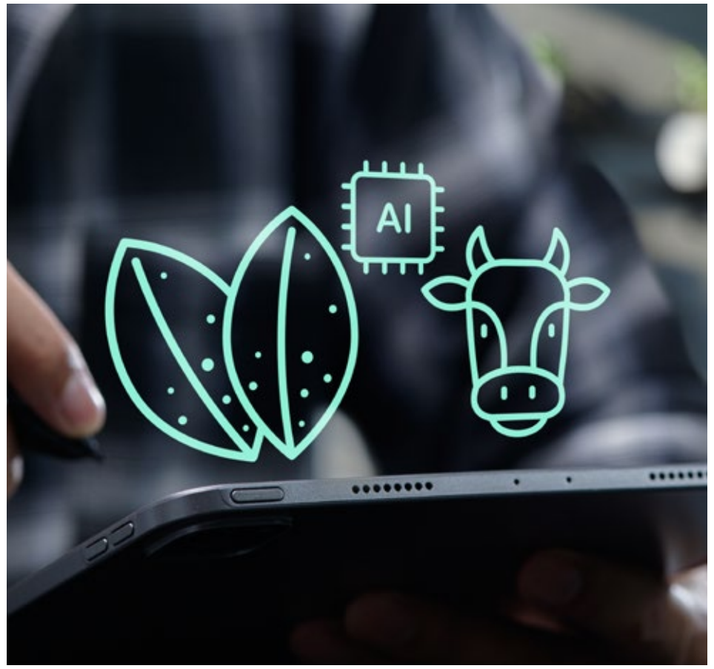
When it comes to the future of machinery, Carribeiro believes that "evolution needs to be aligned with the reality

of the field. Technology only makes sense when it is accompanied by robustness, stability and confidence in the operation, guaranteeing consistent performance even in demanding conditions. Therefore, the great challenge lies in balancing innovation with durability, making these solutions accessible, applicable and capable of generating practical returns for the producer."

In this context, Genius integrates solutions from technology partners such as Bosch, with systems such as IPS Evo, which contribute to precise control of seed deposition row by row, greater speed of operation without loss of quality, as well as connectivity and data management features. The benefits for the farmer listed by Carribeiro include remote and real-time monitoring of the operation, with access to indicators such as seed rate, singulation and machine performance; greater visibility of the operation in the field and assertiveness in real-time decision-making.

Jacto's Product Development Manager guarantees that "artificial intelligence and autonomy are already realities at Jacto, materialized in solutions such as the first Brazilian autonomous sprayer. This equipment uses laser sensors and LIDAR technology to scan plants and apply at a variable rate, allowing a single operator to remotely control up to four vehicles in convoy."

The application of generative AI is also present in customer support, "but it works exclusively behind the scenes to boost human efficiency in the company's ecosystem", in other words, the AI tool is only used internally by professionals who, when providing customer service, "can instantly consult the company's base of manuals and patents, reducing the time taken to search for technical information from ten minutes to just 30 seconds, which allows the human attendant to deliver a quick, standardized and welcoming solution to the producer", acknowledges Madeira.



Engines and energy transition

Energy transition in the field is another strategic axis for machine manufacturers.

In the case of Marchesan, as the solutions are not motorized, the company "follows the evolution of the propulsion systems used by tractors", says Varella. He points out that there are already initiatives to use biodiesel in greater proportions, biomethane and other renewable fuels. "In the future, new energy sources will tend to gain ground, but this transition will depend on the available infrastructure, cost and operational viability in the field," he concludes.

John Deere's strategy considers that there won't be a single energy solution for the future. The path will involve the combination of different alternatives, such as biofuels, electrification and hybrid systems, "always prioritizing what makes the most sense for each type of operation. In this context, Brazil stands out as a strategic market, both for its strong biofuels presence of and for its agricultural production capacity, which positions the country as protagonist in the transition to agriculture with lower environmental impact."

The company works on developing engines and adapting machines already in operation. Among the results is a 9.0L ethanol engine, currently undergoing field tests in Brazil, specially designed for crops such as sugar cane and grains. John Deere reports that, "unlike a simple adaptation, the engine has received specific software calibrations to ensure performance equivalent to diesel, while maintaining power, efficiency and reliability in operations."

Another option John Deere is working on involves adapting engines to B100, 100% pure biodiesel, via basic adjustments to components such as hoses. This technology has been tested in the field, demonstrating its practical viability.

CNH Industrial - Mazetto assures us - "leads the world in the development of alternative fuels for agricultural machinery, with solutions that include tractors powered by biomethane, hydrogen, electricity and ethanol. One example is the New Holland T6 Methane Power tractor, a world

pioneer powered by biomethane, which significantly reduces emissions and also uses organic waste generated on the farm to produce energy."

Among the main innovations in this context, CNH's Product and Portfolio Director for Latin America reports on the project to develop ethanol-powered machines, such as a sugarcane harvester with an ethanol prototype that has already been tested, "Case IH has begun field tests of its ethanol-powered Puma tractor, in partnership with São Martinho, one of the world's largest sugar, ethanol and bioenergy producers. The initiative provides for the creation of a portfolio and represents an important step forward, especially for markets like Brazil, which already have a consolidated production chain for this biofuel. The idea is precisely to take advantage of the country's energy vocation to offer more sustainable and economically competitive solutions for rural producers."

Another important front is related to the use of biomethane. New Holland has a long history in this area and, since 2006, when it launched its clean energy leadership strategy, it has been developing solutions with alternative fuels, including biodiesel and hydrogen, all the way to biomethane.

A milestone in this trajectory was the development of the New Holland T6 Methane Power, the first biomethane-powered tractor, which inaugurated a new segment within agricultural machinery. The great advantage of this technology is that it allows producers to generate energy on their own farms, using biodigesters that transform animal waste and organic residues into biogas. This creates a circular energy system on the property, increasing energy self-sufficiency and reducing the need to buy fossil fuels.

This line has also evolved into more powerful models, such as the New Holland T7 Methane Power, and prototypes powered by liquefied and compressed natural gas. At the same time, we are making progress on another strategic front, which is electrification. One example is the all-electric New Holland T4 Electric Power tractor concept and the Case IH Farmall 75C Electric, powered entirely by a battery pack and without the presence of an internal combustion diesel engine. This type of solution has zero pollutant emissions and offers important operational advantages, such as immediate torque response, greater control and simplicity of operation. In addition, the tractor can function as a power source on the property, providing external sockets to power tools or carry out repairs in the field.

Fuel is an important part of the company's technology strategy, says Madeira, adding that "all technologies are designed with a focus on optimizing the equipment fuel consumption; the equipment weight is also a fundamental link in managing fuel consumption. Today machines are already prepared to use biofuels such as biodiesel. As a strategy for the future, the company is also beginning to look at the use of ethanol and biomethane as alternative fuels for the machines, since these fuels are extremely available in the Brazilian energy matrix."

Mazetto conveys CNH Industrial's vision, saying: "When we look to the future, what we see is the consolidation of a multi-fuel ecosystem, in which different technologies will coexist according to the energy reality of each region and each type of producer. Our strategy has been precisely to lead this movement."

Training the workforce

Training the workforce to operate machinery, implements and equipment is one of the challenges recognized by manufacturers as relevant. The evolution of technologies is directly proportional to the need for continuous training of the operators and professionals involved.

Each industry finds its own way, but the focus is always the same: the use of advanced technologies in favor of training, helping to raise the level of professionalization of the entire ecosystem in the sector. To this end, simulators, virtual reality, augmented reality and even metaverse environments are commonly used to train employees, clients and partners throughout Latin America.

Mazetto guarantees that "these tools make it possible to reproduce real operating situations with high level of fidelity, accelerating learning and increasing safety in the training process." He also adds partnerships with universities and educational institutes, "strengthening collaboration and open innovation to expand access to technical training and prepare professionals to deal with the latest technologies in the sector."

At John Deere, in addition to training through its dealers, partnerships are made with educational institutions, such as the National Industry Service (Senai), and universities. The manufacturer also has six training centers throughout the country, prepared to develop skills in the operation of modern machines, implements and equipment, helping to fill the labor bottleneck and ensuring that operators are prepared to make the most of the available technologies.

In addition to continuous investment in training the sales and service teams of the master dealer network, ensuring that support for producers is specialized, the labor bottleneck is mitigated with the development, by Jacto, of user interfaces with a more intuitive design and precision technologies that provide the exact application of resources. "These solutions aim not only to mitigate the shortage of professionals, but above all to reduce waste in the field, optimizing every drop of pesticide and kilo of fertilizer to balance the producer's bill," says Madeira.

The more embedded technology there is, the greater the dependence on specialized labor. The application of technology can be a path to reduce rural exodus, retain youth in the countryside, and attract professionals. The technology present in agricultural machinery and equipment has elevated the operator from a simple driver to a manager of technology in the field, responsible for preparation, adjustment, and operation, ensuring safety and technical efficiency in rural production.

INTERVIEW

Machinery and Agriculture: A Relationship Based on Efficiency, Cost Reduction, and Sustainability

GINO PAULUCCI JR. - CHAIRMAN OF THE BOARD OF DIRECTORS OF THE BRAZILIAN MACHINERY AND EQUIPMENT INDUSTRY ASSOCIATION (ABIMAQ)

The sector represented by Abimaq has various relationships with agribusiness, including several sectoral chambers intended to bring together companies that focus on this sector. Considering the machinery and equipment sector as a whole, what is the share of agribusiness?

Agribusiness is one of the pillars supporting the Brazilian machinery and equipment industry. Currently, the agricultural machinery segment accounts for approximately 25% to 30% of the total revenue of the sector represented by Abimaq. This relevance is reflected in our internal structure: we have sectoral chambers dedicated exclusively to agribusiness, which bring together companies specializing in implements, self-propelled machinery, and irrigation systems. It is a symbiosis where industrial innovation dictates the pace of productivity in the field.

Abimaq develops initiatives for the internationalization of products. What is the volume of exports of machinery and equipment linked directly or indirectly to agribusiness?

Brazilian agricultural technology is extremely competitive, especially for tropical crops. In terms of volume, exports of machinery and equipment linked to agribusiness have maintained a robust level, representing approximately US$ 1.5 billion to US$ 2 billion annually. Our internationalization efforts aim to consolidate Brazil not only as the "breadbasket of the world" but also as an exporter of intelligence and embedded technology, reaching demanding markets in Latin America, Africa, and Eastern Europe.

In terms of agribusiness financing, considering Abimaq's partnerships with financial institutions, how much does agribusiness represent in the business conducted through these partnerships?

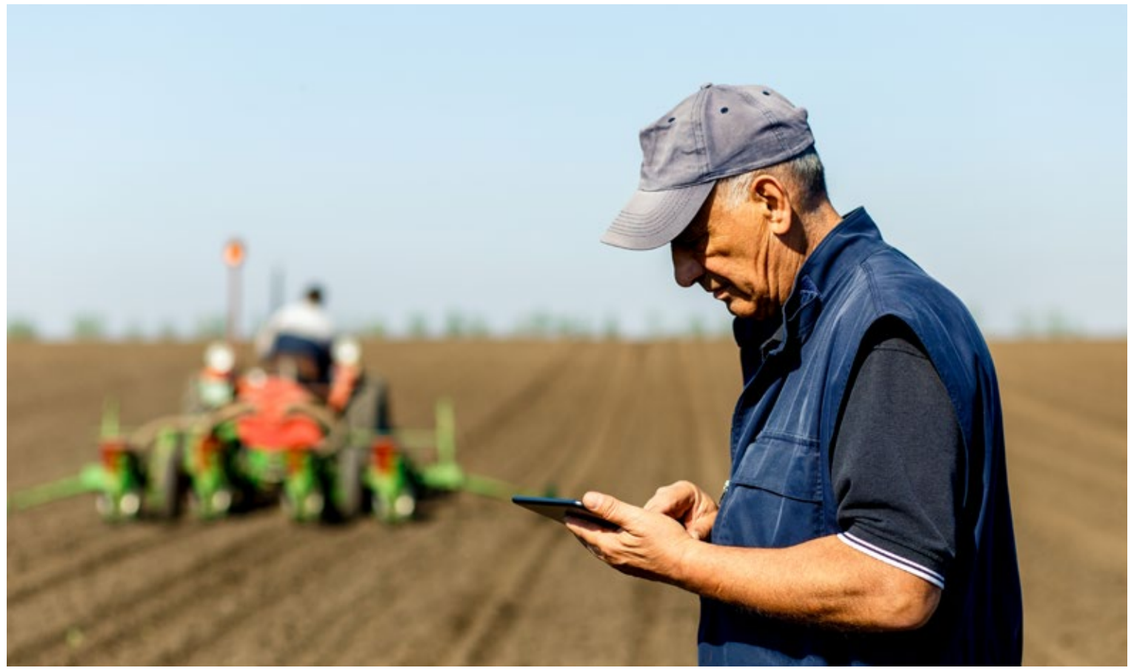
Credit is the fuel for modernization. In the partnerships that Abimaq maintains with financial institutions and development banks, agribusiness holds the largest share of demand for credit lines, accounting for approximately 40% to 50% of the operations structured for the acquisition of capital goods. We work intensively to ensure that programs such as Moderfrota and low-carbon sustainable lines (ABC+) have predictable resources, as producers need legal certainty and competitive rates to invest.

What is the importance of Agrishow for the machinery sector and for Brazilian agribusiness?

Agrishow is much more than a showcase; it is the thermometer of investment in the country. Institutionally, the event positions the Brazilian industry at the center of global discussions on food security and sustainability. In terms of business, the fair is responsible for a significant portion of the year's purchase intentions. The impact is catalytic: it anticipates technological trends and seals partnerships that drive the entire production chain, from small producers to large agro-industrial groups.

What is the commitment of the machinery and equipment sector to agribusiness?

To the Brazilian rural producer, I would like to reiterate the unwavering commitment of Abimaq and the entire machinery industry. We do not just deliver iron and steel; we deliver efficiency, cost reduction, and sustainability. We know that the field never stops and that market and climatic challenges are constant. Therefore, our focus is on developing solutions that allow farmers to produce more in less space, with greater precision. The Brazilian industry walks side-by-side with the producer to ensure that Brazil continues to be the protagonist of global agriculture, with proprietary technology and excellent technical support.



Beyond machinery and equipment

Brazilian agribusiness productivity, in terms of machinery and equipment, includes other technologies, such as irrigation and storage solutions, ventilation and grain blowers, among others.

A technique that continues to advance in terms of capillarity and technological sophistication, irrigation in Brazil still has a lot to develop. The area irrigated grows year by year, "especially in mechanized drip and central pivot systems", says Cristiano Del Nero - president of the Sectoral Chamber of Irrigation Equipment of the Brazilian Association of the Machinery and Equipment Industry (CSEI-Abimaq) - and confirms: "Brazil still has ample room for sustainable expansion of the irrigated area, considering its water, land and climate potential."

In this segment, new technologies are also available, and "the evolution is clear, as irrigation is becoming a platform for data, automation and efficiency", Del Nero assures, highlighting irrigation 4.0, which integrates climate, soil, crop and system operation to apply "the right dose, at the right time". Telemetry and connectivity is another advance and allows remote management, alerts, predictive maintenance and cell phone control, reducing dependence on labor and travel.

The CSEI president also lists gains in energy efficiency and energy transition, with the use of more efficient engines, optimization of pumping, increasing use of solar and storage (batteries) to deal with peaks and power quality; and the possibility of integrated applications, such as fertigation (application of fertilizers and nutrients) and chemigation (application of agricultural inputs fertilizers, pesticides, herbicides) and, in specific systems, application of by-products such as vinasse, with materials and engineering suitable for corrosive environments.

Solutions with specific focus

Products for covering and storing grain, corn, soybeans and cotton, pipes for conducting irrigation water, biodigesters for producing biogas, tanks for raising fish and biofertilizers, as well as rural and water infrastructure such as cisterns, flexible tanks and blankets for waterproofing soil and reservoirs. This variety of solutions from Sansuy covers various stages of rural production, regardless of the size of the farm and the type of agricultural segment.

In this activity, evolution is also permanent, the result of consistent investments in solutions that generate gains such as agility. Jonny Tsuyoshy Kano, director of Sansuy, mentions, as example, an electrical system for vinyl wrapping focused on road and agricultural implements, providing speed, ease and safety.

Investments are also being made in solutions capable of contributing to sustainability. One of the innovations highlighted by Sansuy is the Vinibiodigester, a product that processes waste, generates clean energy, produces natural fertilizer, reduces costs and inputs, reduces emissions and pollution. In short, "a solution that transforms the farm into a more efficient, clean and self-sufficient system," summarizes Kano.

Ventilation solutions for storage environments, whether for grain or agricultural inputs, is one of the focuses of Ventisilva, a company that - according to Lígia Mezher Silva, the company's director - lists "Perdigão and Sadia (now BRF), Cargill, Bunge, Cosan, Marfrig, Aurora, etc." among its clients in this sector.

The expansion of its presence in the agriculture sector has included the "discovery of other uses for the products in the agriculture line, such as the use of micro-fans for agricultural machinery and equipment, blowers for drying tobacco, centrifuges for soil aeration and exhaust fans for silos", says Silva, stressing that "in recent times, demand has intensified, including for special projects."

The solutions listed by Ketery Filip Silva, director of Ventisilva, as the most used in the agricultural sector are axial exhaust fans, which are efficient and versatile for renewing air in poultry, pig and cattle sheds; in grain warehouses, agricultural greenhouses, feed stores and various materials, as they move large volumes of air, quickly renewing the air in an environment, providing thermal comfort, eliminating odors and helping to control humidity.

Centrifugal exhaust fans, on the other hand, are especially suitable for processes that require high pressure, such as aerating silos, drying grains, pneumatic conveying of grains, husks and bran; exhaust systems that contain large pressure losses, long ducts with bends and filters; and for modernizing agricultural implements in applications that require a large flow of air in field activities.

Ventisilva's line for agriculture is complemented by high-pressure blowers, which play a fundamental role in the automation and efficiency of various processes in agribusiness, such as moving inputs and maintaining controlled environments; drying grains, aerating silos, cleaning and separating impurities, and are also "vital components in the treatment of effluents, responsible for oxygenating treatment ponds for organic waste generated in livestock farming", summarizes Ketery Silva.

Of the entire range of products for use in livestock farming, the fans in the VP100 and VP AGRO ranges are the most versatile, as they can be used in various areas of animal husbandry, dispersing heat and contributing to the thermal comfort and productivity of animals. In poultry houses, for example, they ensure health, well-being and productivity of the birds, preventing losses and guaranteeing the quality of the birds. They play a similar role in pig farming and in the confinement of dairy cows, especially those with European genetics.

Another very common application listed by Ventisilva's director is in agricultural greenhouses, where they are essential for the direct control of conditions that affect the productivity and health of plants, acting to control temperature and humidity, strengthening plants, renewing gases (CO_2) and ensuring the uniform distribution of air.

Trucks and the yellow line: an important contribution

The advance in the use of construction machinery (popularly known as the Yellow Line) in field applications is driven by the search for greater productivity, the professionalization of operations and the need to reduce the cost per ton handled. This evolution is strong in segments such as sugar cane, grains, intensive livestock farming, forestry and poultry farming, with the equipment involved in routines such as maintaining internal roads, loading inputs, handling waste and supporting operations.

A similar situation applies to forklift trucks, which are also synonymous with efficient load handling in agribusiness and meet the need for robustness, versatility and high performance at all stages of the chain. In this area, there are solutions from brands such as those maintained by KION group - Linde, Still and Baoli - which offers complete forklift solutions, covering everything from activities in the field to port operations.

With models starting at 1.5 tons, KION equipment is available in diesel, LPG and CNG versions, as well as electric options aimed at customers who prioritize energy efficiency and lower environmental impact. This business group also highlights the adaptability of the machines, achieved through the use of specific accessories, such as coil and bale clamps, which broadens their application in different segments.

According to the company, Kion brand solutions are present in strategic agribusiness sectors such as sugar and alcohol, cotton, pulp and paper, as well as special operations like meatpacking plants, where performance and reliability are essential.

Specifically, the Linde brand stands out for offering new and semi-new forklifts for immediate delivery, with capacity of 6 to 7 tons. Still, on the other hand, invests in the nationalization of production, with electric forklifts of RCE model, with capacity of 1.5 to 2.5 tons, aligning technology and efficiency with the demands of the Brazilian market.

Excavators and backhoe loaders

The variety of applications for hydraulic excavators, backhoe loaders, wheel loaders and telescopic handlers, as explained by Etelson Hauck, JCB's Director of Product Strategy & Solutions, justifies their presence in the support to farms, whether in opening drains, contour lines, irrigation channels or internal logistics, especially on large properties, after all, "every centimeter of a well-executed planting or harvest makes a significant difference to the return on the crop."

Because of these characteristics, this equipment is now "a key part of the producer's day-to-day life, supporting activities such as movement of inputs, maintainance of roads and organization of production areas. There is a clear trend towards more versatile and productive solutions," adds Rafael Cardoso - Commercial Director for Agribusiness, HR and Institutional Affairs at the British manufacturer.

In the specific case of JCB, its presence in agriculture intensified in 2025, when, after 25 years of operations in Bra-

zil, the company launched a wheel loader designed especially for the agricultural segment, equipped with a 173hp Cummins engine and a 6m³ bucket, which makes it especially suitable for handling large volumes, such as, for example, applications in sugar cane mills, for handling sugar cane bagasse, announces Adriano Merigli, president of JCB Latin America.

This initiative is linked to the company's vision of the future, since the understanding is that "as this equipment becomes more popular on rural properties, it will also be recognized as a fundamental part of production, whether in pure agribusiness or agro-industry", comments Hauck.

The launch of new machine models, the investments in technology, in improving after-sales service, in training technicians and in opening new points of sale - also meet the company's stated goal, in mid-2024, of doubling in size by 2030, says the president of JCB Latin America, highlighting the announcement, at the same time, of a record investment of R$ 500 million, "of which around R$ 360 million in expanding operations and modernizing Sorocaba (SP) plant, which supplies South and Central America."

The company's investments in serving the Brazilian market in 2025 also included 20% increase in the number of technicians and the creation of a skills development area. "We also invested in our parts inventory, which is located in our Distribution Center in Jundiaí (SP) and serves part of South America, in addition to the domestic market," says Felipe Battistella - JCB's After Sales Director - listing among the achievements " increase of around 70% in the number of maintenance plans."

Weaknesses in agro - Commenting that the company "stands out for being an innovator (it was the inventor of the backhoe loader and the telescopic handler), it was also the company that developed the world's first hydrogen-powered construction machines, the JCB chairman regrets that although the machines have "more and more technology on board, making connectivity essential for operation in the field and for real-time decision making, as well as direct communication with the maintenance area (its own or the dealership's) to avoid unscheduled downtime", connectivity in the field is still a bottleneck.

Another bottleneck affecting the company, and agribusiness as a whole, is related to labor difficulties. "The availability of qualified operators remains a challenge in the field. To mitigate this impact, JCB invests in machines with simple, intuitive operation and low maintenance complexity. This reduces the learning curve, increases productivity and broadens access to operation, reducing dependence on highly specialized labor," says Cardoso, adding that ergonomics, standardized controls and operator support systems contribute to gains in efficiency and safety on a daily basis.

Trucks

Trucks also play a joker role in the agricultural chain, as they are present from direct operations in the field to long-distance transportation logistics. In addition, in this activity, truck is seen as a tool that needs to run as long as possible with minimal stops for maintenance, says Daniel Bandeira, Sales Manager for Off-Road Solutions at Scania Commercial Operations Brazil.

The applications range from transport of extreme loads, which can reach 74 tons; to long-distance operations, since the sector uses vehicles prepared to travel long stretches of road (continental dimensions), where fuel efficiency is critical; to disposal of production, when the trucks are used to transport cargo in general, ensuring that the product leaves the rural property for its final destination.

In this set of activities, Bandeira points out that "the use of trucks in off-road environments, such as in harvest support operations, demands maximum traction capacity and axle weight from the vehicles. They travel over the roughest terrain in agribusiness and need a raised structure, differentiated axles and a better angle of attack to deal with uneven sidewalks."

The demands of operations in agribusiness also involve the energy matrix, which is less and less dependent on fossil fuels, and is increasingly powered by biodiesel - an energy matrix that is becoming increasingly common to reduce operating costs in both harvesting and transportation - or biomethane, common in the sugar-alcohol sector (sugarcane) and is produced from the vinasse of the sugarcane itself.

As well as having products that meet all these requirements, Scania - Bandeira assures us - also meets complementary, but no less important, needs, such as the monitoring Risk Areas by creating "virtual fences on critical stretches of farms or rural roads to automatically limit speed and prevent tip-overs. In addition, connectivity makes it possible to control the working hours of drivers in remote regions, guaranteeing operational safety even in extreme loads; and to know, thanks to a magnetic identifier (id button), who is driving and for how many hours, helping to control logistics and working hours. The technology ranks drivers, allowing specific training to be created for those who need to improve their driving to reduce wear and tear on the parts."

In environments such as farms, where there isn't always connectivity or connectivity fluctuates, vehicle safety is also guaranteed in offline conditions: "Systems such as the automatic emergency brake and the lane reader operate autonomously and don't depend on internet signal to protect the driver. The truck module stores the operating data and uploads it as soon as the signal (2G to 4G) is re-established," explains Bandeira.

Another feature of the Scania truck listed by the Off-Road Solutions Sales Manager involves the Super engine platform, launched in 2023, which "anticipated the Proconve P8 (Euro 6) emissions standards" and made it possible to achieve the "perfect triad: more power, more torque and less consumption."

The results of the new technology, as indicated by Bandeira, are "transporting the same load in less time, which favors productivity and the working day; greater vehicle availability, as this platform has technology that has made it possible to increase the overhaul cycle, leaving the truck available for longer periods; and the impact on costs, since the thermal efficiency of this engine is an important competitive differentiator, especially when considering that fuel represents 40% to 50% of the haulier's costs."

"The precariousness of Brazilian roads is compensated for by technology," says Scania's Off-Road Solutions Sales Manager: "The engineering focuses on damping systems that protect the truck, the load and the driver. This is the case with the front air suspension, a recent innovation that makes it possible to cushion the impact of bad roads right at the front axle, reducing driver fatigue and the risk of damage to the load."

The brand's care for the truck driver can be seen in the cab, which "has been treated like a luxury office and an extension of the professional's home. The cab launched in 2019 has reduced blind spots and placed all the controls (air conditioning, multimedia, gear changes) within easy reach, without the driver having to move their body. What's more, there are comfort options such as a microwave, coffee maker, fridge and freezer," says Bandeira.

Inputs: solutions, practices, and evolving technologies enhance sustainability and protect crops

Nutrients and crop protectors are fundamental in agriculture. Whether chemical, biological, or mechanical, these integrated solutions protect crops from pests, diseases, weeds, and climatic variations, helping to maximize productivity and sustainability.

Integrated Pest Management (IPM) represents the state of the art in plant protection by prioritizing sustainability and reducing dependence on agrochemicals, potentially reducing the use of insecticides by about 60%. Defined by Embrapa as a strategy that combines biological, cultural, physical, and chemical methods, IPM seeks to keep pest populations below the level of economic damage through constant monitoring. This approach is applicable in both rural and urban settings, always aiming to protect the environment and human health through systemic management that balances productivity with ecological preservation.

In practice, management involves cultural control, such as crop rotation and no-till farming, which break disease cycles and preserve soil quality and moisture. Biological control is strengthened by the use of natural enemies, such as parasitoid wasps, predatory mites, and microorganisms, which combat pests naturally and specifically. When the use of chemical pesticides is strictly necessary, priority is given to modern, selective molecules with low environmental impact, applied only after identification, through monitoring, of the required level of action, which spares beneficial organisms and ensures the maintenance of a balanced and resilient ecosystem.

The evolution of IPM integrates precision agriculture technologies and digital tools, utilizing drones, Internet of Things (IoT) sensors, and artificial intelligence to predict outbreaks and optimize the application of inputs in specific locations. In addition to these technological innovations, the system benefits from protected cultivation structures and hydroponics, which isolate plants from soil pathogens and extreme weather conditions, creating an ideal microclimate. This set of coordinated solutions enables more efficient, economical, and safe agricultural production, establishing systemic management as a fundamental pillar for the sustainable modernization of agriculture.

Foto: Koppert Brasil

Chemical and biological pesticides: complementarity for productivity

Even though IPM and its components reduce the use of chemical pesticides, Brazil remains prominent in international rankings. According to data from FAO (UN Food and Agriculture Organization) and the Brazilian Institute of Geography and Statistics (IBGE) compiled by CropLife, the country harvests two to three crops per year and has a tropical and subtropical climate, which favors the proliferation of pests, fungi, and diseases, and uses, on average, 7.4 kilograms of chemical pesticides per hectare, considering multiple applications across different harvests.

However, countries that harvest only one crop per year use higher volumes of pesticides than Brazil, such as France, which averages 13.7 kilograms per hectare.

A non-profit civil association representing companies specializing in research and development of solutions for sustainable agricultural production in the sectors of Germplasm (seedlings and seeds), Biotechnology, Pesticides, and Bio-inputs – CropLife Brasil provides information on its data platform (CropData) indicating that losses caused by pests and diseases can reach 37.5% before harvest, which underscores the role of these inputs in maintaining productivity.

Another positive aspect for Brazil involves the evolution of active ingredients, which have become more efficient, less persistent in the environment, and applied in smaller quantities. Regulation also contributes to the control of the products used and signals continued investment in new solutions.

To be authorized for use, these products must be registered with the Ministry of Agriculture, Livestock, and Supply (MAPA) and have their data available for consultation in the Agrofit system, a public database that provides information on agrochemicals, active ingredients, companies, and authorized uses for combating pests and diseases in Brazil.

In 2025, the number of registrations for pesticides and bio-inputs reached a record high, totaling 912 –37% increase over the previous year. Of this total, 323 correspond to technical products or raw materials; 162 are bio-inputs; 6 are technical products with new active ingredients; and 19 are products formulated with new active ingredients, reinforcing the modernization of the phytosanitary portfolio available in the country.

MAPA's annual report on pesticide and bio-input registrations for 2025 highlights that "the introduction of new active ingredients into the Brazilian market represents a strategic advance for strengthening phytosanitary protection and agricultural competitiveness. Unlike equivalent or generic products, these new molecules expand the available modes of action, strengthen integrated pest and disease management, reduce the risk of resistance, and incorporate more modern technologies."

Of the total registrations granted – according to MAPA's report – equivalent products predominate in terms of quantity, and they are intended to increase competition, ensuring supply, and reducing costs for rural producers.

Furthermore: The Ministry clarifies that the number of registrations granted is not directly related to the volume of pesticides used in agriculture. The demand for these inputs depends on technical factors, such as cultivated area, pest pressure, weather conditions, and management systems. In 2024, for example, national data indicate that 58.6% of registered commercial brands of chemical pesticides and 13.6% of active ingredients were never actually marketed.

BIO-INPUTS: A GROWING MARKET

An estimate by CropLife Brasil indicates that the bio-input market will reach US$ 45 billion by 2032, with annual growth of 13% to 14%, reflecting producers' growing interest in the potential of biologicals as strategic tools in agricultural management.

And the growth recorded year after year supports this forecast. In 2025, for example, the bio-inputs market, according to CropLife data, broke the R$ 6.2 billion barrier, representing 15% increase over the previous year's market value. During the same period, the area treated with biological products reached 194 million hectares, 28% increase over 2024. This unprecedented performance reflects the expanding use of these technologies in the field, driven by integrated pest management and the search for more efficient and sustainable systems.

The four segments within the bio-inputs sector monitored by CropLife showed growth: biofungicides, bioinsecticides, bionematicides, and inoculants.

Regarding the treated area in 2025 compared to 2024, the CropLife bulletin released in March 2026 shows that inoculants were used on 77 million hectares last year (40% increase), accounting for 13% of the treated area and R$ 812 million in market value. Bioinsecticides recorded 24% growth and generated R$ 2.1 billion in revenue, accounting for 35% of the total market, and covered 47 million hectares in treated area, an expansion of 14 million hectares; while the biofungicide segment recorded the highest growth in value (41%), reaching R$ 1.4 billion, with the treated area growing by 37%, accounting for 22% of the total, or 26 million hectares. In terms of treated area, the best performance in 2025 was by bio-nematicides, which recorded an expansion of 16 million hectares – approximately 60% growth – accounting for 30% of the treated area, generating R$ 1.8 billion in revenue and totaling 44 million hectares treated.

Soil and plant nutrition tailored to the tropical climate

Brazil's intense agricultural activity places the country at the forefront among fertilizer consumers and makes it the world's largest importer, second only to China. Figures from MAPA show that Brazil accounts for about 8% of global fertilizer consumption, and around 80% of the fertilizers consumed in Brazil are of foreign origin.

The figures vary depending on the harvest. According to IBGE, production reached 346.1 million tons in 2025, against the 292.5 million tons of the previous year. The National Association for Fertilizer Distribution (ANDA) reports that 49.11 million tons of fertilizers were delivered to the domestic market throughout the year, 7.7% increase compared to 2024.

In the field of crop production technologies, innovation has made significant strides, with the development of increasingly efficient technologies tailored to the conditions of tropical agriculture. In this context, "we are seeing a major expansion in specialty fertilizers (mineral, organic, and organomineral) as well as biofertilizers and soil conditioners – solutions that not only provide nutrients to plants but also help improve the physical, chemical, and biological conditions of the soil," notes Roberto Levrero – president of the Brazilian Association of Plant Nutrition Technology Industries (Abisolo) and president of the Thematic Chamber of Agricultural Inputs (CTIA), affiliated with the Ministry of Agriculture and Livestock (MAPA).

Another important aspect raised by Levrero relates to the evolution of formulations, which "allow for greater efficiency in nutrient use, reducing losses in the production system and increasing uptake by plants. The trend is for this sector to move increasingly toward integrated solutions, combining different technologies and agronomic practices to increase productivity in a sustainable manner."

POTÁSSIO AUTAZES: THE GOAL IS TO REDUCE DEPENDENCY ON IMPORTS AND INCREASE SUPPLY PREDICTABILITY

Brazil's dependency on imported potassium for fertilizer is on its way to being partially reduced. It is forecasted that in 2029, Brazil may increase its domestic production of this input by 20% with the start of operations of the Potássio Autazes Project, led by Potássio do Brasil, a wholly-owned subsidiary of Brazil Potash, in the municipality of Autazes (AM).

Sérgio Leite, president of Potássio do Brasil, explains that the project "foresees the production of potassium chloride to meet the demand of the national agribusiness, with a capacity of up to 2.2 million tons per year. The initiative already has a relevant portion of its future production committed through long-term contracts, which reinforces its economic viability."

An essential input for agricultural productivity, playing a significant role in plant development, water regulation, and resistance to climatic stress, the potassium used in Brazilian agriculture is predominantly imported, which exposes the agricultural sector to external fluctuations. In this context, the project is part of an effort to reduce this vulnerability, increasing supply predictability and strengthening the competitiveness of Brazilian agribusiness, thus fulfilling its goal to "contribute significantly to the balance of the domestic fertilizer supply over time," Leite assures.

With the installation license delivered in April 2024, the project advanced on important fronts throughout 2025, such as the "raising of funds in the international market and the structuring of financing, in addition to the start of activities related to site preparation and the implementation of socio-environmental programs provided for in the licensing process," Leite emphasizes, explaining that "these programs include archaeological monitoring actions, preservation of cultural heritage, and initiatives aimed at relationship-building with local communities, including the Mura indigenous people, respecting the specificities of the region and the applicable legal frameworks."

Known as specialty fertilizers, these formulations cited by Levrero play a strategic role in Brazilian agricultural productivity because they increase the efficiency of plant nutrition and improve crop performance under different soil and climate conditions. In other words, "these solutions also contribute to making the use of nutrients and water more efficient, allowing for greater production with less environmental impact."

This group consists of slow-release or controlled-release fertilizers – which make nutrients available gradually throughout the crop cycle, increasing agronomic efficiency – as well as organic fertilizers, organomineral fertilizers, and soil conditioners, which help improve soil fertility and balance.

The specialty fertilizer sector "directly contributes to reducing agriculture's carbon footprint through the development of technologies that increase nutrient use efficiency," asserts the president of Abisolo, acknowledging that "the industry has also invested in research and innovation to create technologies aligned with global sustainability and decarbonization goals for agricultural production, developing solutions geared toward agricultural systems with lower environmental impact, capable of improving soil quality, stimulating biological activity, and increasing agricultural productivity in a sustainable manner."

Regardless of how they work, these solutions improve the fertility of tropical soils and increase the efficiency of plant nutrition. Abisolo's president highlights the role of the sector represented by the entity, which "played a significant role in the development of these solutions, providing technological advances that helped transform areas previously considered to have low fertility into highly productive regions." He concludes: "Today, the sector continues to invest in innovation to support an increasingly productive, technological, and sustainable agriculture."

Interdependence

Plant nutrition relies on various established techniques for diagnosis, recommendation, and nutrient management. Regarding the first point, soil analysis remains one of the most powerful tools for diagnosing the chemical status of soils.

As Flavio Bonini, Manager of Agronomic Services and R&D at Mosaic, explains, this activity has evolved to provide not only information on nutrient levels but also data of critical importance for accurately assessing soil health, such as biological activity (through the well-established BioAS analysis), including the microorganisms present in the soil, obtained via advanced analyses like metagenomics.

The 4R Nutrient Stewardship (right source, right dose, right time, right place) addresses the recommendation stage and "have benefited greatly from models and applications that utilize artificial intelligence and a vast amount of data collected by sensors on agricultural equipment, drones, maps, and satellites to estimate the ideal and cost-effective quantities of each fertilizer and biological input in order to ensure productivity and, above all, the sustainability of production," says Bonini.

"The third phase – products – is addressed by the fertilizer industry, which brings "more and more innovations aimed at increasing nutrient use efficiency, reducing environmental impacts, and creating value for farmers," sums up the manager of Agronomic Services and R&D at Mosaic, convinced that "with the advancement and integration of soil, plant, and biological sciences – and AI – there is no doubt that it will increasingly be possible to have information and solutions that will bring agriculture to optimal levels of performance, delivery, and sustainability."

Detailing the process of soil fertility and plant nutrition, Michel Castellani, Director of Research and Development at ICL, lists techniques and technologies that involve both soil fertility and plant physiology and metabolism, which can be correlated with plant nutrition. These include: soil fertilization with mineral fertilizers, macro- and micronutrients, applied directly to the soil; foliar nutrition, to correct specific deficiencies, to act at critical moments, and/or to enhance nutrient use efficiency; fertigation; precision agriculture; efficient use of nutrients, optimizing the consumption of slow-release nitrogen fertilizers and reducing phosphorus adsorption to soil colloids; and biological inputs.

Past and Future: Development of Cerrado and pasture restoration

Various sources confirm that productive expansion, especially since the 1990s on naturally poor soils such as those of Cerrado, was only possible thanks to the proper use of fertilizers, soil amendments, and biological inputs. Fundamental practices such as correcting acidity with limestone and agricultural gypsum, combined with no-till farming and nutritional management using mineral and organomineral fertilizers, have made it possible to transform low-fertility areas into highly productive environments, establishing the country as a world leader in the export of food, fiber, and energy.

Today, soil degradation is the final stage of a gradual process of ecosystem functional depletion, and well-nourished soils with active microbiota are naturally more resistant to this problem. For Bonini, the regeneration and preservation of these areas are directly related to pasture management: "Studies indicate that proper plant nutrition, combined with the use of fertilizers, soil amendments, and biological inputs such as inoculants, is the most efficient strategy to break this negative feedback loop and restore degraded areas. By reactivating essential biogeochemical processes and restoring the fertility, these management practices restore the soil's primary function of sustaining healthy plants, ensuring the productivity needed to meet humanity's growing demands."

ICL's Director of Research and Development chooses to view soil degradation through the lens of chemical degradation: "In terms of fertility, we must consider broader concepts of agricultural management associated with more conservation-oriented practices. That is what truly changes the game and improves the productive environment; after all, nutrition is just one pillar of this recovery."

Castellani's approach involves correcting soil acidity and building a nutritional profile, with increased chemical fertility and soil organic matter; correcting macro- and micronutrients, fundamental for rebuilding the productive environment; improving the development of crop root systems and stimulating soil microbiota; and reducing erosion and compaction.

ICL's Director of Research and Development anticipates forecasts for the coming years by highlighting the presence of "increasingly efficient technologies, always focusing on pillars such as fertilizer use efficiency, the method for delivering them to plants, application methods, and compatibility – these will be major differentiators in the market."

Lamenting that Brazil is still "highly dependent on fertilizer imports, particularly NPK and certain micronutrients," Catellani discusses the need for investment in public policy initiatives to mitigate these issues, increase production, and enhance national security. He mentions the existence of "a plan being rolled out by Embrapa and the Ministry of Agriculture aimed at reducing this dependence."

Nanotechnology and Biofertilizers

The use of fertilizers derived from nanotechnology processes is gaining ground in plant nutrition because they offer efficient ways to deliver nutrients to plants, especially those with low solubility and, consequently, low availability to plants.

"Care must be taken, however, with situations where drastic reductions in nutrient doses are recommended simply because they are nanotechnology products; the smaller size of the products may lead to improvements in efficiency, but the technical parameters for nutrient recommendations do not change on the same scale," warns Bonini.

For Castellani, the introduction of nanotechnology – alongside bio-inputs – promises to revolutionize the field of plant nutrition in the coming years, "as these technologies, combined with sustainability projects, are closely linked to the carbon footprint and still need to be better understood throughout the entire chain, from production to the end consumer."

Regarding the combination with biological inputs, Castellani explains that, with the exception of Biological Nitrogen Fixation (BNF), "studies linking nutrition and microorganisms are relatively recent. However, the benefits of microorganisms in the living phase of the soil are already known; they improve nutrient availability, promote better soil structure and extensive root development, and result in increased above-ground growth. As recent examples, we can cite growth-promoting bacteria, nutrient mobilizers, and nitrogen fixers themselves."

Roberson Marczak, Adama's Sustainability and Communications Manager, adds to the company's concerns the inclusion of sustainability "in product development, which is now evaluated not only from the perspective of profitability and productivity, but also for its environmental impact throughout the life cycle."

Seeds: high added value

Seed production in Brazil is a dynamic sector that generates approximately R$ 45 billion annually. Listed as the input with the highest added value due to carrying the genetic makeup of the variety – since maximum agricultural productivity potential is determined by genetic potential – seeds are produced in quality standards capable of guaranteeing producers the best performance in the field and maximizing the benefits of fertilizers and pesticides, among other factors.

In this segment, all production and sales must be registered with the National Seed and Seedling Registry (Renasem) and are supervised by MAPA, ensuring traceability and genetic quality. The production process ranges from planting and management (roguing) to harvesting, drying, and processing, culminating in laboratory analysis and storage.

In Brazil, the use of certified seeds predominates, which directly contributes to increased productivity and the sustainability of national agriculture. However, in regions such as the South of the country, there is higher incidence of use of saved seeds or seeds for personal use.

Faced with extreme temperature fluctuations and periods of water stress that have characterized Brazilian agricultural cycles, producers have been seeking more resistant varieties with resilient performance and high yield stability.

Corteva Agriscience is among the companies operating in this segment, investing US$4 million globally in Research & Development of seed varieties, hybrids, pesticides, and biological products. "This means offering the best technologies, with genetics adapted to tropical conditions and the development of hybrids with more vigorous root systems and greater physiological tolerance," says Marcus Santos, the company's Agronomy Leader.

The company's portfolio includes corn hybrids developed to help the plant maintain its green, photosynthetically active leaves for longer, even under intense heat. Santos notes that there are also hybrids which, thanks to advanced genetic breeding techniques, exhibit greater tolerance to water stress during grain filling, pronounced stay-green traits, and high efficiency in absorbing soil water, in addition to being recognized for their excellent heat tolerance, their ability to maintain productivity in the second crop when temperature fluctuations and the closing of the rainy season are constant risks, and their superior pollination capacity even at high temperatures – a time when many common varieties abort their ears.

Another product line from Corteva combines a short growing cycle with high yield potential, featuring hybrids that can "escape" critical periods of drought and heat through early and uniform flowering. One of the varieties, "widely used in Mato Grosso and Goiás, for example, features genetics that favor the development of deep roots, allowing the plant to seek water in lower soil layers during dry spells and days of record-breaking temperatures," explains Corteva's Agronomy Leader, adding: Both brands apply a technology to their corn hybrids that "protects leaf integrity against the main caterpillars. Indirectly, this contributes to thermal performance: a plant with preserved leaf area can transpire efficiently, regulating its internal temperature and preventing premature leaf curling under intense sunlight."

For Corteva – confirms Santos – "what we will see going forward is that farmers will begin to measure success not only in bags per hectare, but by the carbon balance and the health of soil biology and biota. Hybrid packages allow producers to maintain extremely high yield ceilings (guaranteed by genetics and chemicals) while improving their sustainability profile (through the use of biologicals)."

Thus, the company, which also holds crop protection technology with chemical and biological solutions, is convinced that the future lies in balanced management: "Chemicals protect genetic potential today; biologics ensure the viability and health of the production system tomorrow. It's not about choosing one side or the other, but providing the right tool for every challenge the farmer faces," summarizes Corteva's Agronomy Leader.

Biopesticides are moving toward the seventh generation and go beyond corn and soybeans

The use of biological pesticides generally involves fungi and bacteria, such as e Trichoderma genus, which already accounts for more than half of bio-input use compared to other biological agents.

Even so, research continues, as noted by Aramis Camargo, Sustainability Manager at Biotrop: "Other alternatives with great agricultural potential are emerging, such as actinomycetes, yeasts, and other microorganisms, which may explore tools and areas of action that bacteria or fungi cannot fully utilize."

The use of metabolites, which may originate from bacteria, fungi, or other types of microorganisms, is also advancing, but "they are not considered living organisms." "These are byproducts with specific functions, whether for pest control – such as nematicides, insecticides, or fungicides – or for agricultural purposes, such as the solubilization of phosphorus and potassium, or even foliar nitrogen fixation," asserts Camargo.

In this field, cereals are the main crops served, especially soybeans and corn, with sugarcane and cotton gaining prominence in recent years.

Confirming this information, Camargo mentions a company product that, "during the last harvest, treated more than one million hectares of sugarcane to control fungal diseases." According to calculations by Biotrop's Sustainability Manager, the company's products "applied in agricultural areas currently treat more than 40 million hectares in Brazil, considering the use of bio-inputs based on recommended average doses."

The list of crops served by Koppert includes not only soybeans, corn, sugarcane, and cotton, but also citrus and coffee – assures Marcelino Britto, Koppert's Market Development Manager – which, in his opinion, demonstrates the company's support for "highly technological production systems with growing demands for sustainability and efficiency."

This reality, for Britto, means that "the challenge from now on will no longer be adoption – which is already a well-established reality – but profitability. Technological differentiation, quality of field execution, and service capacity will be decisive in capturing value in a market that is becoming increasingly professional and selective."

Soil carbon stabilizers

A pragmatic and future-oriented approach characterizes Koppert Brazil's operations, according to Juliana Longatto, the company's Production Manager. In practice, this means "integrating sustainability into day-to-day decisions, ensuring technical robustness in emissions inventory while simultaneously maintaining financial and operational resilience."

Certain initiatives underscore this approach and translate emissions reduction into practical field applications. Koppert Brasil's Market Development Manager cites "biological nitrogen fixers (BNF) and phosphorus solubilizers, which increase the plant's nutritional efficiency and stimulate greater root growth and biomass production. This results in more carbon captured through photosynthesis, which is directed to the root system and rhizosphere, and subsequently converted into organic matter in the soil."

Britto extends this effect to bio-inputs in general, since "they activate soil biology, promoting greater nutrient cycling and the formation of stable carbon in the production system. As a result, more carbon is incorporated into the soil in a lasting way, both through the expansion of the root system and through increased microbial activity, responsible for transforming plant residues into stabilized carbon."

Not all are the same

Citing solutions containing Trichoderma strains exclusive to Koppert that maintain consistent results and performance from the coldest and wettest conditions in the southern region of the country to hot and dry environments, – such as those in Cerrado and northern Brazil – or "superior resilience even when exposed to non-ideal temperature and humidity conditions, withstanding solar radiation for longer hours and enduring extended periods without optimal humidity, which ensures effective pest control," the Market Development Manager at Koppert Brazil notes: "What sets these microorganisms apart is the combination of the strain's genetics and the formulation's quality. Together, these factors ensure stability, efficacy, and predictability, even in a climate as challenging as Brazil's."

The evolution of solutions from biodefensive manufacturers is characterized by the development of so-called "smart bio-inputs," which activate specific plant genes for resistance to drought or specific pests. As Biotrop's Sustainability Manager explains, "the products currently available on the market are already in their fourth generation, characterized by the use of live microorganisms engineered to produce metabolites of interest."

The trend is the use of integrated chemical and biological solutions, combining different technologies and agronomic practices.

In the case of Biotrop – Camargo assures us – "fifth-generation products are being launched, in which there are no live microorganisms. In these cases, only the metabolites produced by the microorganisms are used, that is, the byproducts obtained from the induction of these organisms.

These two generations "already work by activating specific genes, promoting synergy with plants and helping them cope with adverse conditions, such as drought, heat stress, and other types of abiotic stress. Furthermore, resistance induction mechanisms are already part of these generations and are commercially available," comments Camargo, explaining that "this advancement is directly linked to the use of microbial genetics."

In the near future, the sixth and seventh generations of products will emerge, and they are expected to gain a firm foothold in the short term. These new generations are closely linked to technologies such as RNAi (RNA interference) and the use of applied metagenomics, which involves the gene expression of microorganisms. In this context – says Biotrop's Sustainability Manager – "it will be possible to enhance specific characteristics through genetic engineering, further increasing the efficiency of these solutions."

Animal protein production: livestock 4.0 is a reality

Cattle, pigs, and poultry – especially chicken and eggs – are the main sources of animal protein supplying domestic and international markets. Aquaculture, with farmed fish, keeps pace, showing year-over-year growth, as shown in Chapter 1.

Technology is present in all these livestock activities and contributes to quality, productivity, and profitability. Thus, animal protein production is undergoing a digital and biotechnological transformation, focused on increasing efficiency, sustainability, and animal welfare.

Artificial Intelligence (AI), IoT (Internet of Things), automation, advanced genetic improvement, and traceability are commonplace, including due to the need to meet the requirements of countries that consume Brazilian products.

Precision livestock farming promotes resource optimization, minimization of environmental impacts, and increased productivity without expanding land use. Furthermore, it enables producers to profit from their operations.

Artificial Intelligence (AI) and Machine Learning, for example, are used to cross-reference data on climate, animal behavior, and biosecurity. Meanwhile, IoT and sensors (Internet of Things) monitor the animals' health, nutrition, and environment in real time, as well as their behavior. Radio Frequency Identification (RFID) systems contribute to automatic monitoring from birth to slaughter, ensuring accurate records of performance and management.

Automated systems weigh the animal, which at the time of slaughter undergoes image analysis and carcass evaluation using 3D, and computer vision tools to determine yield with greater precision. Earrings or chips enable individual animal tracking.

At the time of slaughter, smart cameras automate the quality grading of chicken and pork carcasses, reducing human fatigue and increasing precision in cut selection.

Breeding is assisted. Thus, advanced techniques enable the selection of animals with greater disease resistance, better feed conversion, and higher carcass quality, accelerating genetic progress.

Nutrition also deserves special attention. There are diets optimized for each stage of the animal's life, improving efficiency and reducing waste. Platforms connect data from the farm to slaughter, monitoring production and health metrics.

All information about each animal, using blockchain technology, ensures traceability and transparency throughout the process, creating a tamper-proof, shared database that records the animal's entire history (vaccinations, diet, weight), thereby increasing consumer confidence. These data are converted into a QR code, printed on the packaging of the product purchased by the consumer, allowing them to trace the food's origin in seconds.

On-farm processes utilize tools that reinforce the concepts of sustainability and environmental management. An example is the monitoring of water resources in production, aimed at rational water management; and biodigesters and composting solutions, which transform animal waste into electricity (biogas) and fertilizers, aligning production with the Low Carbon Agriculture Plan (ABC Plan).

Cattle Farming

In addition to these Livestock 4.0 technologies, specifically in modern cattle farming, drones help monitor pastures and herd behavior in open areas, while robots handle milking and provide feed.

In addition, precision livestock farming focused on beef cattle production must also consider pastures and their interactions with climate and soil conditions.

Feedlot - With the majority of Brazilian herd raised on pasture, feedlot data grow year after year, and estimates suggest that feedlots now account for about 20% of animals slaughtered in Brazil.

Companies operating in this sector, providing specific technologies, conduct field research to collect herd data. One of them is DSM-Firmenich, which annually publishes the Feedlot Census.

The 2025 edition, with data presented in February 2026, shows that the country reached 9.25 million head of feedlot cattle, 16% increase compared to the 2024 results, distributed across 2,445 properties and 1,095 municipalities, highlighting the progress of production intensification as a strategy for efficiency gains and predictability.

According to the survey, the state of Mato Grosso remains the national leader, with 2.2 million head of cattle in feedlots, 29.6% increase over the previous year. Next is São Paulo, with 1.4 million head, maintaining its growth trajectory (7.7%), followed by Goiás, which also reached 1.4 million head, with 13.6% increase. Mato Grosso do Sul ranks fourth, with 0.9 million feedlot cattle, 17.8% increase, while Minas Gerais rounds out the top five states, with 0.8 million head, remaining stable compared to the previous cycle.

According to Túlio Ramalho, director of the Ruminant Business Unit at DSM-Firmenich for Brazil, Paraguay, and Uruguay, the survey also reinforces the industry's role: "The growth of feedlot operations demands increasingly precise, reliable, and sustainable solutions. Our commitment is to stand alongside producers, offering technologies that transform information into results in the field." And the results prove that, since 2015, feedlot operations have grown consistently, in line with the professionalization of the industry and the increased adoption of nutritional and management technologies.

In this sector, nutritional supplementation is essential to unlock the full potential of production systems. Some solutions promote greater weight gain and contribute to indicators of immunity and gut health; improve carcass performance, strengthen immunity, and enhance metabolism.

According to João Yamaguchi, the company's Grass-Fed Beef Cattle Manager, "producers who combine data, management, and proper nutrition are able to navigate market cycles with greater resilience."

Nutrition for ICLF (Integrated Crop-Livestock-Forestry) - With over 160 years of experience as a global family-owned company, Cargill is active in all aspects of livestock farming, offering cutting-edge solutions focused on animal nutrition. The company's most recent launch, by Cargill Animal Nutrition and Health, involves nutrition for pasture-raised beef cattle and was developed specifically for crop-livestock integration (CLI) systems. The product optimizes the nutritional performance of beef cattle, improving rearing efficiency on integrated pastures, which represent a highly efficient and sustainable production model, already covering approximately 14 million hectares in Brazil.

"With this launch, we are meeting the demand for precise solutions in beef cattle farming. By improving nutrient absorption and the utilization of pasture fiber, the solution optimizes individual and per-acre performance, boosting producers' competitiveness," says Felipe Bortolotto, Beef Cattle Technology Manager at Cargill Animal Nutrition and Health.

The new line also features improved formulations, with optimized levels of highly bioavailable macro- and microminerals. These innovations expand coverage to various production strategies, ranging from operations in the early stages of intensification to highly intensive systems, with a focus on efficiency and measurable results in producing one arroba at a highly competitive cost, delivering profitability results consistent with high-tech agriculture.

Milk

In the case of milk production, innovations focus on increasing efficiency and sustainability, reducing dependence on labor-intensive practices. In this regard, the technologies and tools used in Livestock 4.0 are complemented by others, such as robotic milking (VMS - Voluntary Milking System), an automatic system in which the cow chooses when to be milked. The system operates 24 hours a day, monitors milk quality and udder health, and provides personalized feed.

Collars, electronic ear tags (RFID), and pedometers monitor in real time the animals' rumination rate, activity, health, estrus, and location, sending alerts to the producer's smartphone, while integrated platforms analyze data on milking, nutrition, and reproduction, facilitating decision-making based on accurate information.

Genetic Improvement deserves special attention; it incorporates genomics and utilizes in vitro fertilization (IVF) and fixed-time artificial insemination (FTAI), with the goal of propagating the genetics of the best animals.

In a dairy cow barn, animal comfort plays a significant role in production. To this end, techniques such as Compost Barn or Free Stall, fans, sprinklers, and automatic rubber flooring are used to control temperature, humidity, and comfort. Furthermore, autonomous feed wagons or conveyor belt systems ensure precise and continuous nutrition for the herd.

Poultry Farming

Modern poultry production utilizes Poultry 4.0 technologies, which incorporate the same technologies and tools as those of Livestock 4.0, with key differentiators including the pursuit of energy efficiency and the precise use of resources as cost-reduction tools.

The application of Livestock 4.0 principles is also linked to the confined environment in which the birds are kept and requires the incorporation of devices for continuous monitoring of air quality (CO_2, ammonia), as well as AI-driven analysis of images and sounds to detect diseases and identify laying hens.

On these farms, robots are used for cleaning, sanitizing facilities, and automated egg collection, optimizing repetitive tasks; automatic systems distribute feed and water in a precise and monitored manner, preventing waste; and Precision Laying systems, consisting of automated conveyor belts and rails, handle the collection and transport of eggs.

Digital biosecurity aims to ensure animal health and prevent disease. To this end, access control systems and camera-based farm monitoring systems are used to track diseases.

These technologies, integrated with Precision Livestock Farming, enable more sustainable production, with greater health control and efficiency in the use of inputs

Swine Farming

The main technologies applied to pig production aim to increase productivity, improve animal welfare, optimize nutrition, and ensure biosecurity, moving pig farming toward the concept of smart farming.

As in other livestock activities, the technologies applied in swine farming have specific purposes. Here, Computer Vision and 3D cameras monitor the behavior of pigs to detect aggression, movement, and rooting, as well as to count animals, while sensors collect data on temperature, humidity, and ammonia and dust levels

Algorithms predict the optimal slaughter time, detect diseases, and analyze feed. Automatic feeders are used for sows in group gestation (ESF), and piglets are guaranteed an exact supply of nutrients, reducing waste and optimizing feed conversion. Smart cameras calculate the weight and body mass of pigs using images, eliminating the need for stressful manual weighing; and automated systems monitor daily water consumption, helping to identify health issues early on.

In this activity, advanced artificial insemination techniques are used, such as Intrauterine Artificial Insemination (IAIU) for genetic improvement and increased prolificacy. Additionally, genomic selection technology allows for the selection of the best breeding stock based on DNA for traits of interest, such as growth rate and meat quality.

BiosSui – Developed by Embrapa Swine and Poultry (SC), this software assesses and classifies the health risk of farms, enabling technical improvements. The tool generates compliance indicators and organizes recommendations for improvements in the production system. It can also be used to support decision-making by producers, managers, and technicians in agribusinesses and health protection agencies.

The software collects data via a web form and provides dashboards, maps, performance reports, and recommendations for improvements. Farms are evaluated based on 23 criteria, including external and internal biosecurity requirements; infrastructure characteristics and procedures that serve as the main pillars for protecting farms from pathogen entry.

The tool allows for individualized management or management oriented toward groups of farms, such as cooperatives, agribusiness units, and others, facilitating compliance analysis, farm ranking, and the formulation of improvement programs.

The software consists of three main modules: Assessment, Improvement Simulation, and Dashboards. In the first module, Assessment, the farm's status is recorded via a questionnaire, enabling biosecurity indices to be calculated and evaluated

The second module generates technical recommendations for farm improvements. This feature allows users to simulate the impact that improvements in farm infrastructure and management can have on biosecurity indices.

The third module enables monitoring of these indices through dashboards and interactive maps, facilitating analysis at both the farm level and the group level to which the farm belongs.

5

AGRIBUSINESS FINANCING

Financing.

Safra Plan (Crop Plan).

Alternatives in rural credit.

Rural and parametric insurance.

Banks and credit cooperatives.

FINANCING

Access to credit: an instrument for financing agriculture, despite the bottlenecks

In order to achieve the results they have achieved, Brazilian farmers need credit instruments, whether for funding or investments in machinery and equipment, livestock activities, sustainability, exports, among others.

In this context, the Harvest Plan (Plano Safra) is still considered one of the main public policies to encourage agribusiness, guaranteeing credit, subsidies and special conditions for small, medium and large farmers, stimulating both food production and sustainability in the countryside.

In addition to fostering economic growth in the agricultural sector, Harvest Plan seeks to strengthen family farming, encourage ecological production practices and increase access to financing at more competitive rates. However, even though it breaks records year after year, it is insufficient.

The current edition - which runs until June 30, 2026 - has made resources available in the order of R$516.2 billion for funding, marketing and investment, for medium and large producers, an amount R$8 billion higher than the total for the previous harvest. It includes programs such as Programa Nacional de Fortalecimento da Agricultura Familiar (Pronaf); Programa Nacional de Apoio ao Médio Produtor Rural (Pronamp); Moderfrota: specific line for buying agricultural machinery and implements; Inovagro, for financing technological innovations and automation; and Programa para Construção e Ampliação de Armazéns (PCA), with a focus on storage infrastructure.

The next cycle—according to Renato Buranello, vice president of Abag—"is likely to continue to be marked by tighter credit conditions and high financing costs, which will require farmers to be more efficient in their management and planning. At the same time, Brazil maintains solid fundamentals, with high productivity, a leading global role, and the capacity for sustainable expansion."

Production growth at a more moderate pace, yet still driven by technology, innovation, and more sustainable practices, is the forecast expressed by Buranello, who recommends: "Increased attention to financing conditions, rural insurance, and logistics infrastructure, which remain critical factors for the sector's competitiveness."

"The sector expects a robust, predictable program aligned with the reality of the cost of capital in the country. Furthermore, there is a growing demand for operational simplification and greater legal certainty, essential factors for expanding access to credit and stimulating long-term investments," comments Buranello.

Among the key points, the vice president of ABAG lists: expanding resources with rates compatible with producers' ability to pay; strengthening rural insurance with greater budgetary predictability; incentives for sustainable practices and low-carbon agriculture; and greater integration with private financing instruments

Adding to this, his counterpart at ABAG, Luiz Carlos Corrêa Carvalho, also a vice president, notes that "the Safra Plan presents relevant initiatives for the sector," and emphasizes: "There are still uncertainties regarding the actual availability of funds." Caio Carvalho, drawing on previous cycles when "it was observed that part of the announced credit was quickly exhausted or did not reach the different producer profiles uniformly," calls for "improvements in the clarity of access criteria and disbursement timelines, since predictability is fundamental for crop planning. In this context, the sector is closely monitoring the situation, hoping that the announced instruments will, in fact, translate into accessible credit and adequate conditions to enable the necessary investments."

Financial institutions

The participation of agriculture in financial institutions can be measured in the results of the National Bank for Economic and Social Development (BNDES), for example. Released on March 17, 2026, BNDES balance sheet recorded the highest recurring profit in the institution's history in 2025, with R$15.2 billion, a result 15.4% higher than that of 2024. Operating performance in 2025 showed strong growth in demand for credit compared to 2024 and was helped by agriculture, which totaled R$ 54.3 billion in credit approvals, recording 100% growth compared to 2022 and 4% over 2024.

Climate and sustainability

In addition, other tools managed by BNDES are added to the Harvest Plan, interacting with agribusiness, such as two instruments coordinated by the Ministry of the Environment and Climate Change - MMA -, the Amazon Fund, which benefits agriculture in a targeted way, focusing on strengthening sustainable practices, community agricultural production and agro-extractive chains; and the National Climate Change Fund, called the Climate Fund, because it encourages low-carbon practices in the field.

The Amazon Fund, for example, only in March 2026, via a partnership with the Government of Maranhão through the Institute of Colonization and Lands of Maranhão (Iterma), defined an investment of R$ 52.9 million, with execution scheduled for 36 months to strengthen land regularization in 85 municipalities of the Legal Amazon in the state of Maranhão, including the capital São Luís.

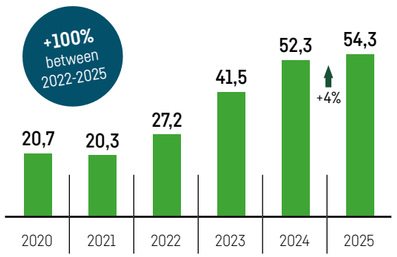
The Climate Fund, which in 2025 leveraged R$34.6 billion in public and private resources for projects that boost energy transition, green industry, resilient urban development and forest protection, among others, in 2026 has set a public budget of R$27 billion, totaling R$52.4 billion since 2023.

The results of these funds were highlighted by BNDES when it released its 2025 results. Specifically with regard to the Amazon Fund, the figures show that it was practically at a standstill until it began to integrate projects for degraded areas, technical training and assistance to the population. At the same time, in the last financial year, the Climate Fund changed its paradigm since the energy transition was taken on as a fundamental axis of economic policy.

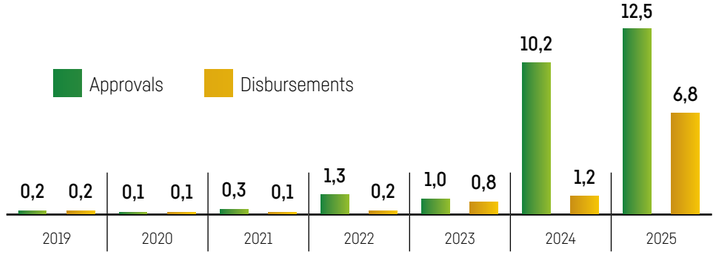
Aimed at encouraging sustainable practices, the ABC+ Plan (Sectoral Plan for Adaptation to Climate Change and Low Carbon Emissions in Agriculture 2020-2030) is drawn up and coordinated by the Ministry of Agriculture, Livestock and Supply (MAPA) with guidelines from the Ministry of the Environment (MMA).

An evolution of the ABC Plan (Low Carbon Emission Agriculture), the ABC+ Plan's main investment line is RenovAgro (Program for Financing Sustainable Agricultural Production Systems), which, in the 2025/2026 harvest, together with related sustainability lines, reached around R$8.1 billion, compared to R$7.68 billion in the previous harvest, a volume around 12% higher than that allocated in the2023/2024 harvest, which was R$6.88 billion.

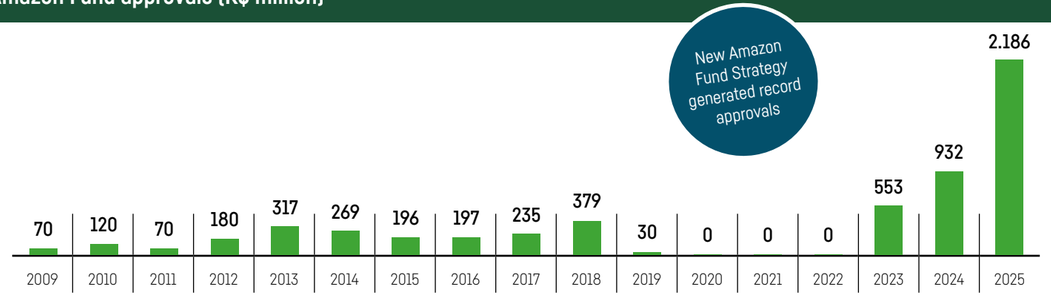
Performance of agriculture in BNDES' balance sheet



Climate Fund Approvals and Disbursements (R$ billion)



Amazon Fund approvals (R$ million)



Financial health and interest

Naturally, the producer's financial health has a systemic impact on the entire chain, causing a domino effect. Credit bottleneck is also significant, as Selic rate close to 15% can lead to the final cost exceeding 20% per year, making financing and the costing of the harvest more expensive, putting pressure on the producer's profitability.

Added to this is the growing number of judicial reorganizations in agribusiness, which exposes financial pressure in the countryside and accelerates the migration of rural credit to private structures and specialized funds. According to experts, prolonged adverse cycles affect payment capacity and reduce bank appetite for risk in the countryside, proving the high number of JRs. In 2025 alone, estimates indicate that the sector registered 1,990 requests for judicial reorganization, the highest number in the historical series, 56.4% higher than in 2024.

Renato Buranello–vice president of ABAG–echoes the industry's concerns regarding judicial reorganization. Describing the process as "a cause for concern," he cites data from Serasa Experian: in 2025, the number of judicial reorganization filings in the Brazilian agricultural sector rose by 56.4% compared to the previous year, totaling 1,990 requests. This was the highest volume in the entire historical series, which began in 2021.

Today, agribusiness has 12.6 companies in judicial reorganization for every 1,000 linked to agriculture or rural producers (1.26%), a rate 6 times higher than the national average, while rural defaults have reached 8.3%. In this context, another type of credit is advancing, known as DIP Finance or Debtor-in-Possession Financing, a special type of financing granted to companies undergoing judicial reorganization, which provides essential capital to maintain operations, pay employees and suppliers, with the advantage of having priority of receipt (extraconcursal) if the company goes bankrupt.

FUNCAFÉ: SPECIFIC FUND FOR COFFEE

There are also specific credit lines for some crops, such as coffee, which counts on the Coffee Economy Defense Fund (Funcafé), a Brazilian Federal Government fund that offers credit lines subsidized for the entire coffee production chain, financing from the costing of the crop, harvesting, marketing, to the recovery of crops and working capital for cooperatives and industries, with competitive interest rates and flexible terms

Benefiting coffee growers, production cooperatives, soluble coffee and roasting industries, and exporters, the credit is operated by accredited financial agents, such as public banks and cooperative banks, using the MAPA system.

The Fund - presented annually in parallel with the launch of the Harvest Plan - has an exclusive line for recovering damaged coffee plantations, as well as mechanisms for redirecting resources in emergency situations, making it possible to finance inputs, services and the restoration of degraded areas, helping coffee growers seeking productive diversification and greater climate resilience.

For the2025-2026 harvest alone, more than R$7.18 billion is on offer for financing coffee-growing. This figure represents increase of approximately 4% compared to the 2024-2025 harvest. Of this total, R$2.6 billion is for commercialization, aimed at allowing producers to sell their beans at more favorable market moments; R$1.98 billion is earmarked for maintaining crops and acquiring inputs (funding); R$1.18 billion is for acquiring coffee (FAC) for cooperatives, industries and exporters; R$1.38 billion for working capital for production cooperatives and roasting and soluble coffee industries; and R$31.3 million for recovering coffee crops damaged by climatic phenomena such as frosts, droughts, etc.

As Silas Brasileiro, president of the National Coffee Council, points out, rural credit, especially through Harvest Plan and Funcafé, continues to be fundamental for the sector. According to him, "these instruments guarantee resources for costing, investment and modernization of crops. However, we still face challenges such as access to credit for small producers, bureaucracy and the need to expand the resources available."

Seeking to guarantee its sustainability and efficiency, CNC - assures Brasileiro - "is permanently defending Funcafé", because through the Fund, "cooperative banks make it easier for resources to reach small and medium-sized producers, democratizing credit."

General director of the Brazilian Coffee Exporters' Council (Cecafé), Marcos Matos adds to the specific instruments the advance on foreign exchange contract, focused on coffee exporters. ACC is a pre-shipment financing that the exporter receives in Reais (R$) in advance based on an exchange contract, ideal for buying and processing coffee. In this case, BNDES acts through financial agents in pre-shipment (BNDES Exim) and emergency programs for exporters affected by tariffs.

Sectoral claims

Specific credit lines are also an option for organizations such as the Brazilian Association of Meat Exporters (ABIEC). Roberto Perosa - the association's president - said: "We are discussing with the federal government the creation of credit lines for the entire chain, including industry and livestock farmers. These instruments are important to stimulate investments, such as confinement and innovation, and to provide support in times of market instability. The proposals are still under construction, but they represent an important agenda for ensuring balance in the sector."

Fish farming – which, as Francisco Medeiros, president of the Brazilian Fish Farming Association (Peixe BR), puts it, "in Brazil, it is the agribusiness sector that receives the least amount of financial funding" – is also calling for changes in the criteria for producers' access to credit: "Even though Harvest Plan has made the process easier to understand, the requirements regarding environmental licensing issues still need to evolve," says Medeiros.

The executive sees a positive side to this difficult access to resources, which he defines as "the health of the system, since more than 85% of the costing and investment is done with our own resources. We don't have any other agribusiness activity with financial health like this, but we need more resources for financing."

Some segments of Brazilian agribusiness rely on financing through specific funds, with credit and subsidies that take into account the peculiarities of the activity, such as the Funcafé (Coffee Economy Defense Fund). This practice is currently being demanded by the livestock and fish farming (pisciculture) sectors, for both producers and the industry.

Availability of alternatives to official credit grows

To complement credit for farmers, a number of instruments have emerged. Institutions representing the sector, such as the Brazilian Agribusiness Association (Abag), highlight the role played by private instruments, which are increasingly being considered as complementary alternatives to official credit.

These mechanisms have increased the participation of the capital market in financing the sector, bringing a greater volume of resources and new possibilities for financial structuring. The trend is to strengthen these instruments, driven by greater integration between agriculture and the financial system, as well as the search for more diversified sources of funding.

Capital market structures based on Fundo de Investimento em Direitos Creditórios - FIDC - (Receivables Investment Fund), a financing vehicle that advances the value of receivables - such as duplicates, CPRs and barter contracts - from producers, cooperatives and agro-industries, come to mind, since they raise funds from investors to finance the sector, improving the cash flow of those who sell and offering profitability to those who invest; as well as the Agro-industrial Production Chains Investment Fund (Fiagro), which allows anyone to invest in the sector via the purchase of land or agro securities. These tools are usually structured as Fiagro-FIDC, for agro-industrial production chains.

These instruments are regulated by the Brazilian Securities and Exchange Commission (CVM) and often use real guarantees, such as pledges of crops or rural properties, reducing dependence on traditional banks and offering terms suited to the agricultural cycle.

Raising funds via its own credit platform, with governance, flow predictability and access to institutional investors, is an advance in the forms of financing and a transformation in the financial architecture. Another practice is the integration of capital market structures and tax assets accumulated by agribusiness companies, such as accumulated ICMS credits as part of investment structures linked to structured funds, broadening access to capital and stimulating investment.

Private sources also include Letra de Crédito do Agronegócio - LCA - (Agribusiness Letter of Credit), a security issued by banks to raise money from investors and pass it on to the producer; Certificado de Recebíveis do Agronegócio - CRA - (Agribusiness Receivables Certificate), a fixed-income security traded on the stock exchange (B3), used by large companies and producers to raise millions at once; Cédula de Produtor Rural - CPR - (Rural Product Note), an instrument signed by the rural producer promising to deliver part of the crop (physical) or its value (financial) in exchange for money today; and CPR Verde (Green CPR), a variation of CPR focused on remuneration for environmental conservation or sustainable practices.

The interest in LCA is also expressed in BNDES' balance sheet. As reported, in 2024, the institution returned to the domestic funding market R$10.2 billion on December 31, 2025, with the issuance of LCA and Development Credit Notes (LCD), and specifically the balance of agribusiness bills.

In the case of CPRs, B3, the Brazilian stock exchange, has registered R$6 billion in issues aimed at individual investors since August 2025. The volume was raised in 14 issues, which totaled 4 million units and attracted more than 26,000 investors.

Bernardo Mello, superintendent of Funding and Credit at B3 - the institution that acts as CPR registrar - explains that, "traditionally, CPR is a product used in bilateral negotiations, between rural producers and cooperatives, for example, or used as backing for CRA issues. However, the publication of CMN (National Monetary Council) Resolution No. 5,118/2024 brought restrictions on the issuance of CRA, excluding publicly traded companies whose majority of revenues are not from agribusiness, as well as financial institutions."

In this scenario, marked by the combination of restrictions on CRA and greater flexibility and efficiency of CPR, there was a "natural redistribution of liquidity towards public offerings, which in a short time became an important way of raising funds for companies, as well as bringing new opportunities for retail investors", comments Mello, stressing that CPR can be issued without the need to issue a CRA, including by non-financial legal entities and does not depend on a securitization company, which makes the process simpler and also reduces the costs of the operation.

Regulation

Regardless of the name, purpose and destination, the rules for rural credit are continually being updated and improved, as are the monitoring and inspection instruments, with a view to following up on the use of the resources and, increasingly placing full responsibility on financial institutions, which, according to recent indications, must verify the purpose of the credit throughout the operation, including with the support of technologies such as remote sensing.

The most recent changes, defined by CMN Resolution No. 5,267/2025, which came into force in March 2026, as Marcelo Pimenta, head of agribusiness at Serasa Experian, explains, are structural, since, "by making continuous monitoring a formal requirement, it consolidates a new regulatory level and encourages the adoption of processes and technologies that support more accurate decisions. For financial institutions, this means not only complying with the standard, but strengthening risk management and the efficiency of rural credit."

According to Pimenta, "in practice, what changes is monitoring, which is no longer concentrated on granting or on specific moments in the operation cycle, but is now required on a permanent basis throughout the entire credit journey. To do this, it is necessary to integrate financial, registration, historical, territorial and production data in a consistent, traceable and auditable way, a challenge that requires mature data infrastructure and analytical capacity."

The impasse is to identify inaccuracies and relevant deviations before granting credit, the expert points out, requiring "correctly interpreting what the data reveals about the application of resources throughout the operation and, above all, making the best decision based on them. The criterion of misuse, for example, is a concrete example of this need for monitoring."

Loyalty, barter and consortium

In this scenario, some instruments made available by the input supply industry, such as loyalty programs, which, rather than points programs or relationship actions, are beginning to be seen as a strategy for generating shared value, capable of meeting the complex demands of rural producers and, at the same time, strengthening the entire production chain.

Another common practice in the market, especially in the world of inputs (pesticides, fertilizers and even seeds) for grains, is barter, which is being strengthened in a scenario of expensive and restricted credit, in which the producer is impacted by increasingly reduced margins, difficulty in accessing credit and the high cost of inputs.

Barter is the exchange of commodities for inputs, usually at the time of purchase of the input, at the beginning of the second quarter of each year. In this way, the farmer locks a significant part of his costs and makes the "payment" conditional on the delivery of the grain months later, at harvest. The result is a reduction in the producer's exposure to financial fluctuations, increasing the predictability of production costs.

Consortiums are also a growing practice in the heavy vehicle segment, which includes trucks, tractors, road equipment and agricultural machinery. Data from January 2026, from the Brazilian Association of Consortium Administrators (ABAC), show that the activity grew by 7.5% in the number of active participants and 6.2% in the average ticket, compared to the same period in 2025.

BALANCE SHEET

Rural credit growth is driven by CPRs

Corporate rural credit - according to the Rural Credit Bulletin released on March 10 by the Ministry of Agriculture and Livestock (MAPA), based on information from the Central Bank's Rural Credit and Proagro Operations System (Sicor) - recorded a positive performance in the first eight months of the 2025-2026 Harvest Plan. The total funds contracted between July 2025 and February 2026 amounted to R$354.4 billion, 7% increase on the R$330.8 billion in the same period of the 2024-2025 harvest. Of this total, the funds actually granted amounted to R$342.9 billion, increase of 4%.

Financing for agribusiness is growing beyond traditional methods, increasingly utilizing instruments such as CPR, LDA, FIDC, barter, and Fiagro, among other instruments regulated by the CVM

The positive balance - the report says - was mainly driven by the significant expansion of Rural Product Notes (CPR) issued by rural producers in favor of financial institutions. Contracts via CPR reached R$163.4 billion, increase of 39% against the previous harvest.

As the funds raised by this instrument are mostly used to cover the cost of the harvest, when you add CPR and traditional costing, the total volume used for this purpose reaches R$269.8 billion, increase of 12% compared to the 2024-2025 harvest.

Industrialization - or the transformation, improvement or processing of agricultural raw materials (agricultural, livestock, forestry or aquaculture) within the rural property itself or by cooperatives - also stood out, with 56% increase in contracts, which reached R$22.2 billion, the highest growth among all purposes. In concessions, the segment advanced 51%, reaching R$21.5 billion.

Costing and investment fall in traditional lines

On the other hand, traditional lines of credit fell. MAPA's Rural Credit Bulletin notes that costing contracts fell 13%, to R$106.4 billion, while funds granted fell 16%, to R$103.4 billion.

Investment fell even more sharply: 20% drop in contracts, which totaled R$39.5 billion, and 33% drop in grants, which reached R$33.0 billion. Contracts for commercialization also fell by 15% (R$ 22.9 billion) and 19% in concessions (R$ 21.8 billion).

According to MAPA's Agricultural Policy Secretariat, the bulletin indicates that the outlook for investments remained unchanged, with 20% drop, reflecting the sector's caution in the face of current interest rates, even in the face of the prospect of reduction in the Selic rate of around two percentage points by the end of 2026.

Investment programs: all down

All main investment programs fell compared to the 2024-2025 harvest, according to MAPA bulletin. Moderfrota led the way with 49% drop, from R$6.85 billion to R$3.48 billion.

Proirriga saw 48% reduction, while Inovagro fell 33%. Pronamp, aimed at medium-sized producers, fell by 34%, from R$5.49 billion to R$3.65 billion. Prodecoop was the program with the smallest negative variation, with reduction of 3%.

PROGRAM	HARVEST 24/25 (R$ bl)	HARVEST 25/26 (R$ bl)	VARIATION (%)
Moderfrota	6.85	3.48	-49%
Inovagro	4.52	3.03	-33%
Proirriga	1.19	0.62	-48%
RenovAgro	4.79	3.53	-26%
PCA	3.51	3.11	-11%
Pronamp	5.49	3.65	-34%
Prodecoop	0.72	0.70	-3%
Procap-Agro	0.92	0.72	-22%

Source: SICOR/Banco Central - Prepared by: DEFIN/SPA/MAPA]

Sources of funds

Controlled sources totaled R$98.8 billion, R$6.5 billion increase compared to January 2026. The most significant figure indicated by the bulletin involves the evolution of LCA in the controlled modality, in response to regulatory changes that expanded the use of this instrument: 4.038% increase, reaching R$25.7 billion.

Compulsory resources rose by 5%, to R$36.0 billion. In the opposite direction, controlled rural savings fell 26%, to R$10.6 billion, while constitutional funds fell 7%, to R$13.1 billion.

In non-controlled sources, the total reached R$80.7 billion, down 24%. Free LCA fell 36%, to R$41.1 billion, while free rural savings grew 28%, to R$35.2 billion. Free BNDES fell by 18%, to R$ 3.8 billion.

Equalized resources: 61% of the balance to be contracted

Of the total of R$113.4 billion programmed in equalized resources in the 2025-2026 Harvest Plan, MAPA Rural Credit Bulletin shows that R$44.1 billion had been granted by February, equivalent to 39% of the total. This leaves 61% available for contracting until the end of the plan, on June 30, 2026.

In equalized funding, R$27.7 billion of the R$63.0 billion programmed was granted, with 56% remaining. In investment, R$16.2 billion of the planned R$49.5 billion was released, with balance of 67%. In marketing, only R$279 million of the planned R$845 million was granted, also with balance of 67%.

Among the main financial institutions in equalized investment credit, MAPA's bulletin puts Banco do Brasil in the lead, with R$6.3 billion (35% of the programmed amount), followed by BNDES, with R$5.5 billion (31%). In costing, Banco do Brasil once again came first, with R$10.9 billion (63% executed), followed by Sicoob (R$5.4 billion, 57%) and Sicredi (R$4.9 billion, 30%). Cresol executed 100% of the programmed equalized costing credit.

There are still R$15.1 billion contracted but not yet granted, of which R$7.0 billion in non-binding financing, R$1.2 billion in Pronamp, R$800 million in PCA, R$500 million in Funcafé and R$500 million in Moderfrota.

Source: Rural Credit Bulletin published on March 10 by the Ministry of Agriculture and Livestock (MAPA), based on information from the Central Bank's Rural Credit and Proagro Operations System (Sicor).

Performance of rural insurance proves lack of protection for Brazilian agriculture

An open-air industry, agriculture is highly exposed to climatic risks, price fluctuations and logistical challenges. In this scenario, the expansion of financial protection tools plays a decisive role in guaranteeing productive continuity, income security and investment attraction.

Insurance, whether rural or agricultural, is - or should be - an instrument for mitigating losses caused by increasingly frequent extreme weather events, as well as strengthening the financial stability of production chains. However, this is not the reality in Brazilian agriculture.

The proof is in the figures released by the National Confederation of Insurance Companies (CNseg): the segment's revenue fell by 8.8% last year, from R$14.2 billion in 2024 to R$12.9 billion in 2025. The drop comes against a backdrop of reduced funding for rural insurance premium subsidies and greater caution on the part of producers in the face of rising policy costs.

The CNseg report points out that this downturn in 2025 "interrupted a cycle of expansion observed in previous years and raises alarm bells about the financial protection mechanisms available to Brazilian agribusiness."

The downturn contrasts with the growth seen from 2021 to 2024. During this period, revenue rose from R$9.6 billion in 2021to R$13.4 billion in 2022, R$14 billion in 2023 and R$14.2 billion in 2024. The drop recorded in 2025 interrupts this cycle and suggests a slowdown in demand for rural insurance coverage.

In practice, these figures show that some producers may be opting to be more exposed to climate and productivity risks, precisely in a scenario marked by greater frequency of extreme events, increasing the financial vulnerability of production chains. The reality is that producers with excessive debts and high leverage resist taking out rural insurance because they consider it expensive.

Parametric insurance: an option that lacks modeling

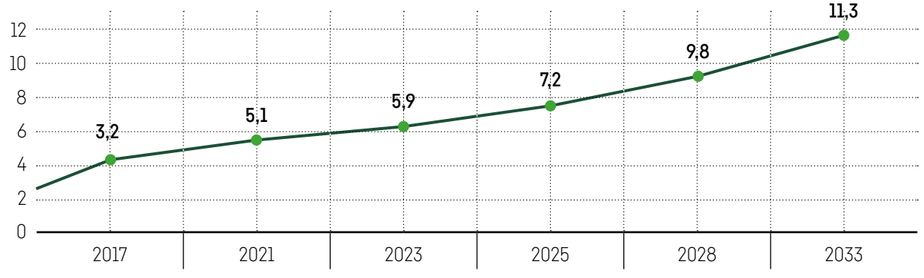
In contrast to this reality, the study "Parametric Insurance in Brazil - Opportunities, limits and challenges", prepared by the Credit and Rural Insurance Observatory of FGV Agro (Getulio Vargas Foundation's Agribusiness Center), points to the global growth of parametric insurance or index insurance, which consists of a complementary alternative to traditional insurance models, triggering indemnities based on indicators such as temperature, rainfall or average productivity, without the use of field inspections, leaving greater predictability and operational agility.

While still dependent on reliable data and institutional training, the agricultural parametric insurance market, as the study shows, is growing strongly: valued at US$ 5.9 billion in 2023, this figure is expected to almost double (US$ 11.3 billion) in 2033.

Specifically in Brazil, this modality is also growing, but in much smaller proportions, going from four contracts, totaling 186.5 hectares and R$ 470,000 in 2021, to 171 policies and 5,579 hectares, totaling R$ 21.6 million insured in 2024. Last year (2025), from January to April alone, there were 63 parametric policies, 5,200 hectares and R$10.8 million.

According to the authors of FGV Agro study, Vitor Ozaki and Daniel Miqueluti, building an effective parametric insurance policy requires rigorous statistical modeling and pricing: "The biggest challenge in parametric insurance is the possibility that the index does not adequately reflect the real loss experienced by the individual insured. It may be that the farmer suffers substantial losses without the index reaching the trigger. The understanding of insurance, which is more abstract than rural insurance, can also be a barrier to greater adherence, especially for small producers."

Growth of the global parametric insurance market (2017-2033) Values in billions of US dollars (US$)



Source: Allied Market Research, 2025

CREDIT AGENTS

In BNDES transfers, public and private banks and credit cooperatives coexist

BNDES, as manager of official credit lines, such as Harvest Plan, Climate Fund and ABC+ Plan, accredits financial institutions to pass on resources to rural producers

In this group, which comprises dozens of institutions, the most prominent are Banco do Brasil, state-owned bank; Bradesco, private financial institution; and the credit union systems, which are the main lenders, accounting for as much as 60% of the total Harvest Plan.

Banco do Brasil, for example, has historically had agribusiness as one of its main pillars. While quantifying this participation, Gilson Bittencourt, vice-president of Agribusiness and Family Farming at BB, cites the 2025 balance sheet, which shows an agribusiness portfolio of over R$406 billion, representing around a third of the bank's credit portfolio, consolidating growth of 2.1% in 12 months, which reinforces its leadership position in the sector

For 2026, predicts Bittencourt, "our outlook is for stabilization and gradual improvement, with more moderate growth in the portfolio, focus on credit quality and strengthening of guarantees. The guidance released last February indicates a variation in the agro portfolio of between -2% and +2%, precisely to ensure long-term sustainability and perennial support for agribusiness and family farming in all regions of the country." In other words: "The scenario is one of greater stability, with prices at a level closer to the historical average, progressive recovery of payment capacity and a more consistent resumption of credit."

With the goal of continuing to be the bank of Brazilian agribusiness, with operations throughout the production chain, Banco do Brasil is investing to advance in solutions in 2026, such as digital barter, integration of credit, insurance and technology, strengthening the relationship with cooperatives and technical presence in the field, because, as Bittencourt assumes, "our commitment is to continue fostering and supporting rural producers at all times, with responsibility, proximity and a long-term vision."

Bradesco - listed among the main on lenders of Harvest Plan among private banks - includes agribusiness as a strategic sector. In 2025 - says Roberto França, director of Agribusiness at this financial institution - "considering the scale of the portfolio, origination capacity and advancement of the ecosystem, 2025 was superior to the previous period. We ended the year with more than R$130 billion in an expanded agribusiness portfolio, considering lines aimed at clients in the segment, which reflects the strategic relevance of the segment within the bank. The bank has national presence, origination capacity and a relevant role in diversifying and generating business."

In an attempt to get the right reading of the cycle, França defines the year as "one of growth and consolidation of presence, but also a more demanding period from the point of view of risk and financial management in the field." Extending the analysis to 2026, he recognizes that the outlook is for growth, but "with discipline and selectivity. The expectation is to make progress from 15% to 20% in the expanded agribusiness portfolio, preserving the client base and looking for opportunities in the market with discretion."

A few days before the close of the 2025-2026 harvest (interview made in March 2026), Bradesco's Agribusiness director's reading shows "continuity of a selective environment, still pressured by the cost of money, but with consistent demand for quality credit", and allows us to maintain "the appetite for growth, with expansion from 15% to 20% in the expanded agribusiness portfolio in 2026, always prioritizing operations with good structure and compatible risk."

The same optimism permeates França's expectations for the next crop year: "For 2026-2027, the trend is for this transition to continue, with less relative dependence on subsidies and greater share of free resources, capital markets and private instruments."

Comprehensive portfolio

José Ramos Rocha Neto, executive director and vice-president of Bradesco, understands that "agribusiness is going through a more selective cycle, which demands complete financial solutions, credit discipline and proximity to the producer." In this scenario, the executive recognizes that the bank's operations "have evolved to combine resources from Harvest Plan with free and private instruments, expanding its support capacity at different times of the production cycle. We remain committed to fostering sustainable growth, with responsible credit, specialization and focus on the sector's competitiveness."

Asserting that Banco do Brasil "has the most complete agribusiness financing portfolio in the country", Bittencourt states that BB's agribusiness operations "combine its own resources, equalized resources and on-lending operations." The amounts made available in the 2025-2026 Harvest Plan, which total R$230 billion, were distributed into four main segments: R$97 billion for funding; R$44 billion for investment; R$19 billion for commercialization and industrialization; and R$70 billion for agricultural bonds and value chain financing.

Breaking down the figures by target audience or credit line, Bittencourt presents the following numbers: R$ 24 billion for family farming (Pronaf); R$ 27 billion for medium-sized producers (Pronamp); and R$ 109 billion for commercial agriculture. He adds: "We are leaders in all major programs, such as Pronaf (34% market share), Pronamp (31% market share), RenovAgro (67% market share), PCA (36% market share), Inovagro (58% market share), and Proirriga (44% market share). We also have a strong presence in CPR, CPR Barter, our own unrestricted funds, and BNDES transfers."

Bradesco also has a broad portfolio of solutions for agribusiness, combining free resources, traditional rural credit lines, private instruments and programs with targeted funding or transfer. Operations aimed at rural production, agricultural and livestock investments, financing machinery and equipment and infrastructure, as well as private instruments such as CPR Financeira are among the products. These lines are in addition to programs like Pronaf, Pronamp and BNDES lines, including PCA, Proirriga, Inovagro, Renovagro and Prodecoop.

Detailing the major blocks and some of the operating conditions, França talks about the impossibility of disclosing figures for each product due to Bradesco's internal policy. The classification is as follows: own resources , market resources and free resources include CPR Financeira (CPRF), rural credit with free resources, agricultural and livestock investments with own funding, and a significant part of the operations originated in E-agro. Directed resources and transfers include Pronaf, Pronamp and BNDES Lines.

For these institutions, Harvest Plan continues to be the main source of funds for agribusiness clients, even for including resources with controlled interest rates, either via equalization by the National Treasury or from demand deposits, and resources at free interest rates, from rural savings and LCA demand deposits, as well as their own resources.

" Harvest Plan is essential due to its scale, predictability and differentiated interest rate conditions for some lines of credit," reinforces BB's vice-president for Agribusiness and Family Farming, based on his observation that, "in the 2025-2026 harvest, we have already disbursed R$117.2 billion, including operations and renegotiations under Provisional Measure 1314/2025."

Bradesco's Agribusiness director also believes that, in parallel with Harvest Plan, as "agribusiness has grown in scale, complexity and need for capital", the sector's financing has increasingly "come to rely on free resources and private instruments, reflecting the evolution of the funding structure of Brazilian agribusiness itself."

Credit cooperatives: an important arm of financing for Brazilian farmers

In the Harvest Plan, credit cooperatives consolidated their position as the main channel for transferring funds from the National Bank for Economic and Social Development (BNDES). Data from the institution show that credit unions account for 60% of the total BNDES transfers, as recorded in the 2024-2025 Harvest Plan, significantly surpassing commercial banks, which accounted for 23%, with Banco do Brasil and Caixa Econômica, Banco Regional de Desenvolvimento do Extremo Sul (BRDE) and Banco de Desenvolvimento de Minas Gerais (BDMG) accounting for the remaining 17%.

The percentage of resources is exceeded by the percentage of requests which, in the same harvest, reached 87% of the total number of operations, showing the strength in capillarity and presence, especially among small and medium-sized producers, with transfers from Pronaf (Family Farming) and Pronamp (Medium Producer) lines.

These results can also be credited to the historical and structural link between agricultural and credit branches. Rodolfo Jordão, coordinator of the Agricultural Branch of the OCB System (Organization of Brazilian Cooperatives), recalls that "the very emergence of many credit cooperatives is directly associated with the need to finance rural production, organize access to inputs and guarantee working capital for producers."

Jordão uses the most recent data from the Panorama of the National Cooperative Credit System (SNCC), as of December 2024, to measure this relationship: in the Individual portfolio of credit cooperatives, 43.3% of operations are classified as Rural. In other words, almost half of the sector's individual credit portfolio is used to finance the rural production sector.

"This percentage shows that agriculture remains one of the main driving forces behind credit cooperatives, both in terms of volume and strategic relevance," Jordão emphasizes, guaranteeing that " rural credit, in addition to sustaining production, boosts local chains, strengthens succession in the countryside and generates a multiplier effect in regional economies - which reinforces the interdependence and complementarity of the two branches."

Giving cooperatives a voice

Asserting that Cresol is one of the few financial institutions in Brazil "that is growing in the volume of credit and operations in financing aimed at agriculture, and that this is one of the main pillars of the cooperative, with relevant participation both in the composition of the portfolio and in the generation of results", Adriano Michelon, vice-president of Cresol, comments that the cooperative's perception of the market differs, in part, from that of the market.

"Our job is to look for alternatives so that producers won't have to slow down, to give them the support they need to maintain their activities in a resilient manner. For 2026, we expect this leading role to continue, with sustained growth and attention to the granting of credit, considering factors such as climate risks, commodity volatility and a more challenging macroeconomic scenario," reports Cresol's vice-president.

Sicoob, listed by the Central Bank of Brazil as one of the largest rural credit providers in the country, has achieved "consistent growth over the years, reflecting our confidence in and commitment to Brazilian agribusiness", says Francisco Silvio Reposse Junior, Sicoob's Commercial and Channels Director.

In 2025, agribusiness was consolidated as one of the main pillars of Sicoob's growth and, today, the rural credit portfolio "represents 35% of our institution's financing", celebrates Reposse, while informing that, for 2026, the outlook "is for acceleration, with a focus on converting market potential into effective disbursements, especially through the strengthening of singular cooperatives and the use of equalized resources."

The expectation is based on the results of the last three harvests, as "we have seen growth of more than 36% in the balance. We closed the 2024-2025 harvest with a portfolio balance of R$83.4 billion. And in this 2025-2026 harvest, we have already released more than R$39.2 billion in rural credit, reaching a portfolio balance of R$92.7 billion," says the Commercial and Channels director of this cooperative credit system.

The Sicoob interviewee adds: "For the 2025-2026 period, our goal is to achieve 8% growth, focusing on redistributing underutilized limits to regions of high demand. For the 2026-2027 cycle, the goal is to maintain our growth, consolidate the digitalization of credit with effective tools and expand the supply of rural insurance, protecting producers' income in the face of climate instability."

Recognizing Harvest Plan as the main source of funds for Sicoob's clients, "due to the equalized rates that offer competitiveness to the producer, especially in Pronaf", the cooperative - according to Reposse - has a robust portfolio, basically with BNDES Rural, Repasses, Funcafé, Constitutional Funds, Own Resources and CPR-F, but is strategically seeking to increase the share of Mandatory Resources, including LCA: "This increases our autonomy and gives us agility at the top, allowing the cooperative to serve producers even in times of scarcity or suspension of external transfers."

For Cresol, Harvest Plan also continues to be the main source of funds for most producers, especially small and medium-sized ones, even because "it offers a set of strategies with more attractive conditions, such as subsidized rates and terms suited to the production cycle. And Cresol, as one of the systems with the most widespread credit in Brazil, maintains this activity in agriculture as one of its most important commitments," says Cresol vice-president.

"The year 2025 marked three decades of Cresol's history. We recorded 26% growth in assets (R$53 billion) and consolidated a network that today has more than 1,000 branches in 20 states, serving more than 1.1 million cooperative members across the country. In the current harvest, we have operationalized around R$12 billion in resources, in more than 100,000 contracts. The amount is already close to the R$13 billion recorded in the 2024-2025 harvest and the trend is to surpass what has already been a historic milestone for Cresol," summarizes Michelon.

At Cresol, a cooperative credit institution that made its history alongside family farmers and has recently expanded its reach, the portfolio for agriculture is diversified, with lines for funding, investment, commercialization and working capital. The balance sheet presented by its vice-president states that costing credit currently accounts for "60% of transfers for the 2025-2026 harvest, followed by investment lines for the purchase of machinery, equipment and structural improvements."

The sources of funds are the usual ones: a significant portion is made up of on-lending lines, with strategic partnerships, such as BNDES , "of which we are the largest operator for the Individual public, mostly made up of small farmers, with more than 103,592 thousand operations and an average ticket of R$84,667.20," says Michelon, noting that "own resources have also been gaining relevance, allowing greater flexibility in credit conditions and more agility in meeting producers' demands."

Banks and cooperatives: similar challenges

Credit defaults are usually pointed out in Brazilian society as a major bottleneck to be overcome, and high interest rates are one of the main internal factors, in addition, of course, to external political and economic factors. Data from February 2026 computed by Serasa's "Map of Delinquency and Debt Negotiations in Brazil" shows a record increase in the volume of delinquents in the entire historical series, with 81.7 million people in debt, after 14 consecutive months of increase.

In agribusiness, defaults do exist, but the levels do not compromise operations. In Cresol's portfolio, for example, Michelon says that they fluctuate "between 1.5% and 2% this harvest, but is historically lower compared to other types of credit. In 2025, there was a sporadic increase in some regions, especially impacted by adverse weather events and price fluctuations, but the scenario remains under control. In the case of Cresol, we have been active in renegotiating and closely monitoring producers, which contributes to reducing risks and preserving the quality of the portfolio."

At Sicoob, 15-day delinquency is 2% of the total and 90-day delinquency is 1%. This indicator is based on what Reposse defines as "rigorous regulatory monitoring. The current focus is on cleaning up demands for LCA and RO to guarantee financial health and avoid penalties, while keeping defaults under control through technical consultancy and proximity to the cooperative member."

At Banco do Brasil, the indicators are higher than those recorded in cooperative credit. BB's Vice President of Agribusiness and Family Farming comments that, in 2025, "the Bank's performance was impacted by the increase in defaults in agribusiness, concentrated in certain profiles, regions and production chains, especially in corporate agriculture and in operations more exposed to free rates. 2025 was a year of adjustment. We had defaults that had never been seen before in agribusiness, with growth well above the historical average, which put pressure on provisions and the Bank's results."

In December 2025 - as reported by Bittencourt - the default rate in BB's agribusiness portfolio "reached 6.09%. This default is mainly concentrated in corporate agriculture, in costing operations and in some specific crops, such as soybeans and beef cattle." Looking from a positive angle, the executive retorts that "this figure does not reflect the sector as a whole. The vast majority of our clients remain in good standing. The challenge lies in specific pockets that have accumulated more than one stress factor that has affected their cash flow and, consequently, their ability to pay."

Assuring that "94% of our portfolio and our clients remain in default", Bittencourt reports that, in this challenging context, "BB showed resilience, ended the year with clear signs of inflection and entered 2026 on a more solid footing, after a series of structuring measures adopted throughout the year."

Assuming that the increase in defaults is largely the result of the high interest rate environment and cash flow pressures in some of the sector's chains, Bradesco's Agribusiness director doesn't cite figures but guarantees: "Brazilian agribusiness remains structurally solid and, in the case of our portfolio, the client base remains mostly healthy, with recurring operations and close monitoring by the bank. Our action has been to anticipate conversations with producers, adjust deadlines when necessary, and preserve the ability to resume operations."

Bottlenecks affecting rural credit

Despite the progress made by Brazilian agriculture and the instruments used to finance the activity, the road to strengthening rural credit still has challenges and great opportunities.

In the view of Cresol's vice-president, the constant changes in scenarios, the recurrence of major climatic phenomena, fluctuations in commodity prices, and the ongoing need to invest in technology interfere with the cooperative's day-to-day relationship with its public.

Bittencourt, for his part, observes a mismatch between production costs and income, high cost of credit, especially free rates, extreme weather events in some regions in recent years, high cost of leases, high level of capital immobilization in productive activities (land and machinery) and non-productive activities, as well as increase in indebtedness to rural credit and input suppliers for certain profiles of producers in past harvests.

To deal with this scenario, Banco do Brasil - according to its vice-president - "adopted a proactive approach. I would highlight the renegotiations supported by Provisional Measure 1314, which made it possible to deal with R$35.5 billion in rural debts, benefiting more than 21,000 clients. In addition, we reinforced the requirement for guarantees, improved our risk models, intensified preventive action with clients and expanded the use of mitigators. Today, more than 40% of agricultural funding already has some kind of mitigator, reaching more than 70% in more sensitive regions."

To mitigate the consequences, "Cresol works with well-defined criteria aimed at the common objectives of the cooperative members, balancing our essence with monitoring new demands. In addition to spreading credit, our relationship with the membership, with the producer, is very close, very simple, and this generates trust, credibility for him to speak up, to bring his difficulties, but also to have the security of the actions we propose, from technical assistance through our projects to the guidance of our teams in the branches," Michelon summarizes .

The alternatives found by Cresol also include taking "the demands to the debates we participate in, when we are at the table with other agents and partners talking about structuring the Harvest Plan. This background is very important for building the most efficient solutions for our agriculture."

Reposse adds to the list the rural exodus, "especially of the young population, which empties the country side and reduces the availability of future labor." Also in this regard, the Sicoob director mentions the shortage of specialized professionals, prepared to work in an increasingly automated and technological agriculture, and adds the need for technical assistance connectivity: "Bringing quality internet and technical guidance to all corners of the country is crucial to optimize the use of credit."

Financial costs and pressure on cash flow, especially in an environment of higher interest rates, are listed by Bradesco's Agribusiness director, who also includes as a point of attention the increased use of judicial recovery in the field, which can raise the perception of risk in the system and impact the cost of credit.

França points to the combination of credit discipline, early renegotiation, reinforcement of guarantees and proximity to the producer, as the institution's response to the market, and adds: "We also continue to invest in specialized presence, with more than 17 platforms dedicated to agribusiness in the country and more than 150 professionals focused exclusively on the sector."

The bottlenecks pointed out by the interviewees also include the need to simplify rural producers' access to credit, especially for small producers, and to expand the contracting of rural insurance and the adoption of mitigation practices. The paths found by Sicoob include investments in technology to simplify the credit journey, from the application to the release of funds, without losing human proximity; and financial education, because, "more than giving credit, we need to teach how to use it well. As a cooperative, we have the role of promoting financial education in the countryside, guaranteeing the financial health of our members and their properties."

Establishing partnerships is also on the list of solutions. As example, Reposse cites the Technical Assistance and Rural Extension Company (Emater) and the National Rural Apprenticeship Service (Senar). The former, together with Sicoob, "identifies families with potential and interest, especially those with young people involved in the succession process. With Senar, we developed a customized knowledge trail."

Sustainability: special lines

Also for credit institutions, whether cooperatives or not, sustainability is fundamental and strategic. To this end, they develop special lines. In the case of Sicoob, in addition to its own lines and programs, the institution maintains lines of Agro sustainable Rural Credit in partnership with IDB (Inter-American Development Bank); "We are in the process of expanding these lines, seeking to increasingly link credit to environmental preservation and productive efficiency", comments the Commercial and Channels director.

To these actions, the executive adds the Sustainable Rural Producer Award, which is in its 5th edition, to encourage good practices, in order to reward and recognize rural producers (small, medium and large) cooperating with Sicoob who stand out for adopting sustainable production practices, in line with ESG (Environmental, Social and Governance) guidelines, contributing to environmental preservation and the responsible development of agribusiness.

According to França, Bradesco operates Renovagro within its portfolio of financing for infrastructure and investment in the countryside, alongside programs such as PCA, Proirriga, Inovagro and Prodecoop, as well as maintaining socio-environmental credit solutions and a broader agenda of ESG operations. "For us, sustainability is not a parallel agenda, but part of the evolution of the sector's own business model," he says.

There is financing through specific funds, such as Funcafé, a practice that is being claimed by the livestock and fish farming sectors for both producers and the industry.

At Cresol, more than 50% of its agro portfolio is considered environmental, according to Febraban (Brazilian Federation of Banks) taxonomy, guarantees its vice-president, and we understand this scenario as fundamental for the advancement of agriculture in the country as a whole. Sustainable production strategies are the organized producer's ally and this environmental compliance becomes a competitive advantage. This is because we have, for example, entrepreneurship programs with the participation of international funds that are very demanding in environmental terms. So these lines have been growing consistently and tend to gain more share in the coming years.

Banco do Brasil, for its part, has made a commitment to reach R$200 billion in its sustainable agribusiness portfolio by 2030. To achieve its goals, it maintains specific lines for pasture recovery, regenerative agriculture, renewable energies, soil management, efficient irrigation and emissions reduction for all groups of farmers, from family farmers to mega-producers. "We also operate our own socio-environmental analysis tools, which prevent credit from being granted in areas with legal or environmental restrictions," adds Bittencourt.

Rural and agricultural insurance

Even though they're not moving very fast, financial institutions recognize that rural insurance has evolved. Banco do Brasil, for example, which operates in partnership with BB Seguros, offers agricultural insurance, billing insurance and, more recently - as Bittencourt commented - has been developing parametric insurance pilots, based on climate indicators.

In credit cooperatives, despite the advantages over commercial and even public financial institutions, human service and the reinversion of results in the community itself generate a virtuous cycle of development for Brazilian agribusiness. Even so, there are bottlenecks when it comes to contracting rural and agricultural insurance.

Defining Sicoob as a "systemic leader in rural insurance in several regions", he, like the other interviewees, recognizes the role of technology in better risk pricing: "Satellite monitoring, for example, is fundamental for fairer pricing."

Bradesco's ecosystem operates through Bradesco Seguros, "with solutions aimed at agribusiness that include agricultural insurance, livestock insurance and insurance for agricultural machinery and equipment, covering different fronts of productive activity in the countryside," explains França, noting that the bank also distributes protection solutions associated with rural credit operations, expanding producers' access to financial protection and risk management instruments.

For Cresol's vice-president, the evolution of the technology embedded in the machines is also helping, allowing the financial institution to carry out inspections via link or by remote sensing, reducing costs.

These developments, as Michelon points out, have given agricultural insurance a cycle of significant evolution, "increasingly understood as essential risk management tool, especially in the face of climatic events and the increase in the value of assets such as livestock, contributing to the re-evaluation of the perception that costs tend to be re-evaluated, because sometimes the loss of an animal can have a direct and prolonged impact on the cooperative member's income, justifying the investment in protection with a focus on providing security to the producer, protecting crops, animals, machinery and equipment."

Both cooperatives have strategic partnerships with major insurance companies, which allows them to offer a complete portfolio of customizable coverage to meet the needs of each cooperative member and ensure that insurance is seen as an investment in protecting assets, and not just a cost.

Bittencourt warns: "Insurance doesn't solve everything on its own. It must be accompanied by management, technology in the field, risk mitigation, sustainable practices and financial planning. The lower the structural risk, the more viable and affordable insurance becomes."

6

WOMEN IN AGRICULTURE

Female presence.

Numbers and challenges.

Profile of Sílvia Massruha, president of Embrapa.

Awards.

Leadership.

Congress.

WOMEN IN AGRICULTURE

Women: recognizing and valuing those who have always been there

The growing participation of women in agriculture is an important step forward. Women are taking on increasingly strategic roles, both in farm management and in leadership positions in organizations and companies.

Considered by many to be a breakthrough, this recognition does justice to a historical but peripheral role that has always been played by women: that of supporting activities in the field, often literally putting their hands in the dough at planting and harvest times, but always feeding and organizing domestic and family activities.

Over the years and with the movements for women's emancipation and empowerment in society, these activities have expanded to farm management, activities that have been encouraged by companies and institutions.

A survey by the Center for Advanced Studies in Applied Economics (Cepea), in partnership with the Confederation of Agriculture and Livestock of Brazil (CNA), reveals that approximately 11 million women work in the sector. The Brazilian Institute of Geography and Statistics (IBGE) shows that the female force controls around 30 million hectares in the country, equivalent to 8.5% of the total area occupied by farms and ranches.

The Brazilian Agribusiness Association (ABAG), for example, encourages and supports this movement through initiatives aimed at valuing diversity, training and increasing the presence of women in decision-making spaces. That's why it participates in actions such as the National Congress of Women in Agriculture, promotes the Women in Agriculture Award, together with Bayer, and the Women in Agriculture Leadership Academy (ALMA), in partnership with Corteva and Fundação Instituto de Administração (FIA), higher education institution founded in 1980 by professors from the Department of Administration at the University of São Paulo (USP).

About 8.5% of rural farm area is led by 19% of all rural producers

The outlook for the medium term is very positive, with a trend towards continued growth in women's participation, driven by greater access to education, professionalization of rural management, and cultural transformation in the countryside.

Numbers of female strength in the countryside

The most recent IBGE Agricultural Census, released in 2017, shows that women manage approximately 30 million hectares in Brazil, only 8.5% of the total occupied by rural establishments in the country. The same survey states that 947,000 women who manage properties, or 19% of all rural producers in Brazil, are women who are in charge of properties that have average size of 48.8 hectares, while the average size of properties managed by men is almost double, 94.9 hectares. What's more, most of the properties led by women are in the Northeast (57%), followed by the Southeast (14%) and the North (12%).

IBGE also found that more than 817,000 women work in the co-management of farms (when they share the leadership with their spouse or partner), which brings the number of women in agricultural leadership to around 1.7 million.

The expectation is that the next IBGE Agricultural Census, scheduled for 2026, will confirm the growth in the role of women compared to previous censuses.

While IBGE hasn't updated the official data, a 2023 survey by Cepea (Center for Advanced Studies in Applied Economics) in partnership with CNA (Confederation of Agriculture and Livestock of Brazil) shows that 10.6 million women work in Brazilian agribusiness, both on and off the farm, including primary production, agro-industries and services.

More recent data collected by Cepea/CNA shows that in the second quarter of 2025, agribusiness reached an all-time high of 28.2 million workers in total. Of this figure, female participation grew by 1.9% compared to the previous year, representing increase of approximately 203,000 women entering or becoming formalized in the sector from 2024 to 2025. This percentage exceeds the growth rate of the male population, which was just 0.2% over the same period.

Cepea/CNA bulletin highlights that this increase in the number of women is accompanied by a rise in the level of education, with significant increase in female workers with higher education in the field.

Casting out nines

A study carried out by Agtech Innovation - called "Protagonism and impact: the presence of women in Brazilian agribusiness" and released at the beginning of March 2026 - found that despite the recognition of women's impact in strategic areas such as leadership, people management and innovation, structural barriers still hold back equity in the sector. In other words, the presence of women in Brazilian agribusiness has been consolidated as a strategic pillar for innovation and sustainability, but gender equality still faces significant obstacles in power structures.

The research combined quantitative and qualitative data and reveals dissonance between the recognition of the value of diversity and the day-to-day practice of companies in the sector. As a result, Brazilian agribusiness remains marked by strong male predominance. According to the survey, in 59% of the companies interviewed, decision-making is seen as the sole responsibility of men. Only 17% of situations are defined by women. Gender balance is perceived in only 22% of cases.

"There are still significant opportunities to effectively increase the presence of women in decision-making positions, which represents not only a strengthening of governance, competitiveness and sustainability in agribusiness, but also a factor in social progress, capable of bringing about structural changes," says Mayra Theis, partner and leader of the Agribusiness sector at PwC Brazil.

Both male and female respondents recognize the important contributions of the female presence in agribusiness, especially in three central pillars: innovation and strategic vision (49%), leadership and management (44%), and adaptation and resilience (44%). These aspects reveal the role of women in opening up space for new solutions, engaging teams and facing the constant challenges of the sector.

"Women act consistently at different levels of the production chain, contributing to qualified decision-making processes and diverse business environments," adds Mayra Theis.

Opportunities and remuneration: inequalities

The consultancy's study confirms that inequalities persist in the agricultural market, especially in relation to female opportunities and remuneration, access to decision-making positions, and working conditions. The survey shows that 73% of participants disagree that men and women have the same opportunities in the sector.

Among women, the main career challenges listed relate to a lack of balance between personal and professional life, salaries that are incompatible with their roles and lack of recognition. According to the survey, 79% of men and women recognize that they face embarrassing situations at work. And 74% of participants also believe that there is a lack of suitable conditions for mothers in the workplace.

To achieve gender equality, women reinforce the demand for financial support for female entrepreneurship and fair salaries for female leaders (30% against 9% of men).

The pursuit of equity is also the job of men

The study "Protagonism and impact: the presence of women in Brazilian agribusiness" highlights the need for greater male engagement to advance the equity agenda. Although 47% of men believe they play an important role in this agenda, they do not see themselves as protagonists of change. Only 39% believe that they should lead discussions and decision-making on the issue.

The main obstacle to male action, mentioned by 34% of women and 16% of men, is the lack of reference and the difficulty to know how to act. There is a perception of "cognitive dissonance": the problem is recognized, but individuals do not take responsibility for the solution.

"The reinvention of the sector depends on the ability to integrate talent, foster dialogue and build collective solutions to increasingly complex challenges. By promoting fairer and more collaborative environments, we strengthen not only our companies, but also society," says Dirceu Ferreira Júnior, CEO at PwC Agtech Innovation and partner at PwC Brasil.

Inclusive environment: the solution

The PwC Agtech Innovation study concludes that diverse teams have demonstrated that they are capable of expanding their repertoire of solutions and strengthening governance. This involves reviewing hiring, promotion and succession policies, ensuring equal opportunities; offering suitable conditions for parenthood, involving men and leaders in discussions and engaging them in their role in advancing equity.

"We will only be able to overcome the barriers that limit gender equality with practical actions that promote an inclusive environment," concludes Mayra Theis.

PROFILE

Silvia Maria Fonseca Silveira Massruha: Embrapa President

With a degree in Systems Analysis from the Pontifical Catholic University of Campinas (1988), a master's degree in Automation from the School of Electrical and Computer Engineering (1996) at the State University of Campinas (Unicamp) and a PhD in Applied Computing from the National Institute for Space Research (2003), Silvia Massruhá started at Embrapa in 1989 as researcher at Embrapa Informática Agropecuária, now Embrapa Digital Agriculture. Since then, she has held numerous leadership positions in response to the investment she made in her career. Her appointment as President of the Brazilian Agricultural Research Corporation (Embrapa) in 2023 can be seen as the crowning achievement of a life dedicated to research and science, and made her the first woman to take on the role in the institution's five decades of existence.

Learn about the career, victories and thoughts of this female leader in agribusiness.

Have a good read!

Your career can be seen as the path usually taken by women to conquer space in the business and scientific environment, as well as in agriculture. What are the main challenges you have overcome?

The conquest of female leadership positions in Brazilian agricultural research reached a historic milestone with my appointment as the first female president of Embrapa in five decades of existence. This progress reflects a structural change that began in the educational field, where the Brazilian Academy of Sciences (ABC) already identifies gender parity in postgraduate research and publications. In agricultural sciences specifically, women already account for 51% of PhDs ,consolidating a highly qualified technical base that underpins the country's technological vanguard.

In terms of Embrapa's management, under the current Board of Directors, which has three women on the Executive Board, we have made significant quantitative progress. Since we took office in 2023, the total number of women occupying commission positions has jumped from 38.48% to 42.34%, signaling a process of continuous and intentional growth. Another symbolic and administrative milestone of great importance was the inauguration in 2024 of the first female ombudsman in the company's history, reinforcing female representation in control and transparency mechanisms.

In the productive sector, we overcame the challenge of the statistical and social invisibility of rural women managers. IBGE's Agricultural Census revealed that the number of women in charge of rural properties in Brazil jumped from 656,000 in 2006 to almost 1 million in 2017, which represents 18.7% of all managers. This increase of almost 300,000 women in a decade shows that the role of women is an irreversible reality, both in family farming - where more than 80% of these managers work - and in large enterprises.

Finally, we have consolidated intelligence tools to support these achievements, such as the Observatory of Rural Women in Brazil. This platform, coordinated by Embrapa with the support of FAO, provides subsidies for improving specific public policies for rural, riverine, indigenous and extractivist women. The legacy of pioneers such as Nobel Prize-nominated researcher Johanna Döbereiner serves today as a basis for inspiration and legitimacy for new generations to occupy their spaces with technical authority.

What challenges still need to be overcome?

Despite the progress, agribusiness is still a predominantly male universe due to historical factors in the evolution of agriculture, where men have traditionally been the protagonists in rural succession. In many contexts, women producers or technicians still face a perception of "strangeness" or mistrust, which requires them to make an extra effort to prove their value and knowledge to their male peers. It is essential that the presence of women in senior management positions is no longer seen as something unusual and is treated as an institutional normality.

One of the biggest obstacles lies in reconciling a professional career with personal interests, especially with regard to the overload of care work. Responsibility for caring for family members and household chores still falls unequally on women, which impacts on their willingness to take on more demanding jobs. In this sense, the implementation of a National Care Policy and internal programs to combat harassment and encourage management are crucial steps to ensure real equal opportunities.

A "glass ceiling" also persists, limiting women's access to the highest levels of teaching and higher management. Although we account for 51% of PhDs in agriculture, we occupy only 25% of permanent teaching positions at universities; at Embrapa itself, although we account for 38% of female PhD researchers, our participation in senior management is still around 25%. Overcoming this mismatch requires organizations to actively encourage women to take part in selection processes and create training and mentoring spaces focused on leadership.

Finally, the challenge of integrating the ESG (Environmental, Social and Governance) agenda should be seen as an opportunity for women, given their systemic outlook and sensitivity to socio-environmental dimensions. We need to move forward so that equity policies take into account the heterogeneity of Brazilian women - including indigenous, quilombola and riverine women - ensuring that technological innovation is, in fact, inclusive. The goal is to reduce the time estimated by the World Economic Forum for global gender equality, promoting a more diverse and resilient agribusiness.

Can the fact that you work for a research company that is a global benchmark be considered a facilitator for women to stand out in positions like yours?

Being part of Embrapa's staff can be an advantage when you consider other spheres of the professional and knowledge world. But, on the other hand, it means increased responsibility and a great deal of involvement and dedication, so that science remains among the world's leaders in scientific and technological development. Furthermore, it is undoubtedly an opportunity that needs to be valued, not just for the visibility, but for the recognition and proof that competence is independent of gender.

How can we encourage greater female participation in the various stages of the agricultural chain?

In order to encourage greater female participation, the fundamental basis lies in continuous investment in women's education, technical and intellectual training. I argue that gaining space must be accompanied by solid preparation, allowing them to occupy leadership positions and act on farms with full scientific authority. At Embrapa, this reality is already evident in the gender parity in postgraduate research and in the fact that 38% of our female researchers have PhD. Uninterrupted encouragement to take part in courses, training and technical studies is the necessary driving force to foster innovation and a spirit of transformation throughout the production chain.

A second essential pillar is direct encouragement for women to apply for management and decision-making positions. Organizations need to promote spaces for exchanging experiences and stimulating talks that encourage female protagonism. We must value the systemic view that women naturally have of rural properties, which makes them a strategic ally in implementing the ESG (Environmental, Social and Governance) agenda. When women take on leadership roles, they bring a decisive sensitivity to organizing processes, bringing the family into the rural business.

Institutionally, overcoming obstacles requires the implementation of public policies and internal programs that guarantee gender equality. This includes strengthening mechanisms to combat moral and sexual harassment, ensuring a safe and inclusive work environment. At the same time, the defense of a National Care Policy is crucial to redistribute responsibility for family care, allowing women to better reconcile their personal interests with professional advancement. The use of data from the Observatory of Rural Women in Brazil is what allows us to subsidize customized strategies for the diversity of women working in the countryside.

Finally, stimulating the presence of women involves valuing successful references and strengthening mutual support networks. Giving visibility to the legacy of pioneers such as researcher Johanna Döbereiner serves as inspiration for new generations to persist in their dreams and professional challenges. The creation of committed groups and movements that promote technical meetings exclusively for women helps to overcome the historical mistrust of the male universe. By recognizing women's contributions at all stages, from production to science, we build a more sustainable, resilient and humane agribusiness.

In the case of Embrapa, are there any programs aimed at encouraging women to work at the forefront of the institution or in prominent positions?

At Embrapa, we have implemented strategies to increase female participation on the front line and in decision-making positions. Under the current management, which has four women on the Executive Board, including the presidency and three directorships out of a total of four directorships, we have seen a significant quantitative advance: the total number of women in commissioned positions jumped from 38.48% in 2023 to 42.34% in 2024. This growth reflects an institutional commitment to transforming female representation into administrative normality, sending a clear

Foto: Valter Campanato/Agência Brasil

message that the federal government encourages the presence of women in spaces of power.

In order to stimulate this protagonism in a practical way, we actively encourage our female employees to apply for management positions, offering stimulating talks and promoting an environment that values the systemic view that women have of organizations. In addition, we have reinforced our internal governance by strengthening policies and programs to combat moral and sexual harassment, ensuring a safe work environment that is conducive to women's professional development.

In terms of structural institutional advances, we recently launched our Diversity Policy and appointed the first female ombudsman in the company's history, which demonstrates the opening up of prominent spaces in strategic areas of control and transparency. These initiatives are aimed at balancing female representation in management, since although women represent 35.40% of the research staff (many with PhD), their occupation in leadership positions is still seeking to achieve full parity.

Finally, Embrapa exercises its leadership in this area through the Observatory of Rural Women in Brazil, a platform that provides intelligence and subsidies for the development of public policies for the benefit of women in the agricultural sector. Coordinated by Embrapa with the support of FAO, this platform covers everything from family farming to large enterprises, recognizing the heterogeneity and determining the role of women in rural management. By promoting these actions, the institution fulfills its social and strategic role, aligning itself with SDG 5 of the 2030 Agenda and valuing legacies such as that of scientist Johanna Döbereiner to inspire future generations of women in science and the field.

SILVIA MASSRUHÁ'S CAREER

She has a PhD in Applied Computing from the National Institute for Space Research (2003) (INPE), master's degree in Automation from the School of Electrical and Computer Engineering (1996) at Unicamp and a degree in Systems Analysis from the Pontifical Catholic University of Campinas (1988). Since 1989, she has been a researcher at Embrapa Informática Agropecuária, and at Embrapa Digital Agriculture as of September 2021, where she has led projects in the area of software engineering, artificial intelligence and scientific computing applied to agriculture with approximately 100 technical-scientific publications and 25 software projects on expert systems, abductive logic, fuzzy logic, machine learning techniques, data mining and texts aimed at animal management and plant disease diagnosis. She held the position of Head of Embrapa Digital Agriculture from July 2015 until January 2022, during which time the Unit underwent a strategic realignment to better reflect its multidisciplinary and transversal role. From August 2009 to March 2015, she was Head of Research and Development at Embrapa Digital Agriculture. She is also currently Researcher-in-charge/Director of Fapesp Science Center for Development in Digital Agriculture (CCD-AD/SemeAr) and Coordinator of the AgroDigital Thematic Chamber in ILPF (Crop, Livestock and Forest Integration) network. She has additional training in management skills development from Dom Cabral Foundation and in advanced management from Amana-Key. She was a member of the Precision and Digital Agriculture Commission of the Ministry of Agriculture, Livestock and Supply (MAPA) and a member of Agro 4.0 Chamber, created by the Ministries of Agriculture, Livestock and Supply (MAPA) and Science, Technology and Innovation (MCTI) (2018-2022). She is currently a member of the Advisory Board of Brazil 6.0 Ecosystem, the Board of Directors of SBIAGRO, the Board of Directors of Eldorado Research Institute, Faesp/Senar-SP Advisory Board, the Strategic Committee of Embrapa's National Agro-Photonics Laboratory - LANAF, and the External Advisory Committee of Embrapa Rice and Beans. In recent years she has also participated in the movement of Agtechs, working in acceleration and mentoring programs for startups in order to contribute to the consolidation of the innovation ecosystem for Digital Agriculture in the country. Since May 2023, she has been president of the Brazilian Agricultural Research Corporation (Embrapa), and also chairs the Cooperative Program for Agrifood and Agroindustrial Technological Development in the Southern Cone (Procisur) and the Forum of the Americas for Agricultural Research and Technological Development (Foragro) for the 2024/2025 term.

From before to inside the gate

The observation of the evolution of women's representation in the agricultural world, especially in the world known as "inside the gate", shows that many of the recognition initiatives come from private companies with global operations, with the support of institutions representing the sector, such as Abag.

In this context, Bayer and Corteva, among many others, stand out with Conexão Mulheres do Agro, a movement that includes Prêmio Mulheres do Agro, and Leadership Academy for Women in Agribusiness (Academia de Liderança da Mulher do Agro - ALMA).

Another input industry that also has initiatives in this direction is Cargill. Among the actions, we highlight the "Prosperous Communities - Women" program, focused on training and succession of female producers in Paraná, carried out in partnership with Capal - Cooperativa Agroindustrial, and EVA (Elas Vivem o Agro) movement, created by Cargill Nutrição e Saúde Animal in 2021. The project is aimed at rural producers who are members of Capal and aims to improve issues such as management, leadership and family succession in rural properties.

Run by BioSistêmico Institute (IBS), the program is developed in cycles of six months to a year, combining face-to-face activities and online ones. The expectation is to impact more than 100 producers throughout 2026 with training, mentoring and networking meetings that strengthen the autonomy and continuity of family businesses.

According to Flávia Tayama, Director of Sustainability - Environmental and Social Responsibility at Cargill, the initiative reinforces the company's commitment to the inclusion and sustainable development of rural communities. "Valuing the role of women in the countryside means boosting the entire agricultural chain. The initiative reflects our conviction that supporting those who lead rural production generates permanent benefits for the economy, society and the environment," she says.

The project for Capal - as Valquiria Demarchi Arns, industrial director of this cooperative, which has 3,800 members spread across 29 business units in the states of Paraná and São Paulo, says - represents yet another opportunity of growth for the cooperative members: " Capal was born with the spirit of unity and continuous evolution. Supporting our producers with training and exchange of knowledge is a fundamental step towards guaranteeing business sustainability and equity in the countryside."

Empowering women for an increasingly transformative agribusiness

Diversity, equity and inclusion are fuels for innovation, emphasizes Daniela Barros, Communications Director for Bayer's Agricultural Division in Brazil, when she says that the initiatives the company maintains with the aim of encouraging and promoting "the presence and performance of women in the sector, and generating visibility and recognition for women in agribusiness, in addition to encouraging their performance in the field, and the adoption of good agricultural practices and contribution to innovation and sustainability."

One of the programs is Conexão Mulheres do Agro, a strategy that articulates and gives scale to different actions carried out by Bayer to contribute to a more inclusive agribusiness and includes three initiatives: Prêmio Mulheres do Agro, established in 2018 in partnership with Abag; Bayer's presence at the National Congress of Women in Agribusiness (CNMA) and Jornada do Conhecimento program.

Together, these actions, as Barros quantifies, have already impacted "more than 15,000 women across the country. They are complementary actions that offer training, inspiration and visibility, connecting female producers and professionals in the sector to relevant content and management, innovation and sustainability practices, with Bayer's aim and commitment to supporting and strengthening female protagonism in Brazilian agriculture."

The Award's mission is to recognize, generate visibility for and encourage women's work inside and outside the farm, as well as promote the adoption of good agricultural practices that transform the sector. Through the stories they share, these women inspire other producers and strengthen the network, encouraging other producers, whether men or women, to innovate and be sustainable. In eight editions, it has recognized 75 women, 72 of them were rural producers from different regions of the country and three researchers, awarded in the Science and Research category, created in 2023.

Jornada do Conhecimento program, in turn, is an experience created to strengthen female protagonism in the countryside. It brings together female producers and agribusiness professionals who are clients of the company and add up, individually, to three Impulso Bayer stars in a development path that combines face-to-face and virtual meetings, always led by specialists. In this case, as Barros says, "the aim is to expand technical and leadership skills, encourage a more confident position and create a safe environment for exchange between women from different regions of the country. More than just training, the program promotes real connections that inspire, support and transform the work of these women in Brazilian agriculture."

Other actions are added to Conexão Mulheres do Agro initiatives. For example, in partnership with cooperatives, Bayer promotes free workshops and training for rural producers in several states. These meetings bring practical content that strengthens management in the field, with topics such as sustainability and digital agriculture. What's more, recently, the company, in partnership with Quiddity Research Institute, carried out a survey - the results are in the box - to map out which topics most interest female producers and what their main desires and challenges are .

For Bayer, as explained by the communications director of the company's Agricultural Division in Brazil, the improvement of the projects needs to be constant and initiatives by institutions, private companies and other agents in the sector, which value and promote the work of women inside and outside the gates, should be encouraged, because "the future of agriculture depends on what is done today."

BAYER-QUIDDITY RESEARCH

The survey 'Rural Women Producers and Innovation in the Field', carried out by Bayer in 2025 in partnership with Quiddity Institute, as Daniela Barros details, "brought very consistent evidence about the role women already play in agriculture and how fundamental their leading role is for the future of the sector. One of the most positive pieces of data is that more than half of the women interviewed, 51%, seek training on an ongoing basis - not just to keep up to date, but to innovate, improve processes and implement new ideas on the farm."

The data also shows attributes that are very present in female leadership: 82% point to attention to detail, 50% highlight caring for people, 47% for nature, 50% for relationships and 41% associate women with creativity. These percentages paint a clear picture of how women contribute to a more sustainable, collaborative and future-proof agribusiness.

Another very important result - and one that Barros celebrated - "was to see that Bayer is recognized as the company that most supports women in agriculture. This makes us extremely proud, because it shows that our actions are generating real value for female producers and professionals in the sector. This recognition motivates us to keep moving forward, expanding opportunities and reinforcing the message that strengthening women means strengthening the whole Brazilian agriculture."

Summing up, the Communications Director emphasizes that "the findings of the survey not only validate what we are already doing, but also guide the next steps, strengthening our commitment to boosting female protagonism in the field and contributing to a more sustainable, inclusive and future-proof agribusiness."

Leadership is also learned, trained and developed

A program by Corteva launched in 2018, with the first class starting in 2019 with a group of 20 women, the Leadership Academy for Women in Agribusiness (ALMA) has graduated seven classes since it began and has trained around 600 women, aged between 20 and 65, who grow a variety of crops, come from thirteen states and have rural properties ranging from 50 to 60 thousand hectares. This diversity of profiles is what enriches the discussions. The exchange of information between the participants is great.

The development of the project was marked by female demand for training and led to a partnership with FIA Business School in 2022, evolving into a continuing education program which, in addition to the Leadership course, ALMA's gateway has classes in ESG in Agriculture, Financial Management and Human Development

In Brazil, about 30 million ha are managed by 947 thousand women, and many invest in training.

Corteva invests in training and in female inclusion and leadership, a condition which, in the company's view, proves its understanding of the "importance of investing in inclusion and diversity and that there is still a lot to be done. We are always looking for internal and external improvements, whether for our employees or for our clients and/or women in agribusiness. We want these women to be prepared for the challenges and to learn to deal with the complexity of agribusiness, whether in business or in their personal lives. We are always keeping an eye on movements and the market to see what we can still do in this segment".

DETAILS OF THE ALMA PROJECT

ALMA Leadership Academy, more than just encouraging women to play a leading role in agribusiness, always brings up-to-date and customized content to participants. Since leadership is learned in practice, course participants develop final projects and have mentoring with the program's teachers.

The course runs throughout the year with fortnightly classes, master classes and practical activities, culminating in the ALMA Journey in October, when participants present their final projects at a face-to-face event in São Paulo (SP).

From April to October, the students take seven-hour modules focused on developing projects, with mentoring from FIA Business School professors. These projects seek solutions to real challenges in the agricultural sector, promoting integration between participants and the development of leadership skills.

All the content is designed with applicability to rural properties in mind, so that the knowledge acquired and shared in classroom enables improved management on rural properties and the development of women.

In 2026, for example, there were 170 participants in three courses. The requirement to take part in ALMA is to be a farmer or livestock farmer and carry out an administrative or technical activity on the farm.

Based on the initiatives and the profile of participants, the crops include, but are not limited to, grains and commodities (soy, corn, rice and cotton), high-value crops (sugar cane, fruits, vegetables, and potatoes) and other sectors, such as pasture production and forest management.

Admission is via registration, and registrations are usually announced on abag website (abag.com.br) and on Corteva Brasil' s official website, in the section dedicated to the initiative. The program is aimed at women who work in agribusiness and are looking to develop skills in leadership, management and sustainability. After registration opens, those interested fill in an application form and go through a selection process to form a class.

Courses in 2026

Leadership

Aimed at women that are taking part in ALMA for the first year. They will have access to content such as Agribusiness Fundamentals, Innovation and Marketing in Agribusiness, Women's Leadership in Agribusiness Governance and Management and Agribusiness Representative Organizations.

Human Development 1.0

Aimed at ALMA participants who have entered and completed the 2025 program. The content will cover topics such as Communication and Relationship Management, Performance Management, Team Development, Negotiation and Influence.

Human Development 2.0

This will be a refresher course for participants who have taken DH 1.0. The program includes topics such as Culture, Purpose and Leadership Behaviors, Human Productivity and Technology in the Field, Strategies for Engagement and Belonging, and Leading Change and Conflict in the Family Environment.

Women's leadership in agriculture extends beyond the farm gate

Studies usually focus on women's presence inside farm gates, but there are many examples both before and after the gates. Flávia Zortéa Cardeal is one of them and represents the second generation taking over the leadership of a family business: Genius, founded over 20 years ago by Eduardo Zortea, based on a vision deeply rooted in the reality of rural producers and the needs of the countryside – built by producers, for producers, with a focus on excellence in farming.

Over this period, the company has consolidated its market presence based on robust solutions, customer proximity, and practical knowledge of agricultural operations. In recent years, management has undergone a process of evolution, keeping pace with changes in the sector, featuring greater internal structuring, investments in technology, expansion of commercial operations, new products, and market positioning.

Genius is currently undergoing a family succession process, in which Flávia Cardeal is taking on a central role in leading the company. She is the first woman to assume leadership, bridging tradition and innovation.

Flávia Cardeal, positioning herself as "directly connected to this movement, leading the company into a new cycle of growth, maintaining the essence built throughout its history, and evolving in a structured and gradual manner," reminds us that transition involves "a consistent shift aligned with Genius's strategic objectives, featuring greater process structuring, defined responsibilities, and organizational evolution, ensuring greater efficiency, and preparing the company for a new cycle of growth. All of this without losing the family-oriented character that has always defined the company."

Different fronts

To take on the leadership role, over the years, Flávia Cardeal has been involved in different aspects of the business and has broadened her perspective on operations and management. "This practical experience, combined with a more modern management approach, has contributed to my preparation and underpins my leadership at this new stage for the company," she emphasizes, highlighting the connection between Genius and the agribusiness sector: "Genius has always been grounded in technical expertise and commitment to results, and this remains the primary criterion within the organization. In general, agribusiness and industry have been evolving in this direction, with greater female presence in strategic positions, which contributes to a more diverse environment, better prepared for future challenges."

Women's Presence

"We genuinely believe in women's potential and the value of diversity to strengthen decision-making and the company's culture. That is why we are already developing female talent internally through our Leadership School, where we already have female employees preparing to take on strategic positions in the future," announces the new director of Genius. She emphasizes: "Our commitment is to expand opportunities of growth, development, and leadership for women within the company. This is an evolving initiative, driven by competence, cultural alignment, and the ability to deliver, as we move forward in building a more inclusive environment, prepared for the development of new leaders."

National Congress of Women in Agribusiness (CNMA) reaches its 11th edition

The National Congress of Women in Agribusiness (CNMA) will celebrate its 11th edition on October 28 and 29 at Transamerica Expo Center in São Paulo (SP). Held annually since 2016, according to Renata Camargo, manager of the congress, it is the largest event dedicated to female leadership in the agribusiness sector

The event brings together rural producers, executives, researchers, entrepreneurs and leaders to debate trends, innovation, sustainability and the strategic challenges of Brazilian agribusiness.

The program - with panels, debates and diverse experiences - has led CNMA to be consolidated as a space for networking, exchanging knowledge and strengthening the presence of women in the agribusiness production chain.

One of the highlights will be the "Profile of the Brazilian Agribusiness Woman: 10 years of progress and challenges".

Renata Camargo celebrates that, "throughout its history, CNMA has fostered the formation of collaborative networks, encouraged business and contributed to increasing the role of women in shaping the future of the sector."

At the National Congress of Women in Agribusiness (CNMA), women are the protagonists of a transformative narrative and the goal is to empower women in Brazilian agribusiness, providing them with knowledge, tools and confidence to lead change and connect brilliant minds, creating a network of support and collaboration that transcends borders and inspires a revolution, a paradigm shift where the voice of women in agribusiness echoes around the world.

An era of equality, innovation and sustainability, a decisive moment to transform agribusiness, where the expertise, passion and determination of women are celebrated and drive the evolution of the sector.

CNMA's target audience includes female farmers, successors, cattle breeders, cooperative members, industry professionals, women passionate about agriculture and executives from corporations in the sector.

Survey on the Profile of Women in Brazilian Agribusiness

This 11th edition will feature a survey coordinated by ABAG, with the support of the Federation of Agriculture of the State of São Paulo – FAESP, and institutional support of CNMA, bringing the Profile of Women in Brazilian Agribusiness: 10 years of progress and challenges".

The first edition of the survey, conducted in 2016, revealed important data on women's participation in the sector, such as the fact that 60% of female producers had a college degree, 73% were involved in the general management of their farms, and 71% reported having faced gender-related professional barriers.

The new edition of the survey will seek to map how these indicators have evolved over the past decade, offering an updated portrait of women's presence in Brazilian agribusiness. "The sector has changed profoundly, and the snapshot from 2016 no longer reflects today's agribusiness. The environment demands data, not perceptions," comments Gislaine Balbinot, Abag executive director.

Year	Edition	Participants	Sponsors	Speakers	States
2016	1st Edition	600	15	35	15
2017	2nd Edition	1.000	30	50	18
2018	3rd Edition	1.500	40	60	20
2019	4th Edition	1.900	50	50	25
2020*	5th Edition	2.300	30	60	20
2021*	6th Edition	2.500	50	50	22
2022	7th Edition	2.500	42	63	26
2023	8th Edition	3.300	57	63	26
2024	9th Edition	3.300	53	80	26
2025	10th edition	3.000	50	80	26

** The 2020 (5th) and 2021 (6th) editions were held online due to the Covid-19 pandemic.*

Curiosities:

- The 7th and 9th editions were attended by 4 countries.
- The congress significantly expanded its hours of content, from 12 hours in the 7th edition to 25 hours in the 2023 and 2024 editions.
- The 9th edition (2024) had more than 80 speakers.

ROBUSTA, SIMPLES DE OPERAR E PRONTA PARA QUALQUER TERRENO

Genius

@geniusplantadeiras

www.geniusplantadeiras.com.br

Entre em contato

49 3541.3650