

TECHNICAL ADMINISTRATIVE SECRETARIAT

# Medium-Term Plan (MTP)

Renewing the future of agri-food systems

# 2025/2030



**FONTAGRO**



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# About FONTAGRO

**FONTAGRO: A unique strategic cofinancing mechanism in the world that promotes innovation in the agri-food sector in Latin America, the Caribbean, and Spain.**

The Regional Fund for Agricultural Technology (FONTAGRO) is a unique strategic cofinancing mechanism that fosters open ecosystems for research, development, and innovation (R&D&I) to transform the agri-food sector in Latin America, the Caribbean, and Spain.

Established in 1998 by 15 countries — Argentina, Bolivia, Chile, Colombia, Costa Rica, Ecuador, Spain, Honduras, Nicaragua, Panama, Paraguay, Peru, the Dominican Republic, Uruguay, and Venezuela — FONTAGRO operates under the legal representation of the Inter-American Development Bank (IDB) and with the operational and strategic support of the Inter-American Institute for Cooperation on Agriculture (IICA). Since its founding, member countries have contributed an initial capital of **USD 83.05 million**, which, after more than 28 years of operation, has grown to over **USD 100 million**, enabling the mobilization of more than **USD 150 million**

to support 212 regional research and innovation projects in the agri-food sector.

FONTAGRO operates as a total fund, using the returns generated by its capital to cofinance strategic initiatives. In recent years, through partnerships with international institutions, U.S. universities, governments such as that of New Zealand, and the private sector, it has consolidated a cooperation model that brings together public and private actors, strengthening the region's scientific and technological capacity.

FONTAGRO's business model, based on the sustainable investment of its capital and the mobilization of external resources, generates regional and global public goods, promotes inter-institutional and interdisciplinary collaboration, and provides innovative solutions to the major challenges facing agriculture and food systems.

Its governance structure comprises a Board of Directors made up of the presidents and executive directors of the national agricultural research institutes of its member countries; an Executive Committee; a Financial

**USD 83.05**  
million  
Initial ordinary capital

**~ USD 100**  
million  
Total Fund

**~ USD 150**  
million  
Mobilized through operations

Committee; and a Technical Administrative Secretariat responsible for implementing the Board's decisions under the direction of the Executive Secretary. Among its main guiding instruments are the Constitutive Agreement, the Operations Manual, and the Medium-Term Plan (MTP), which is updated every five years to guide the regional agri-food innovation strategy.

*In recent years, through partnerships with international institutions, U.S. universities, governments such as that of New Zealand, and the private sector, FONTAGRO has consolidated a cooperation model that connects public and private actors, strengthening the region's scientific and technological capacity.*

# Foreword

Eugenia Saini,  
Executive Secretary  
FONTAGRO

The Medium-Term Plan (MTP) is one of FONTAGRO's most significant strategic instruments, as it sets the five-year roadmap that guides the institution's actions. This document not only defines priorities and guidelines but also reflects the evolution of FONTAGRO's mission and vision in light of global and regional challenges, the priorities of its member countries and partners, and the results achieved over more than 25 years of institutional experience.

The MTP is by nature a dynamic instrument. Each version has responded to a specific context marked by profound transformations in agri-food systems, science, and innovation. From the first plan (1998–2000) through subsequent ones (2005–2010, 2010–2015, 2015–2020, and 2020–2025), FONTAGRO's strategic planning has evolved in parallel with the political, economic, environmental, and technological changes that have shaped the international agricultural agenda. The 2010–2015 MTP introduced for the first time a forward-looking approach based on studies of future scenarios for agriculture in Latin America and the Caribbean and on consultations with regional experts. From this process emerged priorities such as climate change adaptation, sustainable use of natural resources, and connecting producers with markets and knowledge flows, always under the founding pillars of competitiveness, sustainability, and poverty reduction.

The 2015–2020 MTP expanded this framework and defined four strategic areas: technological innovation; climate change adaptation and mitigation; sustainable agricultural intensification; and competitive value chains. During this period, FONTAGRO strengthened its role as a catalyst for collaborative R&D&I projects, fostering the

integration of regional agendas and the enhancement of agri-food competitiveness.

The 2020–2025 MTP, framed by major global transformations such as climate change, the COVID-19 pandemic, and the urgent need to transition to more sustainable and resilient production systems, was developed using national inputs from national agricultural research institutes (NARIs), international evidence, regional dialogues, and the participation of a committee of experts from Cornell University. This plan complemented previous ones through three key strategies: Farm Resilience and Sustainability, aimed at increasing productivity and efficiency through sustainable practices; Sustainable Production Systems and Agroecosystems, focused on adopting innovative technologies and territorial diversification; and Food Security, Nutrition, and Health, emphasizing food quality, biofortification, and stronger producer-consumer linkages. Cross-cutting themes included FONTAGRO's role as a regional forum, institutional governance, capacity strengthening, knowledge management, intellectual property, strategic partnerships, digitalization, and the inclusion of gender, youth, and Indigenous Peoples.

Today, the 2025–2030 MTP represents a strategic update that builds on lessons learned and charts a renewed course for the future of agri-food systems. More than a planning exercise, this plan embodies a commitment to invest today in the transformations needed to achieve a more competitive, sustainable, resilient agriculture with a smaller environmental footprint. At the heart of this strategy are six Flagship Programs, designed as priority pillars to guide research, innovation, and international cooperation over the next five years.

- 1 **Transformation of resilient and carbon-neutral crop systems.**
- 2 **Transformation of livestock and animal protein systems: productive efficiency with a lower environmental footprint.**
- 3 **Impact 2030: effective scaling of R&D&I through new models of extension, technology transfer, and public-private partnerships.**
- 4 **Digital revolution in agriculture: robotics and AI for regional innovation.**
- 5 **The Future Food Basket: diversification and biodiversity use for sustainable nutrition.**
- 6 **Science for evidence-based policymaking.**

This evolution of FONTAGRO's Medium-Term Plans illustrates the institution's ability to adapt to changing contexts, anticipate emerging demands, and direct innovation investment toward strategic priorities. Through continuous learning, consultation, and regional coordination, FONTAGRO has strengthened member-country capacities, consolidated strategic partnerships, and generated high-impact public goods.

Looking ahead, the 2025–2030 MTP reaffirms FONTAGRO's commitment to a transformative agenda centered on sustainability, resilience, and equity, essential pillars for addressing the major challenges of the agri-food sector in Latin America, the Caribbean, and Spain, and for contributing to global food security and well-being.



Medium-Term Plan (MTP)

**2025-2030**



**Sustainable Development Goals**



**#1**

**Transformation of resilient and carbon-neutral crop systems.**



**#4**

**Digital revolution in agriculture: robotics and AI for regional innovation.**



**#2**

**Transformation of livestock and animal protein systems: productive efficiency with a lower environmental footprint.**



**#5**

**The Future Food Basket: diversification and biodiversity use for sustainable nutrition.**



**#3**

**Impact 2030: effective scaling of R&D&I through new models of extension, technology transfer, and public-private partnerships.**



**#6**

**Science for evidence-based policymaking.**

# Message from the Executive Committee

We are living through a period of profound transformation that is redefining agri-food systems at both the global and regional levels. Disruptive technological advances, the growing impacts of climate change, the urgent need to transition toward more sustainable and resilient production systems, and new consumption and trade patterns all present our region with unprecedented challenges and opportunities.

In this context, the **Medium-Term Plan 2025–2030** is the result of a participatory process involving FONTAGRO's member countries, with the support of the IDB, IICA, international strategic partners, and the commitment of researchers, producers, and the private sector. This new plan sets out a vision of regional cooperation with global impact, aligned with the Sustainable Development Goals, the Paris Agreement, and the evolving needs of our societies.

The 2025–2030 MTP is structured around six **Flagship Programs** that define the roadmap for agricultural innovation over the coming decade. These programs encompass the transformation of resilient, carbon-neutral cropping systems; the transformation of livestock and animal protein systems with a focus on productive efficiency and a reduced environmental footprint; the expansion of extension and technology

transfer to accelerate the adoption of solutions; the incorporation of robotics and artificial intelligence as drivers of technological modernization; the development of the future food basket based on healthier and more sustainable foods; and the integration of science, policy, and finance to ensure that scientific evidence informs high-impact decisions.

Each of these programs has been designed to generate regional public goods that transcend borders, creating knowledge and technology spillovers that strengthen competitiveness, sustainability, and the well-being of families across Latin America, the Caribbean, and Spain. The challenges we face are complex and global in nature and can only be met through multi-stakeholder partnerships, international cooperation, and a shared vision for the future.

With this Plan, FONTAGRO reaffirms its commitment to working together to make agricultural innovation the path toward a more prosperous, sustainable, and equitable region. Finally, as FONTAGRO's Executive Committee, we wish to express our deep appreciation to all those who contributed to this process and reaffirm our conviction that science, innovation, and cooperation are the most powerful tools for transforming agriculture and food systems in our region.

## FONTAGRO Executive Committee



**Nicolás Bronzovich**  
President  
FONTAGRO



**Jorge Ganoza**  
Vicepresident  
FONTAGRO



**Eugenia Saini**  
Executive Secretary  
FONTAGRO



# From global transformation to regional action: science and agri-food innovation in Latin America and the Caribbean

**Humanity faces one of the greatest challenges in its history: ensuring food security on a planet that will reach nearly 10 billion inhabitants by 2050.**

According to The State of Food and Agriculture (FAO, 2023), more than 735 million people already suffer from hunger, and millions more experience moderate or severe food insecurity. This pressure is intensifying as agricultural systems are increasingly affected by climate uncertainty, the degradation of natural resources, and the growing demand for food that is more nutritious, accessible, and sustainable. The challenge is not only to produce more but to produce better, reducing environmental footprints while increasing the resilience of agri-food systems.

**Climate uncertainty introduces unprecedented risks.**

Extreme events such as droughts, floods, heat waves, and emerging pests are reshaping agricultural geography and reducing harvest stability. According to FAO (2022), nearly 40 percent of global agricultural production depends on systems vulnerable to climate variability. Reports from the IPCC (2022, 2023) confirm that yields of staple crops such as maize, wheat, and rice are already declining in tropical and subtropical regions. In this context, systems of science, technology, and innovation (R&D&I) become the first line of defense, providing solutions to mitigate

losses, increase productivity, and enhance resilience. Innovations in biotechnology, digital agriculture, remote sensing, predictive modeling, gene editing, artificial intelligence applied to agronomic management, and precision farming are transforming the efficient use of water, soils, and nutrients. However, FAO warns that the adoption of these technologies is highly uneven among regions, and that Latin America and the Caribbean (LAC) must urgently invest in infrastructure, human capital, and governance mechanisms to close this gap (FAO, SOFA 2023).

**In the coming decades, humanity will need to guarantee food security in a context where the global middle class demands more diversified, nutritious, and sustainable diets.** According to FAO and the OECD (2022), this will require an increase in global food production of between 50 and 70 percent. Yet this expansion must occur alongside reductions in greenhouse gas emissions, the protection of ecosystems, and the adaptation of agricultural systems to climate change. Extreme weather events are already causing billions of dollars in annual losses, threatening not only agricultural productivity but also the social, economic, and political stability of many countries.

*In the coming decades, humanity will need to ensure food security in a context where the global middle class demands more diversified, nutritious, and sustainable diets.*



**In LAC, these global dynamics intersect with structural challenges.** The region shows significant productivity gaps in both crops and livestock while displaying high territorial, institutional, and social heterogeneity. According to ECLAC and FAO (2023), average productivity could rise by up to 40 percent with the adoption of technological innovations and improved management practices. However, historically low investment in agricultural R&D and weaknesses in technology transfer have limited the region's ability to realize this potential. Closing these gaps requires stronger regional cooperation and the articulation of universities, research institutes, the private sector, and producers to ensure that innovations are appropriate, accessible, and scalable.

**The international agenda adds further pressure.** The Enhanced Transparency Framework of the Paris Agreement requires countries to demonstrate progress in mitigation and adaptation, while Article 6 provides opportunities to channel climate finance through cooperation mechanisms and carbon markets. To seize these opportunities, the region must overcome key barriers: a lack of reliable data for impact measurement, limited availability of technologies that combine productivity with sustainability, and low adoption rates of climate-smart practices. In this context, regional organizations such as FONTAGRO play a strategic role in mobilizing resources, generating scientific evidence, and coordinating innovation platforms that provide technical support for international commitments.

The IPCC (2022, 2023) reports confirm that the impacts of climate variability are already reflected in

declining yields of key crops in tropical and subtropical regions. In LAC, small and medium-sized producers, responsible for much of the production of staple foods, face growing vulnerability due to limited adaptive capacity and direct exposure to extreme events such as El Niño, hurricanes, and prolonged droughts. Added to this are the deterioration of watersheds, the spread of pests and diseases, and food insecurity, which particularly affects rural, Indigenous, and coastal communities. This combination of pressures demands a profound transformation of agri-food systems, supported by sound public policies, modern extension services, timely financing, and applied technological innovation in the field.

**The region, however, possesses unmatched strategic assets: 28 percent of the world's arable land, 34 percent of renewable freshwater resources, and up to 60 percent of terrestrial biodiversity, in addition to over 113 million people who depend directly on agriculture.** According to the Agricultural Outlook 2025-2034 (OECD/FAO), LAC will continue to play a central role in global grain supply, especially soy and maize, though concentrated in a few countries. The region will also remain key in the production of animal proteins, particularly poultry and pork, while crops such as sugar, bananas, and pineapples will sustain LAC's position as a strategic supplier in specialized global markets. This prominence underscores the region's responsibility as a net food provider in response to Asia's and Africa's increasing import dependence.

**Even so, the abundance of natural resources does not automatically translate into sustainability or**

**resilience of agri-food systems. Across different agroecosystems, millions of producers face challenges in achieving more productive and sustainable agriculture.** The transition toward climate-smart agriculture, more productive and with a lower environmental footprint, requires innovations that include climate-resilient varieties, sustainable soil and water management, digitalization of production, and early warning systems. These solutions must be implemented within territorial innovation frameworks that combine public-private collaboration, investment in infrastructure, and accessible financial mechanisms. In this scenario, FONTAGRO prioritizes projects with strong field impact capable of generating evidence on productivity, resilience, and sustainability at the regional scale.

Beyond its role as a global supplier, LAC contributes to dietary diversification and the supply of higher value-added foods. It exports fruits, vegetables, grains, meats, and fish, and is advancing into

*IPCC (2022, 2023) reports confirm that the impacts of climate variability are already reflected in declining yields of key crops in tropical and subtropical regions.*

markets for bioproducts, organic agriculture, and differentiated foods. The region's potential lies not only in its natural endowment but in its ability to transform comparative advantages into competitive ones through technological, organizational, and institutional innovation. Building resilient and carbon-neutral agricultural, agri-food, and agri-bio-industrial systems is an essential part of this process, in line with the commitments of the Paris Agreement and the 2030 Agenda.


**The global agri-food system is also undergoing a profound transformation.** It is no longer only about climate, soil, or water; structural and contextual factors such as geopolitical tensions, trade policies, financial volatility, pandemics, and changing consumer preferences are reshaping agriculture. The COVID-19 pandemic exposed the fragility of global supply chains and the need to strengthen local and regional production. In this uncertain and changing environment, LAC countries must design adaptive strategies that combine sustainability, inclusion, and international competitiveness, while also integrating ancestral and Indigenous knowledge to reinforce resilience and the conservation of strategic ecosystems. Emerging trends in genetics, biotechnology, digitalization, robotics, artificial intelligence, and traceability will not only determine the future direction of global agricultural R&D but will also shape opportunities and risks for the region. Digitalization and automation optimize input use and allow anticipation of climatic and sanitary risks; biotechnology and genetic improvement facilitate the development of crops resistant to extreme conditions; and traceability, supported by blockchain and digital

platforms, guarantees transparency and access to demanding markets. However, effective adoption requires overcoming bottlenecks in rural connectivity, technical training, financing, and regulation.

**Investing in agricultural R&D&I is therefore essential for LAC to close productivity gaps, strengthen its resilience, and consolidate its position as a strategic food supplier.** Innovation is the driving force that enables the adaptation of technologies to diverse territories and producers, the creation of new market opportunities based on quality and sustainability, and the mobilization of international partnerships that facilitate access to climate finance and the creation of regional public goods. In this process, FONTAGRO plays a key role by mobilizing resources, cofinancing innovation projects, and promoting regional platforms that amplify the impact of applied science in the field.

**Finally, given the magnitude of these challenges, FONTAGRO has structured the 2025–2030 MTP around six Flagship Programs.** This new architecture responds to the need to focus efforts on priority

areas, integrate science and public policy, and direct international cooperation toward high-impact solutions. The Flagship Programs provide a clear framework to promote productivity, sustainability, digitalization, climate adaptation, and food security, ensuring that the region not only maintains its leadership as a global food supplier but does so under a model of innovation, resilience, and global competitiveness.



*Investing in agricultural R&D&I is therefore essential for LAC to close productivity gaps, strengthen its resilience, and consolidate its position as a strategic food supplier.*



# Our Identity: mission, vision y values

FONTAGRO's new Medium-Term Plan (MTP) emerges at a time when global agriculture is undergoing profound transformation, and Latin America and the Caribbean have the opportunity to position themselves as leaders in innovation, sustainability, and resilience. To achieve this goal, it is essential to have a clear identity that guides strategic decision-making and strengthens the trust of our partners and producers. The mission, vision, and values of the 2025–2030 MTP express the collective commitment of FONTAGRO's member countries to an agri-food development model that not only addresses global, regional, and local challenges but also promotes the closing of gaps with sustainability and competitiveness in an interconnected world. These principles serve as the compass guiding the implementation of the six Flagship Programs, ensuring coherence in actions, clarity in objectives, and legitimacy in results. Through them, FONTAGRO reaffirms that transforming agriculture in LAC is not limited to technological innovation, it requires building a shared vision grounded in strong values and aligned with the Sustainable Development Goals.

## Flagship Programs: the pathway for agri-food transformation in Latin America and the Caribbean

**FONTAGRO's 2025–2030 MTP** is organized around six Flagship Programs that comprehensively address the main challenges of agriculture in Latin America and the Caribbean: the transformation of crops and livestock systems, the modernization of extension and technology transfer, the digitalization and application of robotics in agriculture, the development of the food basket of the future, and the generation of evidence-based policies. These programs form the roadmap to convert the region's natural and human potential into sustainable competitive advantages by scaling innovations, mobilizing international resources, and creating regional public goods that strengthen global food security and the resilience of agri-food systems. Annex I presents the action areas, expected outcome indicators, and impact measures.

### #1 Vision

To transform agri-food systems through knowledge so that they become more inclusive and sustainable for both the environment and society.

### #2 Mission

To lead regional coordination, cooperation, and dialogue through the sustainable cofinancing of public good initiatives that contribute to knowledge and innovation in agri-food systems and to improving people's quality of life.

### #3 Values

Integrity, Solidarity, Effectiveness, Transparency, and Respect.



## Transformation of resilient and carbon-neutral crop systems.

### Flagship Program 1. Transformation of resilient and carbon-neutral crop systems

Achieving the goals of the Paris Agreement and other climate commitments increasingly depends on the global transition toward resilient and carbon-neutral agricultural systems. Agriculture accounts for roughly 20-25% of greenhouse gas emissions, and its transition toward sustainable models is crucial to limiting global warming. At the same time, the increasing frequency and intensity of extreme weather events are jeopardizing global food security, demanding greater investment in agricultural innovation aimed at improving adaptation, productivity, and the resilience of production systems.

In Latin America and the Caribbean (LAC), countries face a dual vulnerability: on one hand, the direct impact of droughts, heatwaves, floods, and other increasingly frequent climatic uncertainties on agriculture; and on the other, international pressure to decarbonize their economies, including agricultural production. The region also hosts vast agroecological diversity and a range of strategic crops, such as rice, maize, wheat, soybeans, potatoes, coffee, citrus, and cocoa, that require tailored adaptation and appropriate technologies for local production contexts. This diversity positions LAC as a key global actor: it must respond to the climate crisis while seizing the

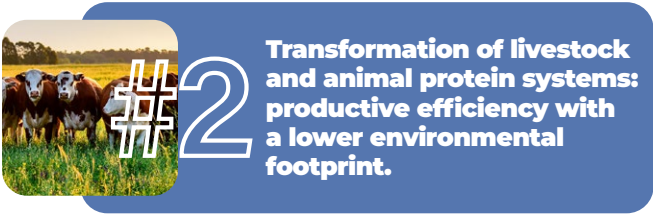
opportunity to consolidate its role as a provider of resilient and sustainable food.

For FONTAGRO, this flagship program represents an opportunity to position the region as a leader in technological solutions for climate-smart and carbon-neutral agriculture. Through its cofinancing and regional cooperation model, FONTAGRO can catalyze the development, validation, and adoption of innovations such as adaptive genetic improvement, microbiome-based biologicals, double-cropping and intercropping systems, diversified agroforestry, regenerative management models, and resilient urban and peri-urban agriculture. It can also foster the creation of scientific and technological networks among member countries, promoting collaborative research, on-farm validation through networked trials, methodological standardization, and the generation of regional public goods.

In addition, this program will align FONTAGRO's portfolio with the priorities of international climate funds and development banks, expanding the institution's resource mobilization capacity and impact. Collaboration with centers of excellence, universities, producer associations, and private-sector partners will be essential to generate scalable solutions that integrate scientific innovation with local and traditional farmer knowledge. In doing so, the region's production systems can be transformed into more resilient, profitable, and sustainable models with direct impacts on food security, competitiveness, and the fulfillment of global climate commitments.

**Specific objective:** To promote the development, validation, and adoption of technological innovations that sustainably increase productivity, reduce environmental footprints, strengthen climate resilience, optimize carbon sequestration, and foster biodiversity conservation and the efficient use of resources in diversified, regenerative, and carbon-neutral agricultural systems in LAC, by linking research networks, on-farm validation, and scaling mechanisms that ensure equitable access to innovation.





### Flagship Program 2. Transformation of livestock and animal protein systems: productive efficiency with a lower environmental footprint

The transformation of livestock and animal protein systems toward more sustainable, lower-impact models has become a critical priority worldwide within the climate agenda. Animal production accounts for a significant share of greenhouse gas emissions, particularly methane and nitrous oxide, and is under growing scrutiny for its environmental impact and use of natural resources. At the same time, consumers, regulators, and international markets are increasingly demanding livestock products that demonstrate traceability, animal welfare, and sustainability. In this context, advancing toward more efficient, resilient, and responsible livestock systems is essential to ensure global food and climate security.

In Latin America and the Caribbean (LAC), livestock production is a strategic activity, both economically and socially, involving millions of small and medium-scale producers. However, it is also one of the main sources of emissions within the agricultural sector and faces persistent challenges such as soil degradation, deforestation, and low production efficiency. In light of these challenges, LAC countries

have a unique opportunity to lead the transformation of their livestock systems through the adoption of low-carbon technologies, silvopastoral systems, genetic improvement, good livestock practices, and regenerative production models that contribute to climate change mitigation and adaptation without compromising productivity or competitiveness.

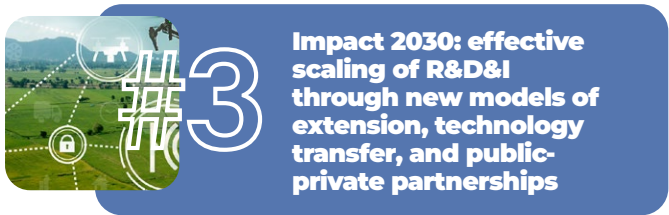
For FONTAGRO, this flagship program represents a strategic axis to promote structural change in the region’s animal protein systems. Through its regional coordination model, FONTAGRO can foster collaborative projects aimed at increasing production efficiency under a climate-smart approach. Key areas of action include reducing enteric emissions through improved management practices, the use of natural feed additives, balanced diets, and better utilization of natural or cultivated forages; promoting genetic improvement for enhanced feed efficiency; and developing emission monitoring systems using sensors and digital tools. The program also emphasizes the strengthening of institutional and technical capacities in livestock research to ensure that technological advances reach producers of all scales.

Furthermore, this program enables FONTAGRO to consolidate partnerships with key stakeholders such as universities, research centers, development banks, and the private sector to scale up solutions that integrate environmental sustainability with production profitability. The transformation of regional livestock systems is not only essential to reducing the agri-food sector’s environmental footprint but also opens new market opportunities in differentiated value chains that respond to the demands of increasingly conscious consumers. Through this effort, FONTAGRO can

position itself as a regional benchmark for innovation in low-carbon, resilient, and sustainable livestock systems.

The program will also explore emerging opportunities related to the development of complementary or alternative low-impact protein sources as part of an integrated approach toward a diversified and resilient protein matrix in the region. It will promote the development of digital solutions for traceability, efficient resource management, and environmental indicator monitoring, facilitating access to certifications and differentiated markets. Moreover, it could contribute directly to LAC countries’ commitments under their Nationally Determined Contributions (NDCs), supporting the development of low-carbon, climate-resilient livestock strategies.

**Specific objective:** To develop and implement technological and management innovations that strengthen productivity, forage stability, reproductive and sanitary efficiency, and climate change adaptation in livestock and animal protein systems, while reducing greenhouse gas emissions, improving animal welfare, and facilitating access to differentiated markets, incorporating digitalization, gender equity, and generational renewal into the sustainable transformation of the sector.



### Flagship Program 3. Impact 2030: effective scaling of R&D&I through new models of extension, technology transfer, and public-private partnerships

Traditional models of extension and technology transfer are being reshaped as countries around the world seek to accelerate the impact of science in the field and close the gaps between research, technology adoption, and socioeconomic outcomes. This transformation is being driven by advances in artificial intelligence (AI), data science, and emerging digital technologies. Agricultural extension is no longer limited to the linear transfer of knowledge; it increasingly relies on intelligent systems capable of providing personalized recommendations, real-time forecasts, and large-scale data analytics to improve decision-making in the field. Institutions such as CGIAR, the World Bank, and FAO are promoting Extension 4.0 approaches that integrate machine learning algorithms, remote sensing, conversational platforms (chatbots), and AI-powered early warning systems to bridge the divide between research, technology adoption, and socioeconomic and environmental results.

In Latin America and the Caribbean (LAC), public extension capacities have weakened in many countries, while innovations generated by universities,

research centers, or startups often lack effective pathways to reach producers. These changes create an opportunity to overcome institutional fragmentation and limited public extension capacities that persist across the region. The integration of AI tools with digital platforms can greatly expand the reach, efficiency, and customization of extension services, even in remote rural areas. For instance, combining AI with university and national agricultural research institute (NARI) knowledge management systems could improve decision support. Yet, innovations generated by research institutions, universities, and startups still struggle to scale in the absence of governance and financing models that foster co-creation and multi-stakeholder collaboration.

In the face of complex challenges such as climate change, natural resource degradation, and the need for more sustainable and inclusive food systems, the region requires a new generation of intelligent, adaptive, and accessible extension services. For FONTAGRO, this program represents a unique opportunity to lead the transformation of technology transfer models toward high-impact, AI- and data-driven frameworks. Through its regional network and cofinancing experience, FONTAGRO can facilitate pilot projects for intelligent extension in collaboration with member-country NARIs, promoting evidence-based solutions that integrate meteorological, soil, production, and economic data in real time to deliver tailored advice to farmers and technicians.

The program will also foster partnerships among researchers, technology companies, software developers, local governments, and producer organizations to create collaborative innovation platforms that are sustainable and scalable at the

regional level. Adopting these technologies will enable progress in professionalizing extension services through digital skills training, the strengthening of regulatory frameworks for public-private partnerships in R&D&I, and the creation of regional public goods based on intelligent solutions. The program will also promote bioeconomy strategies. FONTAGRO thus aims to position itself as a leader in designing and implementing forward-looking agricultural extension systems, where artificial intelligence acts as a strategic ally to democratize access to knowledge, improve production decisions, and accelerate sustainable agricultural development in Latin America and the Caribbean.

**Specific objective:** To strengthen the scaling of R&D&I in LAC through new models of intelligent extension and public-private partnerships, integrating artificial intelligence, data science, and collaborative platforms that promote widespread adoption of innovations, in-field validation, and the generation of regional public goods for more sustainable agri-food systems.





4

Digital revolution in agriculture: robotics and AI for regional innovation

Flagship Program 4. Digital revolution in agriculture: robotics and AI for regional innovation

The digital revolution in agriculture is profoundly reshaping how production is carried out, managed, and commercialized across global food systems. The use of artificial intelligence (AI), robotics, sensors, drones, big data, and automation technologies has moved from being a promise to becoming a reality that accelerates productivity, efficiency, and sustainability in farming systems. Leading countries are integrating these technologies not only in large-scale operations but also in extension services, early warning systems, and data-driven decision-making platforms. Digital innovation has also become a strategic factor for competitiveness, resilience, and adaptation to challenges such as climate change and rural labor shortages.

In Latin America and the Caribbean (LAC), the adoption of digital technologies in agriculture remains incipient and uneven, with widening gaps between countries, regions, and types of producers. Although there has been progress in agtech development, precision agriculture, technology startups, and climate information platforms, scaling these innovations remains constrained by limited connectivity, lack of technical capacity,

weak coordination with the public sector, and low investment in applied digital research. Nonetheless, the region has enormous potential to advance digital solutions tailored to its production and territorial contexts, creating new opportunities for technology firms and non-traditional agricultural actors, including new collaborative and co-innovation centers within national agricultural research institutes (NARIs).

For FONTAGRO, this flagship program represents a strategic opportunity to lead the digital transformation of agri-food systems in LAC by connecting science, technology, and territory. Through this program, FONTAGRO can finance pilot initiatives and platforms in agricultural robotics, AI-based prediction and crop management tools, automation of repetitive or hazardous tasks, and digital solutions for precision agriculture. It can also foster innovation networks among research centers, universities, startups, companies, and public institutions, promoting the co-creation of accessible, inclusive, and scalable technologies.

The program further enables FONTAGRO to catalyze investments and partnerships with international funds focused on digital transformation and artificial intelligence. This approach, aimed at democratizing access to technological innovation, will allow FONTAGRO to position itself as a regional leader in agricultural digitalization with social, economic, and environmental impact. By integrating robotic solutions and AI algorithms into strategic value chains, the program will help improve resource-use efficiency, reduce losses, mitigate climate risks, and foster new data-driven business models. At the same time, promoting digital skills among young

professionals, producers, and extension agents will be key to building a new generation of smart and competitive agriculture in Latin America and the Caribbean.

Specific objective:

To drive the digital transformation of agri-food systems in Latin America and the Caribbean by financing and connecting pilots, platforms, and innovation networks in robotics, artificial intelligence, and precision agriculture; promoting the co-creation of scalable technological solutions adapted to regional contexts to increase productivity, optimize resource use, reduce losses and climate risks, and position FONTAGRO as a regional leader in agricultural digitalization with social, economic, and environmental impact.



#5

The Future Food Basket: diversification and biodiversity use for sustainable nutrition

Flagship Program 5. The Future Food Basket: diversification and biodiversity use for sustainable nutrition

The debate on the future of food systems increasingly reflects international calls to diversify diets, promote more nutritious and sustainable foods, and harness new sources of nutrients that reduce environmental impact. Various global forums have begun to advocate for the redesign of the “food baskets” of the future by incorporating neglected or underutilized crops, functional foods, complementary proteins, and resilient, regenerative production systems. This trend responds not only to nutritional and environmental concerns but also to growing consumer demand for innovative, sustainably sourced foods with cultural identity.

Latin America and the Caribbean (LAC) hosts one of the world’s largest reserves of biodiversity, encompassing plant, animal, and microbial species with high potential for human consumption. However, much of this richness remains untapped in formal markets, both local and global. The region’s agri-food systems remain heavily concentrated in a few crops and value chains, while hundreds of native and traditional species could become the foods of the future, creating new economic opportunities for rural communities,

Indigenous peoples, and agri-food entrepreneurs. Unlocking this potential requires applied research, technological innovation, partnerships with the private sector, and public policies that recognize the nutritional, environmental, and cultural value of this biodiversity.

In this context, the One Health approach provides an essential framework by integrating human, animal, and environmental health, promoting the production and consumption of healthier, more resilient, and sustainable foods. For FONTAGRO, this flagship program represents a strategic avenue to reposition LAC as a global leader in the production of innovative, sustainable, and culturally diverse foods. Through its regional network, FONTAGRO can coordinate research and development projects to characterize, improve, and scale native or underutilized species; promote biofortification; develop new functional products; and foster value chains with high added value and circular economy principles. It can also facilitate partnerships among scientists, chefs, food and biotechnology companies, and local communities to co-create the foods of the future, tailored to the tastes, trends, and nutritional needs of diverse market segments.

This program will strengthen food security, nutrition, and territorial development by diversifying food sources, revitalizing ancestral knowledge, and integrating science, technology, and culture. At the same time, it opens opportunities for producers, agri-entrepreneurs, and regional companies to access differentiated markets, including gourmet, health-oriented, institutional, and export markets, generating employment, identity, and economic resilience. In short, FONTAGRO can play a key role as a

catalyst for these transformations, linking biodiversity, innovation, health, and economic value in a new agri-food paradigm for Latin America and the Caribbean with global projection.

Specific objective:

To promote the diversification of the food basket in Latin America and the Caribbean through research, valorization, and scaling of regional biodiversity, integrating science, technology, ancestral knowledge, and the One Health approach to develop innovative, nutritious, and sustainable foods. The program aims to simultaneously strengthen food security and human, animal, and environmental health; generate added value in production chains; promote cultural identity; and facilitate access for producers and entrepreneurs to differentiated markets, positioning the region as a global leader in the foods of the future.





## Flaship Program 6. Science for evidence-based policymaking

Globally, the formulation of agricultural and food policies faces unprecedented challenges due to the convergence of multiple crises, including climate, food, environmental, energy, geopolitical, and health challenges. In this context, there is a pressing need for a new generation of agri-food policies grounded in scientific evidence, featuring multisectoral approaches and the flexibility to adapt to changing scenarios. The concept of science-based policymaking, understood as public decision-making informed by data and scientific evidence, has gained recognition as an essential tool for improving effectiveness, equity, and impact in the allocation of public resources. Successful experiences in various countries show that research, development, and innovation outcomes can strategically inform regulatory frameworks, subsidies, fiscal incentives, and territorial strategies for sustainable agricultural development.

In Latin America and the Caribbean (LAC), the historic disconnect between science, innovation, and public policy has limited the effectiveness of investments in rural development, agricultural research, and productive transformation. Most countries lack

robust systems for monitoring, evaluation, and feedback based on scientific indicators to guide policy design and implementation. Furthermore, institutional and budgetary frameworks often respond to short-term political cycles rather than to structural needs or long-term foresight of the agri-food system. Strengthening capacities to design public policies informed by scientific evidence is therefore essential to building more resilient, competitive, and inclusive systems.

Currently, the results generated by agricultural innovation projects, such as those financed by FONTAGRO, are not always systematically compiled or adequately translated into public policy recommendations. As a regional mechanism for coordination and cofinancing of public goods, FONTAGRO is strategically positioned to integrate science and policy. This flagship program will make it possible to translate the results of the five preceding programs into actionable evidence for policymaking; foster consortia among research institutes, think tanks, universities, and decision-makers; conduct cost-benefit analyses, impact evaluations, and policy models supported by simulations and empirical evidence; and create regional data repositories to inform regulatory reforms, investment programs, and climate strategies.

The program will also promote the creation of agricultural policy labs in collaboration with national governments and key stakeholders, encouraging a new culture of co-design in policymaking that connects producers, scientists, and policymakers to develop more effective, sustainable, and context-specific regulatory frameworks. Additionally, it

will support regional foresight mechanisms and knowledge valorization initiatives to anticipate risks and opportunities, as well as public-private collaboration spaces that align scientific innovation with market demand and international standards. The program will seek to attract financing from development banks and the private sector to ensure the scalability and sustainability of pilot models and policy recommendations.

**Specific objective:** To strengthen Latin America and the Caribbean's capacity to design and implement agri-food policies based on scientific evidence through the systematization of innovation results, the development of case studies and policy labs, the creation of observatories and digital data platforms, and the promotion of public-private partnerships and collaborations with development banks, in order to generate more effective, sustainable, and scalable regulatory and budgetary frameworks to address climate, productivity, and food security challenges.

# ANNEX I

## Compendium of indicators for the Flagship Programs<sup>1</sup>

Below are the indicators that FONTAGRO seeks to evaluate in each of the projects it co-finances, in addition to the indicative indicators established for each Flagship Program, according to the selected action areas and their respective outcome and impact indicators.



### Indicators of FONTAGRO

The co-financed projects must explicitly indicate whether they generate impacts on any of the corporate indicators defined by FONTAGRO. These include productivity (yield or quantity produced), product prices, production costs, environmental indicators, and/or social indicators. In this regard, each project must specify whether the knowledge, innovations, or technologies developed have a direct or indirect effect on one or more of these indicators, and to what extent they contribute to improving the expected results.

<sup>1</sup> These indicators are subject to review.

Corporate indicators	
Mandatory results sought by FONTAGRO	Number of advanced and validated technologies; TRL advancement
	Number of scientific publications and/or intellectual property registrations
	Number of beneficiaries reached
	Number of trained scientific-technical personnel
	Number of technology dissemination products
	Number of trials and/or pilots implemented and validated
Cross-cutting impacts sought by FONTAGRO (at least three required)	Increase in productivity
	Higher price
	Cost reduction
	Reduction of environmental impact
	Positive social impact
	Increase in area or number of producers adopting the technology



## FLAGSHIP PROGRAM #1

### Transformation of resilient and carbon-neutral crop systems

Action Area	Genetic innovation in strategic crops	Biodiversity for crop improvement	Innovation in sustainable crop management	Biologicals for more productive and resilient crops	Resilient urban and peri-urban agriculture	Technologies to optimize pest, disease, and weed control	New generation of agricultural inputs
<b>Examples of Outputs</b>	Number of validated genotypes with desirable traits.	Number and diversity of genetic resources identified, characterized, and conserved.	Number and effectiveness of validated agronomic management technologies.	Number of promising validated biologicals ready for scaling.	Performance of horticultural and fruit crops under different management and environmental control conditions.	Number and effectiveness of validated integrated management strategies.	Number and effectiveness of new inputs developed and validated.
	Magnitude of genetic gain.	Number and environmental distribution of germplasm banks.	Identification of performance constraints in agricultural systems.	Effectiveness of biologicals under different environmental conditions.	Quantification of energy efficiency in alternative horticultural systems.	Monitoring protocols and action thresholds per crop-pest, disease, or weed.	Prototypes of nanofertilizers, nano-biostimulants, or nanopesticides with controlled and/or targeted release.
	Number of validation networks and genotype-by-environment characterization trials.	New conservation methodologies.	Number of models developed for crop responses to management or environmental variation.	Results of interactions among biologicals.	Integrated systems using renewable energy, water reuse, and sensor-based management.	Regional integrated management protocols with decision matrices.	Release curves and absorption kinetics (in vitro/in vivo) with comparative parameters versus conventional formulations.
	Accuracy of predicted genetic gain from predictive models.	Digital platforms for material access.	Number of prototypes or technological management packages developed.	Genetic improvement of biologicals.		Number of diagnostic kits and early detection algorithms.	Safety evaluations following multiple regulatory frameworks.
<b>Examples of Impacts</b>	Increase in yield and/or quality.	Increase in useful genes or traits identified.	Increase in yield and/or quality.	Increase in productivity.	Increased availability and access to fresh, healthy foods.	Reduction in losses from pests, diseases, and weeds.	Sustained increase in yield and/or quality with lower effective doses of pesticides or nutrients.
	Reduction of yield losses due to biotic and abiotic stresses.	Increase in the diversity of genetic material accessible to farmers and breeders.	Reduction in the use of synthetic inputs and increased efficiency.	Reduction in the use of synthetic inputs and increased efficiency.	Improved efficiency in the use of water, energy, nutrients, and space.	Increased efficiency and responsibility in the use of pesticides: fewer applications, better timing, and higher selectivity.	Reduction in losses from leaching, volatilization, and drift.
	Increase in the area planted with improved genotypes.	Increase in the conservation level of endangered species or varieties.	Reduction in soil erosion.	Improvement of soil health.	Reduction in water, energy, and waste footprints.	Improved regulatory compliance and traceability.	Increased access to niche markets (reduced footprint, reduced residues, certifications).
	Increase in producers adjusting management to genetics, and vice versa.	Increase in genetic gain achieved by breeding programs.	Increase in carbon sequestration, reduction of emissions, and implications for market participation.	Reduction in pest and disease pressure.	Improved preparedness for sanitary emergencies (outbreaks and invasive species).	Increase in the creation of microenterprises.	Increased availability of recommendations for the responsible use of nano-agricultural inputs.

## FLAGSHIP PROGRAM #2

## Transformation of livestock and animal protein systems: productive efficiency with a lower environmental footprint

Action Area	Animal genetic improvement	Management technologies for livestock systems	Integrated management of livestock pests and diseases	Animal welfare as a pillar of productive sustainability	Sustainable improvement of forage resources
<b>Examples of Outputs</b>	Number of improved, adapted, and evaluated breeds or genetic lines.	Number and effectiveness of validated genetic, sanitary, agronomic, and nutritional management practices.	Number of validated early detection and sanitary monitoring systems.	Validated welfare indicators (scales and thresholds).	Validation of management technologies by environment.
	Magnitude of genetic gain.	Number and effectiveness of technologies for quantifying and/or mitigating emissions.	Number of validated control technologies, including integrated management systems.	Continuous monitoring systems installed and operational.	Response curves for forage nutritional improvement.
	Number and effectiveness of reproductive technologies applied to genetic improvement.	Number of documented and validated territorial management technologies.	Standardized biosecurity and surveillance protocols by species/territory.	Evaluation of stress-related management practices and validated mitigation protocols. Validated diets and supplements to reduce stress.	Development and validation of inoculation practices for forage seeds.
	Number of germplasm banks created or strengthened.	Decision-support systems developed and validated.	Calibrated risk and propagation models by pathogen-species-region with intervention thresholds.	Validated diets and supplements to reduce stress.	Development and validation of forage monitoring and forecasting systems.
<b>Examples of Impacts</b>	Increase in productivity and quality.	Increase in productivity.	Reduced incidence and duration of outbreaks; shorter detection and response times.	Reduced losses due to mortality, morbidity, and culling.	Higher productivity, quality, and seasonal/interannual stability of forage resources.
	Reduction in enteric methane emission intensity.	Reduction in enteric methane emission intensity.	Reduced use and improved targeting of pharmaceuticals.	Increased access to markets with animal welfare requirements and quality premiums.	Reduction in enteric methane and/or nitrous oxide emission intensity.
	Improved productivity stability.	Increase in carbon sequestration.	Reduced rejections and trade restrictions; improved lot-by-lot traceability.	Reduced sanitary risks and outbreaks associated with stress and overcrowding.	Reduced dependence on imported concentrates; greater integration of local seed and inoculant supply chains.
	Increased feed efficiency and reduced cost per unit of product.	Improved resilience of livestock systems to biotic and abiotic events.	Reduced zoonotic risk and improved public health protection.	Improved resilience to climatic uncertainty.	Improved soil health.









# FLAGSHIP PROGRAM #6

## Science for evidence-based policymaking

Action Area	Case studies and policy recommendation labs based on scientific evidence	Regional monitoring system and observatory of agri-food policies	Digital evidence platform and knowledge transfer forums
Examples of Outputs	Case studies developed and published that demonstrate how FONTAGRO project results are translated into public policy recommendations.	Design, validation, and implementation of a regional monitoring system.	Interactive operational platform, modular by Flagship Program, with search tools, filters, maps, and guided narratives.
	Policy labs implemented and operational.	Evaluation of FONTAGRO technologies or projects in terms of their impact on agri-food policies.	Analytical tools: country-value chain-year comparators, KPI dashboards, and simple cost-effectiveness and impact estimators.
	Recommendations validated by multiple regional stakeholders.	Common methodological framework for measuring productivity, sustainability, food security, and climate (definitions, indicators, technical sheets, baselines).	Standardized metadata catalog (glossary, indicator sheets, methodologies).
	Institutional mechanisms for science-policy feedback (e.g., observatories and permanent policy labs).	Operational regional data lake with automated ingestion and quality controls (completeness, consistency, traceability).	Open APIs and integrations with national or regional observatories and development banks.
Examples of Impacts	Increased integration of recommendations derived from case studies or policy labs into national and regional policies.	Increased generation of evidence for national and regional policy formulation.	Improved conditions for political decision-making enabled by the platform.
	Increased public and private financial resources allocated to agri-food innovation programs linked to FONTAGRO.	Increased adoption of validated technologies as a result of evidence-based policies.	Increased international visibility of FONTAGRO and its projects as a regional reference for agri-food innovation.
	Improved governance indicators (e.g., efficiency in budget use, reduction in program duplication, and greater transparency in resource allocation).	Increase in the number of projects or investments scaled up thanks to information generated by the observatory.	Increased public and private investment in innovations disseminated through the platform.
	Increased generation of evidence demonstrating contributions to international goals.	Improved efficiency and effectiveness of public policies (including reduced program duplication and greater coherence with climate and food security goals).	Strengthened public-private coordination and greater leveraging toward evidence-based solutions.



# ANNEX II

## Compendium of corporate outcome indicators

FONTAGRO’s sponsors, the IDB and IICA, have related strategic frameworks. Accordingly, FONTAGRO must collect from its projects the indicators listed below:

CRF-IDB-FONTAGRO	CRB-Level	SDG	#	Indicator
Priority: Social inclusion and equality	1, 2	1,5, 10	1	# of women, youth, and Indigenous Peoples participating in initiatives
	1, 2	1, 10	2	# of people trained
	1, 2	1, 3, 10	3	# of theses (students benefiting)
	1, 2	1	4	Total # of beneficiaries
	1, 2	1,5	5	# of women benefiting from the initiatives
Priority: Productivity and innovation	1, 2	9	6	Total investment in R&D&I (USD)
	1, 2	9	7	FONTAGRO investment in R&D&I (USD)
	1, 2	9	8	Counterpart investment in R&D&I (USD)
	1, 2	9	9	Grant and mobilized funds for R&D&I (USD)
	1, 2	9	10	# of Regional Operations
	1	2, 9	11	# of technological solutions and innovations
	1	2,3	12	# of producers receiving technical assistance
Priority: Economic integration	1		13	# of SMEs benefiting from projects / receiving technical assistance
			14	# of producers with market access

CRF-IDB-FONTAGRO	CRB-Level	SDG	#	Indicator
Climate Change and Sustainability	1	13	15	# of low-emission technologies
	1,2	13	16	% reduction in emissions
	1	13	17	# of sustainable practices
	2	13	18	# of producers with knowledge of risk and disaster management
	2	13	19	# of hectares managed sustainably
Institutional Capacity and Rule of Law	2	16	20	# of public officials trained
	2	16	21	# of institutions with enhanced managerial and digital technology capacities
	2	16	22	Strengthened institutional capacities
	2	16	23	Voice and accountability (# of audits with no qualifications)
Performance	3		24	Projects supporting social inclusion and equality (% of new approvals / commitments)
	3		25	Projects supporting climate change adaptation or mitigation (% of new approvals / commitments)
	3		26	Projects that support the management of agriculture, forestry, land use and coastal areas (% of new approvals/commitments)
	3		27	Projects that support gender equality (% of new approvals/commitments)
	3		28	Active projects classified with satisfactory performance (%)
Effectiveness	3		29	Projects completed with satisfactory development results (%)
			30	# of publication downloads
GCYC			31	# of views
			32	# of followers
Responsiveness	3		33	# of new initiatives generated in response to demands

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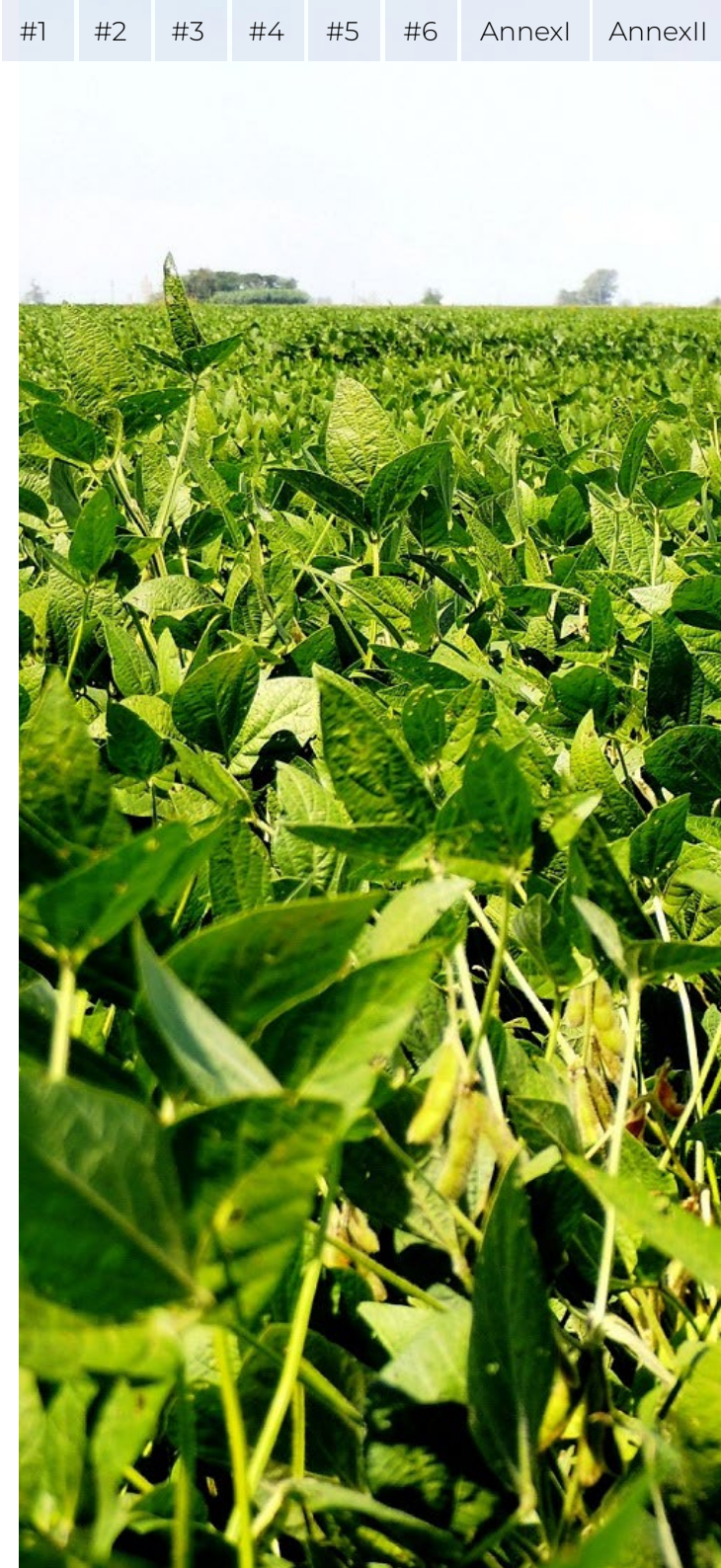
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