FERTIMANURE

Deliverable

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Grant Agreement No. 862849

D6.7. Report on FERTIMANURE replication potential in CELAC region

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Preface

In the **Deliverable 6.7. Report on FERTIMANURE replication potential in CELAC region**, the replicability of the results of the FERTIMANURE project in the countries of the CELAC Region (Community of Latin American and Caribbean States), particularly in Argentina and Chile was conducted. A general review is made regarding the situation of the use of bio-based fertilisers (BBFs) in agriculture in the countries of the CELAC region as well as the use of manure. An analysis of the business model, a SWOT analysis, and identification of key actors were also performed.

Additionally, information was collected on perception and knowledge regarding the development and application of BBFs in the region, as well as their market potential according to regulatory, technological, investment, and financing perspectives.

As part of this study, two mechanisms were employed:

- a survey conducted among webinar attendees;
- responses collected in a series of meetings with relevant stakeholders.

Task 6.7. Industrial exploitation and replicability is designed to analyse the transferability of project results in a user-friendly manner for end-users in the CELAC region, represented in the FERTIMANURE project by Argentina and Chile.

The Community of Latin American and Caribbean States (CELAC) was created in December 2011 in Caracas, Venezuela, during the III Summit of Latin America and the Caribbean on Integration and Development (CALC) and the XXII Summit of the Rio Group.

CELAC is composed of thirty-three (33) countries in Latin America and the Caribbean: Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Saint Kitts and Nevis, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Commonwealth of Dominica, Mexico, Nicaragua, Panama, Paraguay, Peru, Dominican Republic, Saint Vincent and the Grenadines, Saint Lucia, Suriname, Trinidad and Tobago, Uruguay and Venezuela.

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Summary

This section details the most relevant aspects of the opportunities and barriers to the execution of technologies for the development and use of BBFs and tailored-made fertilisers (TMFs) in the CELAC Region. Based on that, a brief description of the main lessons learned during the development of the FERTIMANURE project in the CELAC region was prepared, followed by a recount of the main regulatory and credit frameworks applicable to the research, production, registration, and sale of BBFs.

The prepared report shows the head results found in the replicability and acceptance surveys of the FERTIMANURE project to different stakeholders of the CELAC region.

In summary, the report highlights the strong acceptance of both technologies and BBFs in the region. To ensure success, adjustments are needed at legislative and technological levels, as well as providing support like managing soft credits and training for both BBFs and TMFs. This approach sets the stage for effective integration and progress in agriculture, benefiting producers and the region as a whole.

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List of Abbreviations

BBFs	Bio-based fertilisers
TMFs	Tailor-made fertilisers
CELAC	Comunidad de Estados Latinoamericanos y caribeños
FAO	Food and Agriculture Organization of the United Nations (Organización de las Naciones Unidas para la Alimentación y la Agricultura)
OCDE	Organización para la Cooperación y el Desarrollo Económicos
SENASA	Servicio Nacional de Sanidad y Calidad Agroalimentaria (Argentina)
SAG	Servicio Agrícola y Ganadero (Chile)
INTA	Instituto Nacional de Tecnología Agropecuaria (Argentina)
MAGyP	Ministry of Agriculture, Livestock and Fisheries (Argentina)
LAC	Latin American and Caribbean
MAySD	Ministry of environmental and Sustainable development (Argentina)

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1. Introduction

The increase in agricultural input prices in recent years has raised concerns about global food security. It is estimated that with a 1% increase in fertiliser prices agricultural commodity prices would increase by 0.2%. The increase would be more significant for crops that use fertilisers as direct inputs, than for livestock products that use them indirectly, except for poultry and pork production, which rely heavily on animal feed. While this scenario focuses on the link between fertilisers and agricultural commodities, fluctuations in the prices of energy, seeds, labour, and machinery would also affect food prices (OECD/FAO, 2023).

The countries of Latin America and the Caribbean (LAC) import about 85% of the fertilisers they use, and the use of fertilisers has increased more than in the rest of the world. No other region in the world is so dependent on fertiliser imports and especially, no other region that produces and exports so much food (ECLAC, FAO & IICA, 2023).

Agriculture in Latin America and the Caribbean accounts for around 22% of exports, which is approximately 5% of Gross Domestic Product and employs 15% of the population. In addition, the region is the largest food exporter in the world, 16 LAC countries are agricultural exporters, and more than 80% of the population lives in countries that are net exporters.

The cost of fertilisers has risen since 2021. However, this increase has been exacerbated since the conflict between Russia and Ukraine. Together with the rise in fuel prices, this has led to an increase in the cost of food production. Environmental influences also have an impact on local food production networks. In 2022. climate issues hurt agricultural value added, with the most significant declines recorded in Paraguay, Argentina, Costa Rica, Uruguay and Brazil. However, the crisis must be seen as an opportunity to transition to more sustainable forms of production with more efficient use of artificial fertilisers (CELAC, FAO, & IICA, 2023).

Against this background, the analysis of the replicability and adoption of the FERTIMANURE results in the countries of the CELAC region, represented by Argentina and Chile, were carried out.

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2. Methodologies and Organisation

To analyse the replicability analysis of the FERTIMANURE project in the CELAC region, INTA Argentina and LEITAT Chile used the methodology proposed by IPS Konzalting, a partner in the FERTIMANURE project and leader of work package 6 - Market potential, business plan and exploitation. IPS Konzalting is responsible for defining an exploitation strategy that ensures that the results of FERTIMANURE will continue to be used after the project is completed. The proposed methodology was based on carrying out different interactions with the stakeholders interested in the project in two different modalities:

1- Interactions in open seminars (webinars) summarising the main results and lessons learned from the previous working packages (WP1, WP3, WP4 and WP5)

2- Face-to-face interactions with different stakeholders considered as essential for the project.

Additionally, INTA and LEITAT Chile worked with:

3- Web study – web research in the CELAC region regarding BBFs and TMF, market research (level of BBF and TMF market in CELAC.)

4- Data from IPS Konzalting - IPS provides all project-related information to assist in the preparation of the guidelines.

Figure 1. shows the information provided by the IPS that was generated during the project and was crucial for the development of the guidelines.

DATA FROM IPS:	
MARKET RESEARCH	✓ D1.2 - Report on the market landscape analysis and end-user preferences in the project participating EU states
INPUT FROM WP6	✓ D6.1 - Plan for Exploitation and Dissemination of Results ✓ D6.2 - Report with the IPR guidelines for project consortium ✓ D6.3 - Inventory of stakeholder groups relevant for BBFs and market uptake ✓ Two business models (farms/fertilisers companies) ✓ SWOT analysis
INPUT FROM OTHER WPs	✓ Information from specific work packages, such as WP3 (as fertilizer development progresses) or WP4 (experiments progress) WP7, etc.

Figure 1. Data provided by IPS Konzalting to develop Task 6.7. Industrial exploitation and replicability in CELAC region

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Additionally, Figure 2. summarises the methodology used to complete the task 6.7.

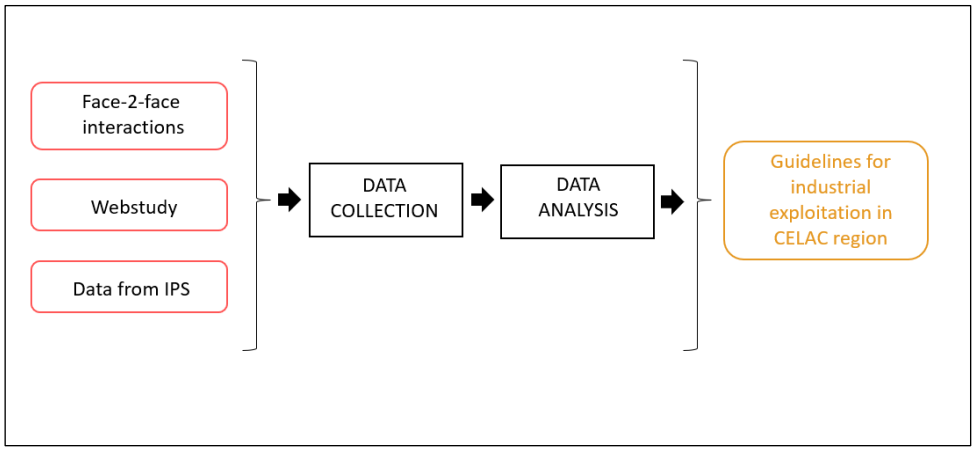

Figure 2. Final overview of the methodology used to produce the guidelines for utilisation and replicability in the CELAC region

2.1. Open seminars (webinars)

Two open seminars were held in online mode to reach both Chilean and Argentinian stakeholders. At the end of each event, a survey was sent out via Google questionnaire for each seminar participant to answer. Questionnaires were prepared based on lessons learned in previous WPs (WP1, WP3, WP4, and WP5) in combination with results of the Task 6.3. questionnaire, a SWOT analysis. Annex 1 shows the questionnaire sent via Google Forms.

Implementation steps for webinars sessions included:

- Meetings between the project leaders to detect which topics should be key to present at the seminars. The topics were selected based on the feedback obtained in previous meetings and interactions with the different stakeholders of the CELAC region.
- Selection of two different dates for the execution of the webinars.
- Invitation of the partners of the FERTIMANURE Project to the seminars.
- Prepare a database of stakeholders to contact.
- Prepare the webinar's dissemination material.
- Share the webinar's session invitation link on your social media (Facebook, LinkedIn, Twitter, etc.), direct contacting (phone calls, meetings) and digital contacting (e-mail).
- Prepare a questionnaire to send to the participants after the webinar's sessions.
- Translate the questionnaire.
- Prepare the presentation material for the webinar.
- Send feedback to IPS regarding the execution, issues/challenges appearing in the webinar's sessions.

The first seminar was held on July 6, 2023, under the name "FERTIMANURE Sustainable biofertilizers and their adoption in the CELAC Region".

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The main topics presented were:

- Make a brief introduction of the FERTIMANURE project, where the objectives, impacts and expected results are developed (*topic presented by PhD. Laia Llenas Argelaguet*).
- Brief introduction to the 5 biorefineries and their associated technologies for nutrient recovery. (*topic presented by PhD. Nagore Guerra Gorostegi*).
- Agronomic tests developed during the execution of the project and their main results (*topic presented by Eng. Berta Singla Just*).
- Life cycle, as a tool to evaluate the sustainability of biorefineries (*topic presented by PhD. Daniel Egas Galarza*).

Figure 3. shows the invitations made and sent by different digital means for the first webinar.

Figure 3. Invitation send to the stakeholders

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The second seminar took place on September 5, 2023, under the title: "New results of the FERTIMANURE project and its transfer to CELAC".

Dissertations included:

- +TMF on Farm: Developing fertilizers tailored made to specific applications (*topic presented by PhD. Begoña Arrufat and José Antonio Rodriguez Sanches*).
- Biostimulants in Agriculture: Production from manure and its demonstration in the laboratory and field (*topic presented by Eng. Omar Castaño and PhD. Anna Margenat*)
- Solid amendments: new drying technologies (*topic presented by PhD. Nagore Guerra*).

Figure 4. shows the flyers sent to participants via digital media for the second seminar.

Figure 4. Flyers sent to participants via digital media

To create the database of stakeholders, the information generated in Task 6.2. Mapping of stakeholder groups was used. Figure 5. show the mapping of stakeholder groups, and the list of 6 stakeholder groups identified within the project.

	STAKEHOLDER GROUP 1 (SG1)	**agricultural producers**	1) livestock farmers 2) arable farmers, crop growers 3) agro SME´s 4) agro associations 5) sustainable agriculture associations

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	STAKEHOLDER GROUP 2 (SG2)	**fertilizers processing industry**	1) Fertilizer companies (manufacturers and sellers, both mineral and organic) 2) chemical industry 3) manure processors 4) public investors in bioeconomy 5) private investors in bioeconomy 6) technology providers 7) fertilizer association
	STAKEHOLDER GROUP 3 (SG3)	**academia and research**	1) research institutions 2) EU subject related networks and clusters (agro - industry, sustainable chemistry) 3) EU R&D neighbouring projects and consortiums 4) nutrient recycling research community
	STAKEHOLDER GROUP 4 (SG4)	**business and financial advisors**	1) business consultants 2) financial institutions 3) agricultural banks 4) funding agencies
	STAKEHOLDER GROUP 5 (SG5)	**policy makers & authorities**	1) ministries of agriculture 2) paying agencies for agriculture 3) agro-connected intermediaries established by government (extension service, LAGs) 4) local council 5) regional government 6) waterboards 7) standardization body 8) EU policy makers 9) CELAC policy maker
	STAKEHOLDER GROUP 6 (SG6)	**public entities & general public**	1) non- governmental organisations 2) media 3) general public – rural communities

Figure 5. The stakeholder groups identified for the FERTIMANURE project

2.2. Face – to – face interview

The face-to-face interviews were developed based on a questionnaire sent by the IPS that included the main topics to be revealed during the surveys (Annex 2 shows the questionnaire used in the face – to – face interviews). Based on the mapping of stakeholder groups, approximately two to three representatives from each were invited. The interviews were carried out in person and some online where, a partner from the CELAC region, held an interview of approximately 1 hour with the detected stakeholders. During this, the surveys were filled out in order not to leave out any of the critical points.

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3. The FERTIMANURE project findings and BBF market

3.1. Results and achievements - lessons learned from the project

As mentioned in the introduction, the countries of the CELAC region strongly depend on external sources to supply fertilisers used in agriculture. In the world, several technologies are being developed to recover and re-use nutrients from organic by-products, but many are insufficiently mature, and the characteristics of the obtained products do not always fulfil the end-user's needs. Manure is a highly valuable product that provides nutrients to plants and organic matter to the soil, helping to address soil deficiencies and improve soil quality. Therefore, current on-field manure management must be considered more as a disposal alternative, rather than an efficient use of its nutrients and valuable compounds. The FERTIMANURE project demonstrated and validated at the farm level the performance of innovative technologies or innovative integrated treatment schemes to recover mineral nutrients, biostimulants and organic matter from animal manure. With the aim of risk assessment and better understanding and placement of BBFs on the market, several market analyses and perception strategies of future users were carried out within work package 6. In this section, a summary of the main lessons learned during the project for the CELAC region was performed.

3.1.1. SWOT

The SWOT analysis and stakeholder opinion represent a crucial segment for further distribution and placement of BBFs on the market. The main results of the SWOT (task 6.4) analysis carried out for the two representative countries of the CELAC region are summarized below (Figure 6).

STRENGTHS	AR	CHL
Bio-based fertilizers (BBF) **improve the profitability of agriculture**	1	3
BBFs **reduce environmental impacts** and contribute to sustainability	2	5
BBFs have a **positive impact on soil fertility** and transition from conventional to organic farming	3	4
BBFs **maintain the quality, organic matter, physical and chemical properties of the soil** by decomposing substances	4	4
There is **no leaching of nutrients from the root area**, so BBFs stimulate plant growth over a longer period	4	5

WEAKNESSES	AR	CHL
EU standards and regulations make it difficult for producers to sell BBFs in different countries	2	2
Common **misconceptions** that organic fertilizers have **slow nutrients release effect, have higher cost or cause storage/odour problems**	1	1
Application of BBFs brings **numerous technological challenges, uncertainties on quality control or higher logistic costs**	5	3
Lack of appropriate legislation on national or regional level	4	3
Limited knowledge of product´s sustainability in terms of energy consumption, crop applicability or greenhouse gas emissions	3	4

OPPORTUNITIES	AR	CHL
Sustainable use of resources using manure to produce new fertilizers	5	4
Converting manure into **valuable resources with an added value** (reducing GHG emissions)	4	4
Development of **new business models encourages** companies to focus on green solutions and supports **jobs creation**	3	3
Efforts made by the European Commission to investigate the sustainability of BBFs in the scope of fertilizer regulations (CE mark that ensures **free movement in the single market**)	2	4
BBFs field testing and scientific validation on soil nutritional profile and other environmental factors	1	5

THREATS	AR	CHL
Legal restrictions regarding BBFs production (e.g., permitting) and application	5	4
Harmful organic substances (e.g., antibiotics) could transfer to the food chain	4	4
Lack of technical standards	3	3
Disinterest of farmers and fertilizer industry for new products and technologies implementation	2	4
Differences and **non-compatibility of certification schemes across the EU** (trading obstacle)	1	5

Figure 6. SWOT analysis for CELAC region

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In summary, the main strengths, weaknesses, opportunities, and threats of BBFs that should be focused on to promote their adoption in the region were:

STRENGHTS

- No leaching of nutrients from the roots area, so BBFs stimulate plant growth over a longer period.
- BBFs maintain the quality, organic matter, physical and chemical properties of the soil by decomposing substances.

WEAKNESSES

- The application of BBFs brings numerous technological challenges, uncertainties regarding quality control, and higher logistics costs. Additionally, at the same level the limited knowledge of the product´s sustainability in terms of energy consumption, crop applicability, or greenhouse gas emissions.
- Lack of appropriate legislation on the national or regional level.

OPPORTUNITIES

- Sustainable use of resources using manure to produce new fertilisers (valuable resources).
- The development of new business models encourages companies to focus on green solutions while also fostering job creation.

THREATS

- Legal restrictions regarding BBFs production and applications.
- Harmful organic substances could transfer to the food chain.

3.1.2. Business Model Canvas

In general, the Business Model Canvas is visual representation of business model, highlighting all key strategic factors. It is a general, holistic, and complete overview of the workings, customers, revenue streams, and more. Other than providing a general overview of the business model, these canvases enable companies to visualize and analyse their strategy.

Project partners in the CELAC countries used prepared questions regarding the business model elements and participants were invited to provide relevant answers based on their previous experience and knowledge from the real sector.

The main results of the business model canvas obtained for the CELAC region are summarized in this section (Table 1).

Table 1. Main results of business model canvas for CELAC region

BBFs and TMF can solved	BBFs and TMF cannot solved
Acidification of soils due to the use of chemical fertilisers.	Increased production per hectare (assuming a stable surface and increasing demand worldwide).
Amount of leachate that passes into the groundwater.	To completely replace the use of traditional fertilisers. Certainly, mixed fertilization plans will have to be evaluated for different crops and environments.

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Reduction of the current cost of fertilization.	Specific micronutrient requirements and antibiotic content could also represent problem for BBFs and TMF production.
Environmental impact, via the recovery of nutrients from waste. Improving the management of nutrients at the local level.	
Dependence on international prices, improving supply and availability in the local market.	
Transportation costs of products with high water content (management of manure).	

Furthermore, when the stakeholders were consulted about different key points relevant to BBFs and market uptake in the CELAC region, **the following key points emerged:**

- The importance of incorporate the know-how of the technologies, and technicians for the management of biorefineries.
- Another key point is the generation of field experiences that demonstrate the effectiveness of the technologies, as well as the efficiency and safety of the BBFs and TMF in the field.
- Regarding distribution channels, the stakeholders mentioned that the best way is through wholesale distributors, retailers, and the local market, as a currency of exchange from producer to producer.
- Stakeholders need to feel government support and an appropriate regulatory framework should be developed.
- In general, livestock production is located at great distances from each other. The creation of a centralized biorefinery is not considered feasible because of the prices of transporting manure from animal production to the centralized biorefinery.
- One of the crucial elements is also the lack of subsidies or access to credits.
- Develop more seminars that allow knowledge to the public.
- Another point is if the FERTIMANURE technologies could be applied to CELAC production because the common intensive production in the area is bigger than in Europe. (*For example, the Dutch pilot works with 50 milking cows. The question is how this technology and methodology can be extrapolated to the Argentina model, with 30,000 milking cows*).

3.1.3. Chilean SWOT

Likewise, Chile worked on a specific SWOT analysis for the region. Below are the results found for this task.

STRENGTHS

- Using organic fertiliser avoids negative impacts to the environment because it improves the soil and recycles animal waste.
- It is a natural product and is produced in large quantities.

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- Recovering organic matter from the soil allowing the fixation of carbon. Additionally, improving the capacity to absorb water.
- Because this fertiliser is 100% of animal origin, it does not produce any chemical residue that could be highly harmful to the quality of the environment.
- The reduction in dangerous compounds guarantee that the products will development without negative impacts for environmental.

WEAKNESSES

- Lack of knowledge regarding animal-based organic fertiliser applications.
- Possibility that BBFs are more expensive than chemical products.
- The low concentration of nutrients and the high humidity concentration BBFs entail considerable costs for transportation, application, and handling, especially in hillside areas.

OPPORTUNITIES

- Increase in global demand for organic products.
- Increase in the consumption of organic products in Chile. In this way, producing companies could request considerable quantities of organic fertiliser for their production (vegetables, tubers, cereals, etc.).

THREATS

- The large area of traditional agriculture and its management.
- The large number of traditional farmers and their crop management with mixtures of organic and agrochemicals that affect the certifications of totally organic products.
- Poor management of farms to produce fertiliser can cause undesirable odours and diseases in nearby populations and thus lead to legal problems.

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4. Farmers' notions and acceptance of BBFs in CELAC region

4.1. Purpose and design of stakeholder workshops in CELAC region

Table 2. shows the summary of the two webinars held with the stakeholders of the CELAC region.

Table 2. Summary of the two webinars in the CELAC region

Type of Communication/Dissemination activity	Technological dissemination and exploitation of the FERTIMANURE project in the CELAC region.
Duration of the event	160 minutes per webinar
Thematic of the event	Technological dissemination and explore on the exploitation of the FERTIMANURE project in the CELAC region.
Relation of the event with FERTIMANURE	Two webinars were held to disseminate the results obtained in the FERTIMANURE project and in this way enable the various stakeholders in the project to better understand the technologies and products developed in the project so that they can answer the questions in interviews (questionaries from Task 6.7) with greater precision.
Type of audience	Livestock farmers, agricultures farmers, fertiliser companies, organic amendment and substrate producers, biogas companies, private consultants, financial institutions, fertiliser associations, academia and research, local council, and public entities.
Number of participants	An average of 60 stakeholders per webinar.
Communication/Dissemination material	The presentations, the webinar videos and the questionnaire were sent by mail.

Speakers and Participants from FERTIMANURE Project S: speaker – O: organization
Laia Llenas (Beta UVIC) (S)
María Eugenia Beily (INTA) (O)
Alicia Lucero (Leitat Chile) (O)
Nicolas Riera (INTA) (O)
Patricia Bres (INTA) (O)
Nagore Guerra (Beta UVIC) (S)
Berta Single (Beta UVIC) (S)

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Daniel Egas (Beta UVIC) (S)
Omar Castaño Sánchez (Beta UVIC) (S)
Begoña Arrufat (Fertinagro) (O)
José Antonio Rodríguez-Sánchez (Fertinagro) (S)
Anna Margenat Mas (Leitat España) (S)

4.2. Results and key insights

4.2.1. Webinar Surveys

This section presents the most important results of the webinar surveys. A total of thirty-three people responded to the questionnaire, 39.4% were from academic and research, 18.2% fertiliser and organic amendment companies, 15.2% were agriculture farmers, 9.1% livestock farmers, 9.1% technology companies and business consultants and 9.1% policy makers, authorities, and rural associations.

Figure 7. shows the type of stakeholders who took part in the survey.

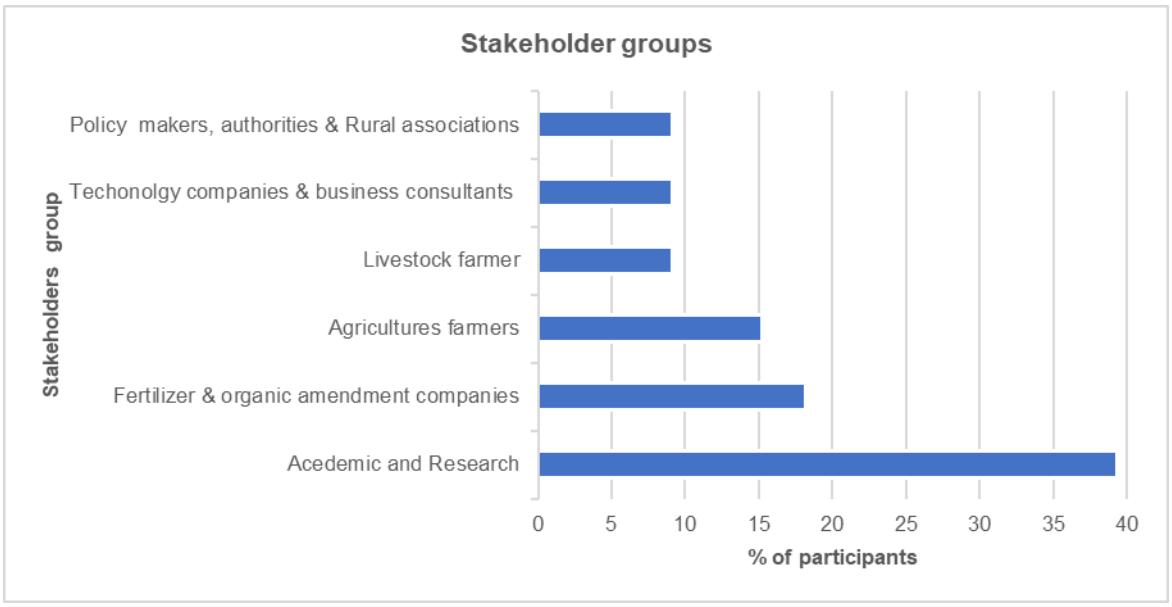

Figure 7. Role of the Industry of the participants in the FERTIMANURE webinars

Based on the first questions in the questionnaire related to the potential of fertilisers, participants see the production and use of BBFs and TMFs in their country. The weighting method chosen was 1 for a potential minimum and 5 for a potential maximum. Figure 8. shows that 66.6% see a high potential for these products in the region.

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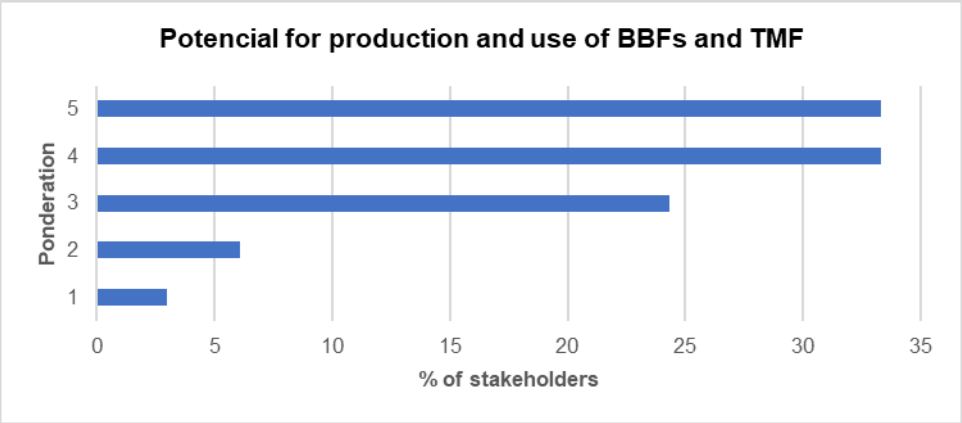

Figure 8. Potential in the production and use of BBFs and TMF

Participants were also asked for opinions on whether BBFs and TMFs are accepted by stakeholders (livestock and agriculture farmers, fertiliser companies, etc.). More than 50% of the respondents answered that there would be good acceptance by the stakeholders. However, they emphasized that this acceptance can only be achieved if BBFs and TMFs have a similar or lower price than chemical fertilisers and if there are demonstrations with successful field experiences. This portion of the surveyed population believes that a large part of the success of their acceptance is that the global population is looking for more sustainable productions and, in the management, and utilization of waste (livestock manure).

The remaining percentage of respondents believe that acceptance is there, but that we need to work harder to spread and commercialize it on the market. Furthermore, it is necessary to verify the degree of nutrient contribution vs. chemical costs, and that regulatory and technical-economic challenges will have to be faced.

Some opinions of the participants are noted:

"The livestock sector is concerned about the contamination of water and soil resources and has the initiative to adopt management that mitigates and reduces the environmental impact. In addition, it prioritizes managing its waste and revaluing and using it within the same property".

"They will be of interest if these formulations have an affordable cost. They must also be mass produced and have good quality (low electrical conductivity and are metabolically active substances) to improve the crop production".

"Acceptance will depend on the price ratio kg of grain/kg of nutrient. From the response in performance. Of logistics and ease of handling and application. I note that the nutrient concentration of the products has a low concentration of nutrients. Therefore, this can be a significant disadvantage compared to synthetic fertilisers".

"In Argentina, the degree of technology in treatment systems is low. Most livestock producers use open-air anaerobic lagoons (ponds), and in many cases, they are not well designed and do not make correct agronomic use of them. There is knowledge of technologies, but there is ignorance of their application. At the same time,

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there is a low development of national companies that provide these technologies, and the cost is very high when foreign technologies are acquired. Finally, more public policies are needed to accompany investment".

Continuing with the logic of the previous response, when asked what the main challenges and barriers of BBFs and TMFs were, the stakeholders mentioned, in order of importance, economic, technological, social/environmental, regulatory, and operational.

Likewise, when consulting them about the main recommendations mentioned to solve economic, technological, and regulatory challenges, participants pointed out:

- **Economical:** Improve economic incentives by state agencies and promote associativity.
- **Technological:** Improve the dissemination of technologies. Invest more in R&D. Generate agreements with companies that produce synthetic fertilisers. Demonstrate that the BBFs and TMFs are safe. Generate more pilot plants in different production systems in the CELAC region to make a more comprehensive evaluation.
- **Regulatory/Legal:** Promote regulatory for the use of BBFs through economic benefits support from environmental and agricultural authorities.

Concerning initiatives, research, or programs supporting the production or utilization of BBFs and TMFs in CELAC region, 60% of respondents are aware of such endeavors. However, 40% are not acquainted with any initiatives or research in these domains.

Some of the programs or research mentioned are:

- *The development of research at INTA (Argentina).*
- *The National Organic Valorisation Program (PROVO – Argentina).*
- *The new regulation for bio inputs and biopreparations (SENASA - Argentina).*
- *The Ministry of Environment and Sustainable Development of the Nation (MAyDS) make specific regulations for the employ of digestates (19/2019) and compost (1/2019). (Argentina).*
- *Biogas plants that are working to provide added value and use of waste, improving the circular economy.*
- *Research development mainly by universities.*
- *Specific private development in Chile (e.g., Patagonia Biotechnology is an industry that development fertiliser using salmon production wastes (Chile)).*
- *Transition to Sustainable Agriculture (INDAP - Chile).*

Another question mentioned in the questionnaire during the webinars was whether they considered that the products and technologies generated in the FERTIMANURE project could take a "piece of cake" of the fertiliser market in their countries.

The majority of respondents said that it is feasible that BBFs can enter the market if there is state support, greater dissemination, and commercial marketing. In addition, it is necessary to demonstrate that these

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products are better than synthetic fertilisers and all recommended technological support for their adoption and implementation in the region.

On the other hand, when asked if they would be interested in buying/using them, the results showed that 75% of respondents would be interested in purchasing it, 15.6% would use it depending on its quality and if the corresponding permissions exist for its application, and 9.4% would not use it now. The decision on implementation of the BBFs and TMFs is based mainly on the results in the field, the quality of the nutrients, and price according to the market.

Figure 9. shows the results on the main factors on which the decision to implement the use or production of BBFs will depend.

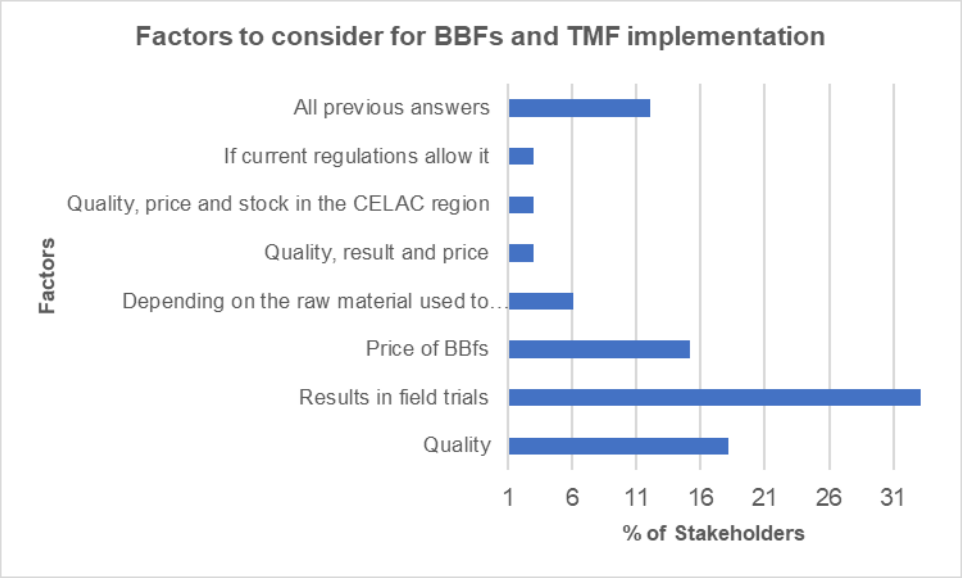

Figure 9. Factors to consider for BBFs and TMFs implementation

Finally, the last question was about the regulatory requirements and certification processes that BBFs or TMFs face in the CELAC region.

In response to this query the 30% responded that they do not know what specific regulatory requirements and certifications required to implementation BBFs in the region. However, others mention certain state entities such as SENASA office or specific provincial control bodies (Argentina). Additionally, the Chilean stakeholders mentions the SAG office and ISO quality certification. Regarding the specifications of BBFs and TMFs, they must comply the equal requirements of synthetic fertilisers (e.g.: nutrient content, environmental approvals, absence of pathogens, heavy metals, guarantee of sanitation processes, low electrical conductivity, etc).

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4.2.2. Face to face interviews

Twenty-eight stakeholders participated in the survey. Figure 10 shows the main stakeholder groups that participated.

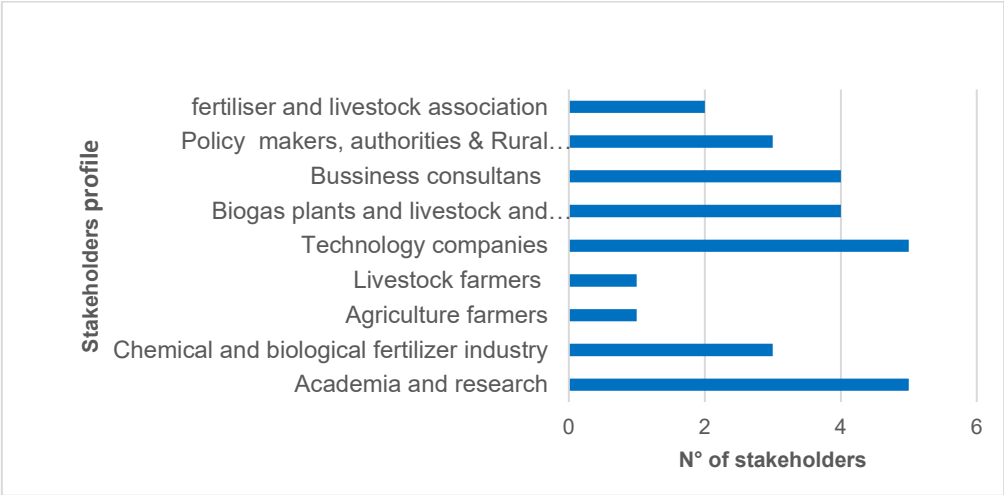

Figure 10. Role of Stakeholders in the industry

Below are shown questions and the main results obtained in this instance of the development of task 6.7.

a- What are the current market trends and opportunities for BBFs in the CELAC region and how are you addressing them?

Figure 11. shows the vision of the stakeholders consulted on the trend and opportunities for the production and use of BBFs and TMFs in the region.

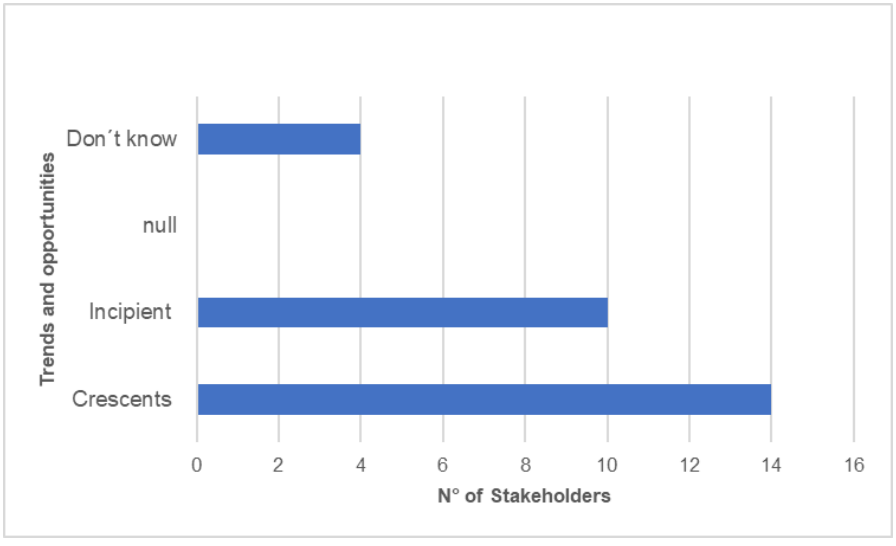

Figure 11. Trends and opportunities for BBFs and TMFs in the CELAC region

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As Argentina and Chile are countries where agricultural production plays an important role (livestock farming and agriculture), thousands of tonnes of waste are produced in the country. Due to the high cost of chemical fertilisers, producers are also beginning to investigate the use of bio-inputs to replace traditional chemical fertilisers. As such, many growers have started to use manure as part of their field fertilisation plan and as a waste management strategy. However, current trends in decarbonization programs, the water footprint, the promotion of the circular economy and the energy transition are forcing many growers to start developing improvement plans, such as the use of technologies to recover nutrients from manure and stabilise organic matter in waste. Similarly, many of the stakeholders mention the increasing use of national bio-inputs in sustainable production programs and link this phenomenon to the growing consumer demand for products without agrochemicals (organic food). In addition, numerous large biogas plants have been installed in Argentina over the last ten years with the main objective of producing energy. However, biogas plants are currently demonstrating the need to develop technologies to recover nutrients from the digestate obtained as a substitute for fossil fertilisers and to potentially sequester carbon in soils and convert it into carbon credits. On the other hand, some stakeholders point out that in countries such as Argentina, extensive agricultural production is still highly dependent on the use of fertilisers and agrochemicals, a no-till production system. Therefore, we will have to work harder on this type of production to demonstrate the possibility of transitioning from chemical fertilisers to biologically based ones.

As opportunities, the Ministry of Environment of the Argentine Nation generated a National Program for the Valorisation of organic waste, and from this program they work on different technologies that value this waste. Thanks to this type of programs, there is a clear trend towards the research, development, and use of BBFs. Furthermore, the Ministries of the Environment and Agriculture seek to provide legislative support for this type of bio-products.

That is how different regulations that regulate the registration for the use and sale of amendments and other bio-products have been managed in the last six years.

b- Do you see that the use/production of BBFs has a future in the CELAC region? What is your opinion about them? Do you think that they will be accepted by stakeholders?

Figure 12. shows the stakeholders perception about the future of the production and use of BBFs.

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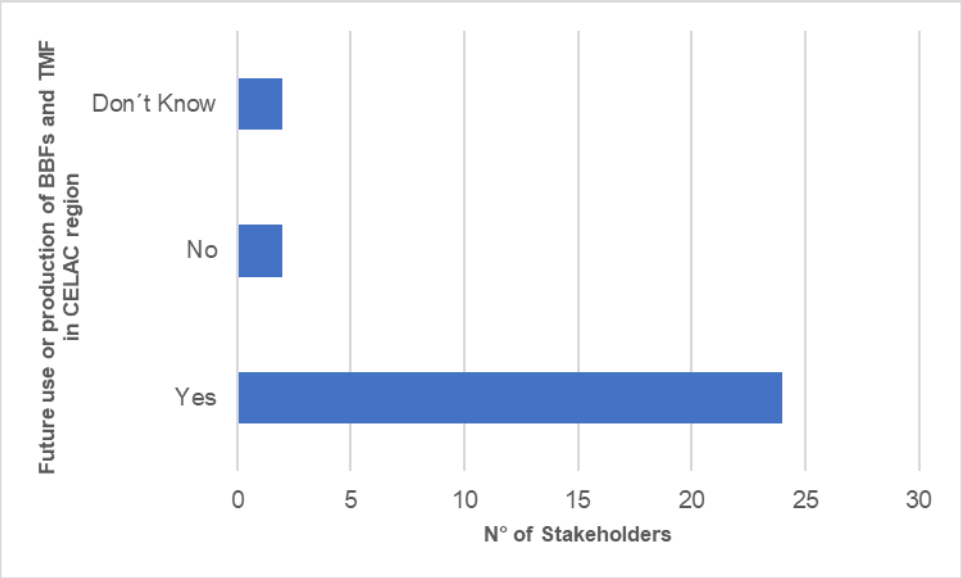

Figure 12. Perception of the future use or production of BBFs and TMFs in CELAC region

In general, stakeholders believe that BBFs and TMFs are of high quality and provide benefits for soil and environmental improvement (including reduction of water and carbon footprint). However, some mention that there is a lack of studies demonstrating the specific benefits to soil, crops, and the environment, which is delaying the adoption of these technologies.

Regarding the uptake of these technologies, most stakeholders agree that they are crucial to be cost-competitive and that their efficiency in crop production and soil improvement can be demonstrated through data collected in trials. Similarly, it would be of great importance to simplify the technologies associated with manure treatment to obtain BBFs. In addition, public measures should be taken to promote sectoral and/or private measures to encourage their introduction. It was also mentioned that the trends in the sale of organic fertilisers in the region are increasing exponentially (Argentina is growing by 9% annually, Brazil by 20% and Colombia by 12%). However, this phenomenon could increase further if knowledge about bio inputs is improved in the CELAC region. This phenomenon is related to the specific lack of curricula in universities and secondary schools dedicated to agricultural production. From the Argentine Chamber of bio inputs, work has been carried out with various universities (which are members of the Chamber) to improve the training of professionals in the sector in the areas of efficiency, production, composition, impact and effects on plants and soils. Similarly, some advisors noted that consumer preference for sustainably produced organic products has changed since the pandemic. As a result, BBFs will become increasingly important in agricultural and food production. Producers must adjust to the new demands of consumers. Furthermore, considering that soils are increasingly degraded worldwide, BBFs are an alternative to restoring them. Nonetheless, certain respondents opined that a significant number of producers still place greater emphasis on crop yield rather than on programs that promote the reduction of carbon footprint and other environmental aspects. So, to increase the acceptance of BBFs and TMFs in the region, it is important to show through data that crop production can be kept at the same yields by using BBFs and TMFs.

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c- Are there any specific initiatives or programs being implemented by you to promote the use of BBFs in the CELAC region?

Most of the stakeholders consulted mentioned knowing some programs or initiatives to implemented BBFs and TMFs in the CELAC region (Figure 13).

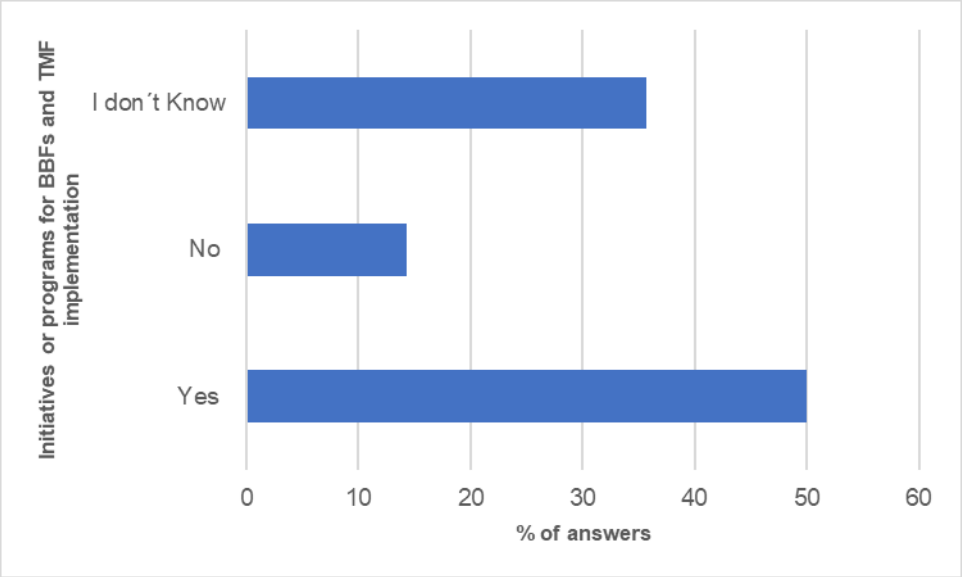

Figure 13. Initiatives for BBFs and TMF implementation

Additionally, the following items were listed among the affirmative answers:

- INTA's participation in the FERTIMANURE project.
- SENASA regulations regarding the production, registration, sale, and use of bio-inputs and bio-preparations.
- The National Program for the Valorisation of Organic Wastes (PROVO) of the Argentinean Ministry of Environment and Sustainable Development.
- National and international programs for funding research on innovative technologies or advances for treating organic amendments.
- Not returnable funds provided to private enterprises for the purchase and utilization of certain mycorrhizae and rhizobacteria that promote plant growth (funded by the Ministry of Agriculture).
- It was additionally reported that there are multiple initiatives in Uruguay, Brazil, and Colombia which promote the development of this kind of biofertiliser.

d- Were there any research and development efforts being undertaken to improve the effectiveness and use/production of BBFs for the CELAC agriculture?

Regarding this question, most of stakeholders consider that actions are being developed in the region to improve the production and use of BBFs and TMF (Figure 14).

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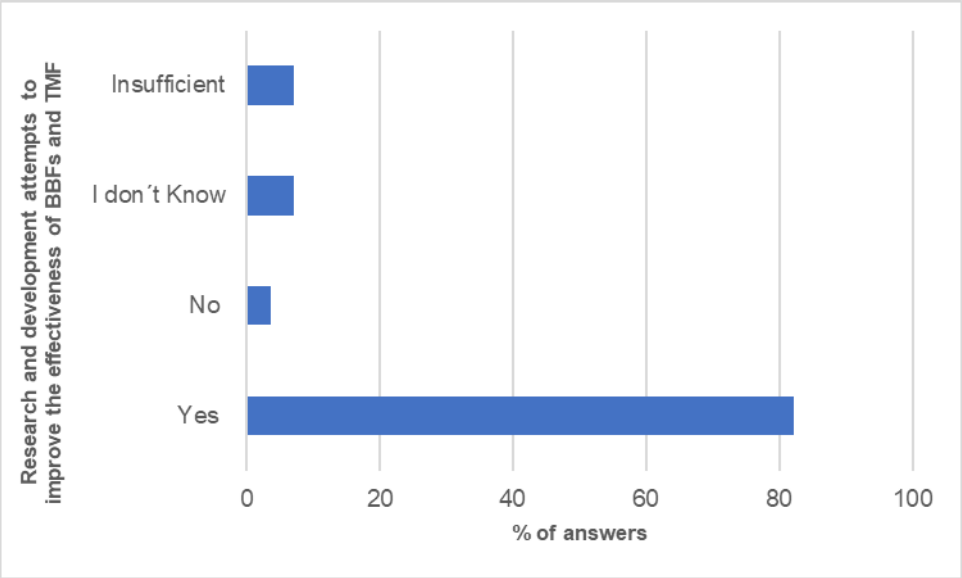

Figure 14. Attempts to improve the effectiveness of BBFs and TMFs in the CELAC region

e- How FERTIMANURE biofertilizer could take "a piece of cake" in the CELAC market? Do you have any advice on how to be able to cover some segments of the market?

According to 78% of respondents, BBFs made in FERTIMANURE with a biological basis might capture some "piece of the cake "of the market in the CELAC region. Below are some of the comments that came from this question.

- If the price of fertilisers (both of which inorganic and biological bases) are equal.
- The agronomic and environmental advantages of these products should be demonstrated and communicated to the producer.
- Scalable success cases and collaborative development among business and academic areas.
- Promote awareness of the benefits and characteristics of BBFs and TMFs in the fields of economics and the environment among producers and consumers.
- Certifications which allow increasing the standard of products produced using BBFs and TMFs.
- Producer support throughout the transition from chemical to BBFs.

Additionally, stakeholders indicate concerns regarding the costs related to these technologies, which could hinder their implementation in the CELAC region.

f- Do you have a long-term vision regarding the market penetration and growth of biofertilizer in the CELAC region? What would be suggested initiatives or plans to achieve it?

For this question 92% of the stakeholders responded that they have a long-term vision and agree that there will be a growing demand for the application of BBFs.

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The following are some of the main initiatives or strategies to achieve the transition between chemical and BBFs are:

- Provide greater dissemination and training on these products.
- Increase investment in research and development to validate these products in the field.
- Support from the state with regulations, programs, and incentives that encourage its use.

g- What do you think is important to include in the guidelines for the fertilizer industry/farmers if they would like to use/produce BBFs? (Manufacturing processes, product quality, labelling, storage, distribution, etc.)

Most stakeholders agreed that it should not be missing from the labeling:

- Information regarding the composition (quality, macro, and micronutrient content).
- Product application and distribution guide (application methods, recommended and maximum doses, type of crop)
- Manufacturing process (nature of the product and manufacturing technology)

Others also mentioned as relevant:

- International product certifications and regulations/standards.
- Advantages and benefits compared to chemical fertilisers.
- Safety labelling (indicating risks and precautions in handling and application).
- BBFs storage.

h- If a farmer were to produce BBFs or TMFs, would you be interested in buying them from them and using/selling?

The majority (67%) of stakeholders confirm that they would use and/or buy BBFs or TMFs from an agricultural producer. They always make it clear that the quality of the product is guaranteed. On the other hand, 21% answered no, as they prefer to market these products to suppliers of inputs and fertilisers for agriculture (fertilizer industry), who are thus different from the agricultural producer.

Another 12% stated that they would buy directly from a producer, depending on several factors:

- The producer must demonstrate experience in producing BBFs or TMFs.
- The quality of the product (must be consistent).
- That a continuous supply is guaranteed.
- If environmental and economic sustainability is proven, if there is a life cycle analysis, etc.

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5. Guidelines for CELAC stakeholders – step by step

5.1. Technical Guidelines

5.1.1. Opportunities and barrier

Table 3. shows the main opportunities and barriers found in the CELAC region for the production and use of BBFs and TMFs.

Table 3. Main opportunities and barriers for BBFs implementation

Opportunities	Barriers
The CELAC region has intensive livestock production. Therefore, large quantities of manure are generated that could be used for BBFs production.	The lack of subsidies or economic incentives for the development of these technologies and products.
High dependence on fertiliser imports.	There is an unclear regulatory framework for the production, utilization, and use of BBFs.
Impact of war/inflation to import fertilisers.	Approval times for new bio-inputs are long, which affects the economic viability of these projects.
Incorporation of new environmental requirements (reduce the carbon and water footprint) for product exports.	The lack of harmonisation of international nomenclature and classification facilitates the export and import of BBFs.
CELAC countries promote new developments in agriculture.	Low development of national technologies for the treatment of manure and digestate (and/or the production of these BBFs and TMFs).
Development of new national and international programs aimed at researching and developing bio-inputs.	The great distance between livestock producers causes difficulty in generating centralized BBFs factories.
New regulations for the production, registration, use and sale of BBFs.	Increase regional trials that demonstrate the efficiency of BBFs and TMFs at different levels (environmental, economic, productive).
Consumer preference for sustainably produced organic (organic food) has changed since the pandemic.	Lack of professionals trained in the production and use of bio-inputs.
Transportation costs of products with high water content (manure without treatment).	Lack of equipment for the application of BBFs and TMFs in extensive productions.

5.1.2. Best practices for implementation

Considering what has been stated so far in this report, three strategies are proposed that could favor the implementation of the FERTIMANURE technologies in the CELAC region.

Strategy 1

Objective: Encourage current biogas plants to introduce the FERTIMANURE technologies

- **Regulatory scope:** Assess whether it makes sense to change the treatment process for the liquid and solid fraction from the biogas plant and apply for the relevant authorisations.
- **Technological scope:** The process used in the FERTIMANURE project must be validated in relation to the waste generated in the installed biogas plant and the quality of the digestate obtained.

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- **Economic scope:** As the investment is high, sources of financing and loans at favourable interest rates must be sought. It is also of the utmost importance to identify the products that will be produced and their marketing channels in the region before installing the nutrient recovery technology.

Strategy 2

Objective: Encourage the formation of livestock cooperatives to agree on the establishment of a centralised biorefinery that can supply large-scale farmers to ensure the availability of organic inputs

- **Regulatory scope:** it is necessary to check whether the regulations in force in each CELAC country authorize the transit of manure and whether it is possible to treat manure from different producers. In addition, it would be very useful if each livestock farmer could be issued with a certificate for the treatment of his waste.
- **Technological scope:** A viable technology must be sought that can work with different manure sources and quantities throughout the process. In addition, the training of technicians managing the biorefinery is important.
- **Economic scope:** It is necessary for governments to create economic incentives for producers to join forces for this purpose. In this way, they will obtain the means to carry out the biorefinery.

Strategy 3

Objective: Encourage small agricultures and farmers to install pilot plants to become self-sufficient

- **Regulatory scope:** governments should be encouraged to legislate on small-scale BBFs and encourage their use in family-type producers.
- **Technological Scope:** the principal research should be done to find technological options with low investment and operation costs, with the objective that small producers can achieve the installation of these pilots.
- **Economic scope:** Local governments should be encouraged to promote the execution of soft credits and incentives so that small producers can access these technologies and, in this way, seek self-sufficiency in fertilisers, as well as treat the manure of their productions.

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5.2. Economic guidelines

5.2.1. Funding sources and mechanisms

5.2.1.1. Situation of Argentina

5.2.1.1.1. National Financing

Below are described the Argentinean government entities that provide competitive funds to execute R&D projects, who are the main actors that promote the development of the national ecosystem.

- **IVT Fund**

These non-refundable funds are a proposal from the Secretariat of Federal Development Planning and Competitiveness (SECPLAN) through the Comprehensive Agricultural Risk Management Program (GIRSAR/BIRF Loan 8867-AR) of the National Directorate of Sectoral Programs and Projects and Specials (DIPROSE) These funds call for the presentation of proposals for research, validation, and transfer of climate-smart technologies to contribute to the mitigation of agricultural risk. This Funding is aimed at scientific and technological institutions (public and private) that work on the issue of climate change and the mitigation of agricultural risks that have experience in technology transfer work to SMEs and rural producers.

Financing Lines:

- Applied research, piloting, and dissemination of promising but not validated climate-smart technologies:

Innovative research and development projects that are considered to have passed the experimental or pre-competitive phase and that can be developed at a pilot or prototype level.

- Research, experimentation, and dissemination for productive diversification:

Aimed at promoting experimental research on new crops and products with added value based on natural resources, which are capable of being transferred to the productive sector.

- **Argentine National Bio-development Program**

The program aims to promote and boost the development, innovation, adoption, and production of bioproducts of the bioeconomy that include the areas of biotechnology, bio-inputs, biomaterials and bioenergy, by micro, small and medium-sized companies, as well as well as cooperatives and public research entities and mixed articulation. Non- refundable funding.

- **Argentine Agricultural Bio-inputs Program**

This program by the Secretary of Agriculture, Livestock and Fisheries is for develop, produce, process, register, market and consume National Agricultural Bio-inputs. This non-refundable Funding is aimed to scientific and technological institutions (public and private) private enterprises and human personas.

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5.2.1.1.2. International Financing

- **Horizon Europe**

Horizon Europe is the research and innovation (R&I) framework program of the European Union (EU) for 2021 -2027. The Horizon Europe Programme is the fundamental instrument for developing the European R&D&I policies. The general objective of the program is to achieve a scientific, technological, economic, and social impact of EU investments in R&I, thus strengthening its scientific and technological bases and promoting the competitiveness of all Member States (EEMM).

- **AI-Invest Verde**

AI-Invest Verde is a program funded by the European Commission to promote sustainable growth and job creation in Latin America. Its objective is to support the transition towards a low-carbon, resource-efficient, and more circular economy to facilitate the implementation of sustainable production models.

- **FONTAGRO**

FONTAGRO is a cooperation mechanism to promote science, development, and innovation in agriculture and food for Latin America and the Caribbean. It focuses on the development of research on climate change, innovation, sustainable intensification, and value chain.

5.2.1.2. Situation of Chile

5.2.1.2.1. National Financing

Below are described the Chilean government entities that provide competitive funds to execute R&D projects, who are the main actors that promote the development of the national ecosystem.

- **CORFO: Chilean economic development agency**

It is an agency of the Chilean State that belongs to the Ministry of Economy. It has eight departments aimed at different objectives to promote production: Entrepreneurship, Networks and territories, Creative Industries, Innovation, Technological capabilities, Gender Strategy, Investment and financing, and Start-Up Chile. Innovation and Technological Capabilities management are the ones that mainly provide funds for Research and development.

- **ANID: National Research and Development Agency**

It is an agency in charge of managing programs and instruments directed to promote the development of research in all areas of knowledge, technological development, and scientific-technological-based innovation. It belongs to the Ministry of Science, Technology, Knowledge, and Innovation. It has five sub-directories: Human Capital, Research Projects, centres and associative research, Applied Research and Innovation, and Networks, Strategy and Knowledge. The suggestions of Centers and Associative Research and the Applied Research and Innovation sub-management are mainly those that provide funds for R&D.

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- **National Regional Development Fund (FNDR)**

It is a public investment program aimed at financing actions in different areas of social and economic infrastructure. This program depends on the Sub-secretary of Regional and Administrative Development, dependent on the Ministry of the Interior. The FNDR finances different investment initiatives, such as basic studies, programs, and projects, in any public investment sector (education, culture, health, sports, etc.). The Regional Council (CORE) is responsible for approving the investment of resources in the regions. In the case of R&D&I, there is mainly the Regional Allocation Competitiveness Innovation Fund (FIC-R), whose objective is to contribute to the economic development of the regions, promoting innovation and increasing competitiveness.

5.2.1.2.2. International Financing

- **Horizon Europe**

Since 2021, Chile is no longer an eligible country to obtain financing from the funds provided by Horizon Europe (Horizon Europe, continuation of the Horizon 2020 program). However, eventually contests are opened where Chile's participation is specified, depending on the topic.

During 2023, a call for the Space subject was opened, and participation from Chile was allowed HORIZON-EUSPA-2022-SPACE-02-56: (RIA) Designing space-based downstream applications with international partners (Call to fund space downstream applications: Almost all LAC countries (exceptionally) eligible to funding | EURAXESS (europa.eu).

The 3rd call, Strategic Autonomy in Developing, Deploying And Using Global Space-Based Infrastructures, Services, Applications And Data 2023 - Applications (Horizon-Euspa-2023-Space), is currently open, it is open until February 14, 2024 (3rd EU call to fund space downstream applications: almost all LAC countries (exceptionally) eligible to funding | EURAXESS (europa.eu)).

- **Al-Invest Verde**

Al-Invest Verde is a program funded by the European Commission to promote sustainable growth and job creation in Latin America. Its objective is to support the transition towards a low-carbon, resource-efficient and more circular economy to facilitate the implementation of sustainable production models (https://alinvest-verde.eu/es_es/segunda-convocatoria/).

- **Eureka-Innowwide**

Innowwide is funded by the European Union as part of the European Partnership for Innovative SMEs (https://www.eurekanetwork.org/open-calls/innowwide-2023-call-02).

- **Eureka Networking Project (https://www.eurekanetwork.org/open-calls/)**

Currently, the following calls are open for Chile:

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I. SMART call for advanced manufacturing project. Ending 22 Jan 24. SMART, our Cluster for advanced manufacturing, has an open call for R&D and innovation projects between 1 September 2023 and 21 June 2024. Clusters (smart).
II. Call for innovative projects for Green Technologies between Belgium (Flanders), Chile, France, and Spain. Ending 10 Apr 24. A call for innovative projects opens to companies from Belgium (Flanders), Chile, France, and Spain. Network projects.
III. Open call for Network projects applications. Ending 31 Dec 25. Network projects is open for applications all year round. Access national funding for your international collaborative R&D projects using our simple flexible programme. Network projects.

Table 4. shows the summary of economic funds available in Argentina and Chile.

Table 4. Funds in Argentina and Chile (maximum subsidy amount available)

Fund name	Responsible entity	Description	Subsidy amount USD
PROBIAAR	Secretary of Agriculture, Livestock and Fisheries	Develop, produce, process, register, market and consume National Agricultural Bio-inputs. Non-refundable Funding.	30.000-50.000
IVT Fund	Secretariat of Federal Development Planning and Competitiveness	For research, validation, and transfer of climate-smart technologies to contribute to the mitigation of agricultural risk. Non-refundable Funding.	100.000-150.00
Argentine National Biodevelopment Program	Secretary of Agriculture, Livestock and Fisheries	The program aims to promote and boost the development, innovation, adoption, and production of bio-products of the bioeconomy that include the areas of biotechnology, bio-inputs, biomaterials, and bioenergy, by micro, small and medium-sized companies, as well as well as cooperatives and public research entities and mixed articulation. Non-refundable funding.	15.000-75.000
Join Innovate	CORFO[1]	Subsidy percentage depends on the size of the company. Product, service, or process innovation projects. Period 6 months.	10.000 – 12.200
Create and validate	CORFO	The subsidy percentage depends on the size of the company. Product, service, or process R&D projects. Square 24 months.	215.000-230.000
Innova Region	CORFO	The subsidy percentage depends on the size of the company. It seeks to support the development of new or better products, processes and or services, from low-resolution prototypes to their commercial validation, that contribute to the regional economy. 12-month period.	65.000
Consolidate and Expand	CORFO	Subsidy percentage depends on the size of the company. Supports the development of national and or international scaling up. In addition, to the validation and packaging of a technological product marketable in target markets. Term 12 months.	76.000

[1] https://www.corfo.cl/sites/cpp/convocatorias_programas_innovacion

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Innovation Scale	CORFO	The subsidy percentage depends on the size of the company. It seeks to support the development of new or improved technologically based functional products, processes and or services, from a prototype to its validation on an industrial or commercial scale that contribute to the regional economy. Term 24 months.	217.000
High technology	CORFO	Subsidy percentage depends on the size of the company. Power, validate and scale R&D&I research, development and innovation projects with high technological risk to scale globally. 48 months.	435.000
IDeA R&D Competition	ANID[2]	It seeks to support the development of applied R&D projects with a hight scientific component, which can become new products, processes, or services, with a reasonable probability of generating productive, economic, and social impacts. Universities and research centres can apply in conjunction with associated private companies. Term 24 months	217.000
IT IDeA Competition	ANID	It seeks to support the development of applied R&D projects with a Hight scientific component, which can become new products, processes, or services, with a reasonable probability of generating productive, economic, and social impacts, from solutions with a level of development advanced technological. Universities and research centers can apply. Term 24 months.	217.000
Startup Science	ANID	It seeks to finance projects that already have a proof of concept validated in the laboratory, that have a project based on highly sophisticated technologies that want to design and validate their prototypes. 12 months.	140.000
Advanced Technologies	ANID	Universities and research centres can apply in conjunction with associated private companies. 48 months.	650.000
FIC-R	Fondo Nacional de Desarrollo Regional	It enhances the economic development of each region by financing research projects that generate knowledge applicable to productive sectors to increase development opportunities and quality of life for people through innovation. Universities, Regional Scientific and Technological Development Centres created by CONICYT calls, business incubators are in force in CORFO, or any Institutions that meet the requirements of Decree No. 68 of February 23 can apply.	100.000-300.000

[2] https://anid.cl/concursos/jsf/jet-engine/tax/areas:10/

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		2009 of the Ministry of Economy, Development and Reconstruction and its modifications.	

On the other hand, a description is provided of the public support and financing institutions in other countries of the CELAC region to promote innovation entrepreneurship and empower SMEs through the generation of research, development, and innovation projects (R&D&I).

Mexico

- Until 2019, it had the National Entrepreneur Institute (INADEM). This institution dedicated to providing financing for Mexican entrepreneurs. Currently, there is a new program called PRONAFIM, the National Microentrepreneur Financing Program of the Ministry of Economy (https://www.gob.mx/pronafim).

Colombia

- Since 2012, it has had a government department responsible for promoting dynamic and innovative entrepreneurship called INNpulsa Colombia (https://www.innpulsacolombia.com/).

Peru

- The ProInnóvate institution, from the Ministry of Production, created in 2021, which promotes and supports innovation for competitiveness and productivity (https://www2.proinnovate.gob.pe/).

Brazil

- In Brazil, FINEP stands out (http://www.finep.gov.br/), affiliated with the Ministry of Science and Technology, which has several support and financing programs for entrepreneurs at different stages and technology-based companies.

Uruguay

- Uruguay, through the National Research and Innovation Agency (ANII), has different programs, where the Innovative Entrepreneurs program stands out. (https://www.anii.org.uy/apoyos/emprendimientos/49/emprendedores-innovadores/).

Panama

- In Panama, there is SENACYT, National Secretariat of Science, Technology and Innovation, which has several calls among those of interest are funds for entrepreneurship and innovation. (https://www.senacyt.gob.pa/fondos-para-innovacion-y-emprendimiento/).

Bolivia

- In Bolivia, they have PRO-BOLIVIA from the Ministry of Productive Development and Plural Economy, with several programs to promote value addition, technological transformation, increased productivity, productive diversification, and innovation. (https://www.probolivia.gob.bo/).

Paraguay

- In Paraguay it is in the Entrepreneur Support Center (CAE) of the Ministry of Industry and Commerce it is responsible for promoting entrepreneurial culture at the local level, the development of business capabilities in entrepreneurs and the strengthening of MSMEs through the linkage with Academia, the Private Sector and the Public Sector. (https://www.mipymes.gov.py/cae/).

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5.3. Regulatory Guidelines

5.3.1 Key regulatory considerations

5.3.1.1. Situation in Argentina

Argentina has three resolutions, which adjust to the BBFs and TMFs produced by the FERTIMANURE project: **Resolution-264-2011- SENASA** - National Agri-Food Health and Quality Service: Establishes the conditions for the preparation, import, export, possession, fractionation, distribution, and sale of fertilisers and amendments in Argentina. This resolution indicates the technical characteristics that the products that are registered in the National Registry of Fertilisers and Amendments must meet for approval (SENASA, 2011). The categories of fertilisers and amendments included in Resolution 264/2011 are detailed in Figure 15.

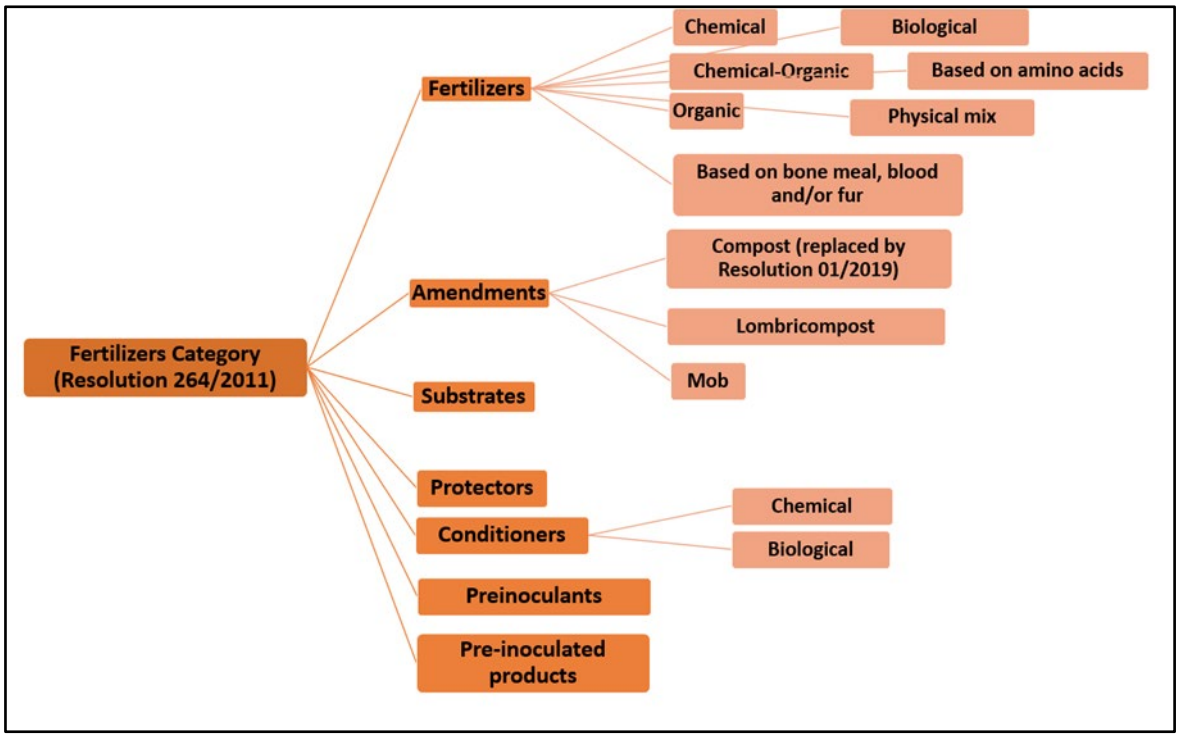

Figure 15. Categories of fertilisers and amendments according to Argentina Resolution 264/2011 (SENASA, 2011)

Resolution 01/2019 - Regulatory framework for the production, registration, and application of compost: The purpose of this standard is to define the possible applications and establish the requirements that compost made from organic waste separated at the origin and collected in a differentiated manner, for its registration, ensuring sustainable management and promoting its production, use and application in the different provincial jurisdictions (SCyMA and SENASA, 2019). Table 5. shows the parameters and limits established for the compost registry according to Resolution 01/2019. (SCyMA and SENASA, 2019).

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Resolution 19/19 - Technical Standard for the Agricultural Application of Digest from Anaerobic Digestion Plants: This document aims to establish the general criteria and the minimum requirements that the digestate from anaerobic digestion plants must meet, to ensure that its agricultural application is sustainable. It seeks to promote the agronomic valorisation of the digestate due to its nutrient content and other intrinsic properties that make it potentially beneficial for soils and crops, protecting the health of people, animals, and the environment (SCyMA. 2019). Table 5. shows the parameters and limits established for the digestate quality according to Resolution 19/2019 (SCyMA, 2019).

Table 5. Parameters and limits parameters of Resolution 01/2019 (Compost) and 19/2019 (Digestate)

Indicator	Parameter	Unit	Resolution 01/2019 (Compost)1	Resolution 19/2019 (Digestate)2
Sanitization	Fecal coliforms	MPN/g DM */ MPN/g FM**	<1000	<1000
	Salmonella sp.	MPN/4 g DM* / MPN/4 g FM**	<1	<3
	Ascaris lumbricoides	viable eggs/4 g DM* / viable eggs/L**	<1	<1
	E. coli		-	Absence
Stability	Water Soluble Carbon (WSC)	g/kg DM*	<10	-
	WSC/Total N ratio	*	≤0.7	-
	CO_2 production	mg CO_2/kg h*	<120	-
	Solvita Test	*	> 5 to CO2	-
	Static Respirometric Index (SRI)	mg O_2/g OM h	≤ 0.5	≤ 0.5
	Synamic Respirometric Index (DRI)	mg O_2/g OM h	≤ 1	≤ 1
	Total organic acids (TOA)	mg/L**	-	≤ 1500
	Volatile fatty acids	g COD/g OM**	-	< 0.43
	AT4	mg O_2/g DM**	-	< 10
	Residual biogas	L biogas/ g OM**	-	<0.25
Maturity	Ammonium (NH_4^+)	mg N-NH_4^+/kg*	<400	To declare
	Ammonium nitrate ratio (NH_4^+/NO_3^-)	*	<0.3	-
	Germination Index (GI)	%*	> 60	-
	Solvita tests	*	≥ 4 to NH_3	-

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Physic-chemical	pH		5.0-8.5	6.5-8.5
	Smell		Absence	-
	Wet	%	<60	
	Electrical conductivity (EC)	dS/m	<4 (A); <6 (B)	To declare
	C/N ratio		≤20 (A); ≤30 (B)	-
	Organic matter (OM)	%	≥20	>40
	Total N	mg/kg DM	-	To declare
	Total P	mg/kg DM	-	To declare
	Total K	mg/kg DM	-	To declare
	Soluble Na^+	mg/kg DM	-	To declare
	Soluble Cl^-	mg/kg DM	-	To declare
PTEs	As	mg/kg DM	15 (A); 30 (B)	15
	Cd	mg/kg DM	1.5 (A); 3 (B)	1.5
	Zn	mg/kg DM	300 (A); 1100 (B)	300
	Cu	mg/kg DM	150 (A); 450 (B)	150
	Total Cr	mg/kg DM	100 (A); 270 (B)	100
	Hg	mg/kg DM	0.7 (A); 5 (B)	0.7
	Ni	mg/kg DM	30 (A); 120 (B)	30
	Pb	mg/kg DM	100 (A); 150 (B)	100
Impurities (plastics, metal, etc.)	Flexible plastics and/or films	% (DM)	≤ 5 (> 4 mm)	≤ 0.5
	Rocks	% (DM)	≤ 5 (> 4 mm)	
	Glass, metals, and plastics	% (DM)	≤ 0.5 (≥ 2 mm)	

1 SCyMA and SENASA, 2019; 2 SCyMA , 2019.

According to the Argentine regulatory framework, the BBFs and TMFs proposed in the FERTIMANURE project could be classified into the following categories of fertilisers and/or amendments:

a) **Organic amendment / organic fertiliser:** This category could be integrating the following BBFs: i) Nutrient-rich concentrate (ES-NC), ii) Biodried solid fraction (ES-DSC), iii) Soil conditioners (NL-SC), iv) Wet P rich fertiliser (NL-WP), iv) Dried P rich and, v) Biochar. There is no category of fertiliser in Argentine regulations that conforms to these BBFs. According to Resolution 264/2011

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(SENASA - Argentina), these BBFs would be categorized as an organic amendment. However, this category only includes organic amendments: i) Compost (replaced by Resolution 01/2019), ii) vermicompost, and iii) mobs. The only way to put these BBFs on the market is through an evaluation carried out by a public institution. This is done on a case-by-case basis, based on a post-demonstration evaluation by the marketer of the agronomic efficacy, safety, and production of the products. These BBFs are not applicable as an organic fertiliser because it has an NPK content of less than 6% (liquid fertiliser) and 12% (solid fertiliser). On the other hand, the digestate and compost resolution indicate an allowed organic waste list (SCyMA, 2019; SCyMA and SENASA, 2019). Liquid BBFs could be categorized according to the Digestate resolution and solid BBFs could be categorized according to the compost resolution (SCyMA, 2019; SCyMA and SENASA, 2019). If some BBFs cannot be registered due to lack of categorization or insufficient NPK content, it could be applied to agricultural soil as a nutrient contribution.

b) **Chemical fertiliser:** This category could be integrating the follow BBFs: i) P from ashes (ES-PA), ii) Ammonium sulphate (ES-AS, NL-AS, BE-AS and FR-AS), iii) Liquid K fertiliser (NL-LK and FR-LK), iv) Ammonium phosphate (DE-AP), iv) Ammonium nitrate (BE-AN) and, v) Ammonia water (BE-AW). According to Resolution 264/2011 (SENASA, 2011) these BBFs could be categorized as chemical fertiliser. Some requirements for chemical fertilisers are: 1) NPK content > 12% (w/w), 2) C/N ratio < 20/1, 3) organic matter (%) ≤ 20%, 4) Specify the organic materials used for the formulation of the product, 5) Heavy Metals could be requested in appropriate cases, according to the characteristics of the product, and 6) Free of hexavalent chromium and free chlorine. If some BBFs cannot be registered due to lack of categorization or insufficient NPK content, it could be applied to agricultural soil as a nutrient contribution.

c) **Bio-stimulants:** The AA-based biostabilized can be considered in the category of fertilisers based on amino acids (SENASA. 2011). The extraction process of amino acids from proteins, and a description of the laboratory methodology, must be presented. Presentation of aminogram and analytical methods to determine the concentrations of each amino acid and identify them. Define the raw materials of plant or animal origin of amino acids. Fertilisers enriched with organic chemical products must comply with points B and C (organic and chemical-organic fertilisers). Note: Amino acids should have a light structure.

Currently, resolution 1004/2023 has been promulgated, through which the registry of bio-inputs is incorporated in the National Registries of Plant Therapeutics, created by Decree No. 5,769 on Fertilisers, Amendments, Substrates, Conditioners, Protectors and Raw Materials, instituted by Law No. 20,466, for those who are interested in preparing, importing, exporting, having, fractioning, distributing and or selling bio-inputs, by the provisions of this resolution.

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Within this regulation, the following categories of bio-inputs are subject to registration:

- Bio-inputs intended for plant protection: invertebrates as biological control agents, semi-chemicals of biological origin, based on extracts of plant, animal, or microbiological origin, microbial control agents.

Bio-inputs intended for nutrition, plant stimulation, amendments, substrates, protectors, and conditioners of biological origin: microbial inoculant and non-microbial biological fertilisers, microbial and non-microbial biological stimulants, microbial and non-microbial biological amendments, biological substrates, biological protectants, and conditioners.

This new regulation covers many of the BBFs and TMFs developed within the FERTIMANURE project. However, because it was promulgated in December 2023, there is still no experience in its application or registration of bio-inputs.

5.3.1.2. Situation in Chile

Chile has two laws that are related to the BBFs and TMFs of FERTIMANURE; **Law N°. 21.349**, which establishes rules on the composition, labelling and marketing of fertilisers and biostimulants, and which begins to apply on September 27, 2022; and **the Law N. 20.089**, that is related to the use of fertilisers for organic agriculture. This Law creates the National Certification System for Organic Agricultural Products (2006) to ensure and certify that organic products are produced, processed, packaged, and handled by the standards of this law and its regulations.

The Law N°. 21.349 is complemented by four resolutions: i) labelling, ii) minimum content of nutritional elements and maximum contaminants, iii) tolerance ranges of laboratory results, and iv) control procedure and sampling of fertilisers and biostimulants. Law N°. 21.349 and its 4 resolutions were drafted using Regulation (EU) 2019/1009 of the European Parliament and of the Council as a reference.

According to the regulation Law N°. 21.349 and resolutions, fertilisers are classified into 6 groups and subgroups. FERTIMANUREs BBFs and TMFs belong to the classification of Group 1, Group 3, and Group 4 subgroup a. GRUOP 1- includes organic fertilisers, GROUP 3 - includes organo-mineral fertilisers, which refers to a co-formulation of one or more inorganic fertilisers with an organic fertiliser, GROUP 4 - includes amendments, which are organic or inorganic compounds, subgroup a includes organic amendments; and the FERTIMANURE´s biostimulant is from GROUP 2 (Non-microbial) and is composed of compound fertilisers and biostimulants based on animal by-products must comply with the specific regulations established by the SAG related to animal health (Law 20.380/2009), in addition to what is established by other competent authorities.

On the other hand, **Law N°. 20.089/2006** indicates that the strategies using manure, green manures, and rotations of crops and carry out a minimum tillage of the soil are allowed following the supreme decree DS No.17 SAG/2011 and the criteria established in Annex A of this Law. However, it is important to mention that List 1 of Annex A indicates that the use of composted, dry, liquid, and semi-liquid manure is permitted but the origin of intensive farming is prohibited.

As already mentioned in Deliverable 1.3, the BBFs and TMFs developed within the FERTIMANURE project could be marketed in compliance with the regulations on organic fertilisers and organic biostimulants (Law N°.

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21.349). However, Law N°. 20.089/2006 prohibits to use of fertilisers from manure from intensive farming, an important point to consider when selling it to the organic agriculture market.

5.2.3. Compliance and certification

5.2.3.1. Situation in Argentina

Resolution 264/2011 is a national resolution, and it establishes the conditions for the preparation, import, export, possession, fractionation, distribution and sale of fertilisers and amendments in Argentina. This resolution indicates the technical characteristics that the products that are registered in the National Registry of Fertilisers and Amendments must meet for approval (SENASA, 2011). The categories of fertilisers and amendments included in Resolution 264/2011 are detailed in Figure 15. In some cases, some categories set a minimum NPK content (e.g., chemical fertiliser > 12% w/w), C/N ratio < 20/1, organic matter (%) ≤ 20%, specify the organic materials used for the formulation of the product, declare heavy metal content, and free of hexavalent chromium and free chlorine.

On the other hand, Resolution 01/2019 was created in 2019 and it set specific condition to produce and commercialize compost in Argentina (SCyMA and SENASA, 2019). This resolution replaced the specific conditions related to compost quality in resolution 264/2011. The Resolution 01/2019 for compost establish quality parameters such as i) stability and maturity, ii) physic-chemical, iii) pathogens and parasites, iv) potentially toxic elements, and v) inert materials (Table 1). Additionally, this resolution presents two categories of compost (A and B) and establishes a positive list of source materials.

Resolution 19/19 establishes the general criteria and establishes the minimum requirements that digestate from anaerobic digestion plants must meet, to ensure that its agricultural application is sustainable. Quality criteria are like compost resolution. However, this resolution did not allow the commercialization of the digestate, it only established the quality parameters (Table 5).

5.2.3.2. Situation in Chile

Law N°. 21.349 came into force on September 27, 2022, this law modified Decree Law N°. 3.557, Establishes provisions on agricultural protection, Decree with Force of Law N°. R.R.A. 25, of 1963, and Law N°. 18.755, Establishes regulations on the Agricultural and Livestock Service, repeals Law N°. 16.640 and other provisions. Law N°. 21.349 permits a regulation on fertilisers and biostimulants, according to the needs of the productive sector, improving information for the farmers for decision-making, strengthening the powers of the SAG (Agricultural and Livestock Service) to adequate control and supervision of these inputs, all of which will contribute to the sustainable and competitive development of Chilean agriculture.

The SAG is the entity in charge of supervising and ensuring compliance, with the regulations, and other complementary provisions and adopting the necessary measures for its application. This service restricts or prohibits the import, manufacture, formulation, production, distribution, possession, and marketing of fertilisers and biostimulants that constitute a risk to human, animal, or plant health, and must maintain a public and updated file. with the details of prohibited and restricted fertilisers and biostimulants.

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The exempt resolution N° 6.725 (2022), Establishes provisions and requirements derived from Law N° 21.349, which must be complied with by manufacturers, producers, formulators, packers, importers, marketers, and distributors of fertilisers and biostimulant products. The SAG resolution sets forth the specific provisions and requirements that manufacturers, producers, formulators, packagers, importers, marketers, and distributors of fertilizer and biostimulant products must adhere to.

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6. Conclusion and plan actions

As noted throughout this document, CELAC presents significant opportunities for the development of technologies related to the production and use of BBF and TMF. However, several areas require attention to achieve successful implementation.

Firstly, while the region has a large number of intensified livestock production systems, there is still limited development of manure treatment technologies. Most producers manage manure in open-air stabilization ponds or use it as fertilizer on agricultural fields. However, more sophisticated treatment methods have been introduced in recent years as environmental and regulatory requirements have evolved. Progress is being made in developing composting plants for producing amendments and biogas plants for energy recovery. Nonetheless, digestate management in biogas plants is still under development.

The lack of investment in advanced technologies, such as those developed in the Fertimanure project, can be attributed to several factors in the CELAC region:

- Low purchasing power to afford imported technology.
- Lack of government subsidies for new technological developments.
- Insufficient economic incentives (such as lower taxes and commercial benefits) for entrepreneurs, companies, or producers to develop new technologies or businesses.
- Low compliance with existing environmental legislation, coupled with weak enforcement by relevant authorities.

Despite the general situation in the region, many companies expressed interest in acquiring these technologies during the project. For example, a Chilean company traveled to the Netherlands to visit the Dutch pilot project with the aim of implementing it in their country. Similarly, at least five Argentinean companies are studying technological and business models to see how they can be adapted to the Argentinean economic and production reality, especially given the current complicated economic situation in the country (inflation, exchange rate disparities, import taxes, and other relevant economic issues for producers and businesses).

On another note, several public and private research institutes have initiated lines of research on manure management technologies. In Argentina, for instance, the National Institute of Agricultural Technology (INTA) has adopted different lines of Fertimanure projects, including the production and use of biochar, which has been funded by the Secretariat of Science and Technology through PICT. INTA's Institute of Agricultural Microbiology and Zoology has received a grant (under the national funding program called Biodesarrollar) to develop pellets from compost or the solid fraction of anaerobic digestate for microbiological enrichment, along with conducting agronomic tests. Additionally, it is developing a machine for the biodrying of the solid fraction of manure, aimed at producing pellets for use as biofuel or fertilizer.

Therefore, when developing a strategy for replicating Fertimanure in the region, it is essential to focus on several points that facilitate CELAC adoption. The following are the most important:

Economical

- Implementation of subsidies by national governments is necessary to facilitate the transition of producers from conventional to sustainable agriculture.
- Establish differential taxes for products made from renewable resources.
- Provide tax incentives for farmers and companies that produce or use bio-based fertilizers, such as tax credits or exemptions.

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Technological

- Develop technologies adapted to local and economic conditions by stimulating synergies among research institutions, industry, and agricultural producers.
- Design methods focused on efficient nutrient recovery in the production of BBFs and TMFs, aiming for NPK content close to that of conventional fertilizers.
- Establish pilot biorefineries to serve as models for producers or companies interested in acquiring the technology.
- Demonstrate the efficiency and safety of BBFs and TMFs production through agronomic trials.
- Encourage the establishment of livestock cooperatives to **set up centralized biorefineries** for the treatment of livestock manure and the production of BBFs and TMFs.

Legal

- Clarify and facilitate the rules for the certification or registration of non-conventional products (amendments or bio-based fertilizers). It is important to reduce the time required for the registration of new products.
- Establish legislation to encourage producers to adopt sustainable technologies.
- Create a register of renewable products and promote clear labeling to build consumer confidence regarding production methods, nutrient content, product restrictions, etc.

Dissemination and Training

- Develop university curricula that incorporate concepts of circular economy and more sustainable production.
- Raise awareness of the importance of using renewable and environmentally friendly products (including those with lower carbon and water footprints).
- Stimulate training on various technological developments for producers and companies interested in BBFs and TMFs.

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Annexes

Annex 1 and Annex 2 are submitted as separate attachments.

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FERTIMANURE

INNOVATIVE NUTRIENT RECOVERY FROM SECONDARY SOURCES-PRODUCTION OF HIGH-ADDED VALUE FERTILISERS FROM ANIMAL MANURE

PROJECT COORDINATOR

Fundació Universitària Balmes (Spain)

CONSORTIUM

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Wageningen Environmental Research (The Netherlands)
University of Milan (Italy)
Leitat (Spain)
GreenWin (Belgium)
European Landowners Organisation (Belgium)
IPS Konzalting (Croatia)
Fraunhofer (Germany)
Dorset Green Machines (The Netherlands)
Prinsen Dairy Company (The Netherlands)
French Chamber of Agriculture (France)
Cooperativa Plana de Vic (Spain)
AlgaEnergy S.A. (Spain)
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Instituto Nacional de Tecnología Agropecuaria (Argentina)

PROJECT WEBSITE:

https://www.fertimanure.eu

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7. Brief project summary

The mission of the FERTIMANURE project is to provide innovative solutions (technology, end-products, and business models) that solve real issues, i.e. the manure challenge, and help farmers with the challenges that they are currently facing. FERTIMANURE will develop, integrate, test and validate innovative nutrient management strategies so as to efficiently recover and reuse nutrients and other products with agronomic value from manure, to ultimately obtain reliable and safe fertilisers that can compete in the EU fertiliser market.
The FERTIMANURE project will cover both technological and nutrient management approaches. The technological side will be addressed with the implementation of 5 innovative and integrated on-farm experimental pilots for nutrient recovery in the most relevant European countries in terms of livestock production (Spain, France, Germany, Belgium, The Netherlands), whereas nutrient management will be addressed through 3 different strategies adapted to mixed and specialised farming systems:
Strategy #1 with on-farm production and use of bio-based fertilisers (BBF)(1) , **Strategy #2** with on-farm BBF production and centralised tailor-made fertilisers (TMF)(2) production, and **Strategy #3** with on-farm TMF production and use.

Definition of Bio-based fertilisers (BBFs): *Bio-based fertilisers (BBFs) are fertilising products or a component to be used in the production of (Tailor-Made) Fertilisers that are derived* ***from biomass-related resources.***

The BBFs of FERTIMANURE are "obtained through a ***physical, thermal/thermo-chemical, chemical, and/or biological processes for the treatment*** *of manure or digestate that result into a change in composition due to a change in concentration of nutrients and their ratios compared to the input material(s) in order to get better marketable products providing farmers with nutrients of sufficient quality".*

However, just separation of manure in a solid and liquid fraction (as first processing step) is excluded. These products are not conceived as a BBF, although they are valuable sources to supply nutrients on agricultural land.

LIST OF BBFs Produced in FERTIMANURE

Number	BBF-code	BBF product description
1	NL-AS	Ammonium sulphate solution
2	NL-LK	Liquid K-fertiliser
3	NL-SC	Soil conditioner
4	NL-WP	Wet organic P-rich fertiliser
5	NL-DP	*90% dried organic P rich fertiliser (calc)*
6	ES-NC	Nutrient-rich concentrate
7	ES-DSC	Bio-dried solid fraction
8	ES-PA	Phosphorous (ashes)
9	ES-AM	Ammonium salts
10	ES-AA	AA-based biostimulants
11	DE-BC	Biochar (solid)
12	DE-AP	Ammonium phosphate on perlite (solid)
13	BE-AN	Ammonium nitrate
14	BE-AS	Ammonium sulphate
15	BE-AW	Ammonium water
16	FR-BC	Biochar
17	FR-AS	Ammonium sulphate
18	FR-LK	Liquid K-fertiliser

Definition of Tailor-Made Fertilisers (TMFs): *A tailor-made fertiliser (TMF) is a customized fertiliser that meets with the nutrient requirements of a specific crop by taking into account the soil type, soil fertility status, and growing conditions and fertilisation practises.*

The TMFs obtained in FERTIMANURE are produced from BBFs (produced from manure or digestate and/or other recovered fertilising products that are available) and/or mineral fertilisers (MF) (and/or biostimulants).

This project has received funding from
the EU Horizon 2020 Research and Innovation Programme
under grant agreement No. 862849

Fully crop specific TMFs can be defined and centrally produced assuming e.g. a sufficient nutrient status of a soil type and no additional fertilisation practice.

However, on farm level the soil-crop requirements will be different due to another nutrient status of the soil and the fact that often manure/digestate will be applied on the fields which has to be taken into account as nutrient supplier. Consequently, the composition of the TMF (combination of BBF and MF) that will be used by the farmer can differ from the one produced in a centralised way.

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under grant agreement No. 862849

Cuestionario

Webinar Fertimanure: Biofertilizantes sustentables y su adopción en la región

* Indicates required question

Tiempo estimado de respuesta: 3 min

Nombre *

Your answer

E-mail *

Your answer

País de residencia *

Your answer

Rol en la industria *

Choose

Le agradeceríamos por favor pueda responder las siguientes preguntas.
Para mayor información puede revisar las fichas de prototipos de BBF al final del cuestionario.

1- ¿Qué potencial identifica en el uso y producción de **fertilizantes de base biológica (biofertilizantes) en su país?.** Considere 1 para un mínimo potencial y 5 para un máximo potencial.

	1	2	3	4	5	
mínimo	○	○	○	○	○	máximo

2- ¿Cuál es **tu opinión** sobre estos productos? ¿Cree que tendrán aceptación por parte de los **grupos de interés** (ganaderos, agricultores, empresas de fertilizantes, entre otros)?

Your answer

3- ¿Cuáles cree que son **los principales desafíos y barreras que deben abordarse para la adopción de los fertilizantes de base biológica** (biofertilizantes), en su país? *

- [ ] Económicos
- [ ] Tecnológicos
- [ ] Sociales
- [ ] Ambientales
- [ ] Regulatorios
- [ ] Other: _____

¿Cuál sería su recomendación para intentar solucionar estos desafíos/barreras?

Your answer

4- ¿Existe algunas **iniciativas, programas o investigaciones específicas que se estén implementando para promover el uso** de fertilizantes de base biológica (biofertilizantes) en su país? Si es afirmativa su respuesta, por favor indicar nombre.

Your answer

5- ¿Cómo los fertilizantes de base biológica (biofertilizantes) generados en el proyecto FERTIMANURE **podrían llevarse "un porcentaje del mercado" en su país**?

Your answer

6- Si un productor agropecuario produjera fertilizantes de base biológica (biofertilizantes), **¿le interesaría comprárselos y usarlos/venderlos?**

- ◯ Sí
- ◯ No
- ◯ Other: _____

¿De qué dependería su decisión?

- ◯ Calidad
- ◯ Resultados
- ◯ Precio
- ◯ Tipo de especie de procedencia del biofertilizante
- ◯ Other: _____

7- ¿Cuáles son **los requisitos regulatorios clave y los procesos de certificación** que deben afrontar los fertilizantes de base biológica (biofertilizantes) en específico en su país?

Your answer

Fichas Técnicas prototipos BBF

BBFs desarollados en Proyecto Fertimanure

Country	BBF-code	Description	BBF-code	Description	BBF-code	Description
	Mineral fertilisers		**Organic amendments**		**Biostimulants**	
ES	ES-NC	Nutrient-rich concentrate	ES-DSC	Biodried solid fraction	ES-AA	AA-based biostimulants
ES	ES-PA	Phosphorous (ashes)				
ES	ES-AM	Ammonium salts				
NL	NL-AS	Ammonium sulphate solution	NL-SC	Organic soil conditioner		
NL	NL-LK	Liquid K-fertiliser				
NL	NL-WP	Wet organic P-rich fertiliser				
NL	NL-DP	90% dried organic P-rich fertiliser				
DE	DE-AP	Ammonium phosphate on perlite	DE-BC	Biochar		
B	BE-AN	Ammonium nitrate				
B	BE-AS	Ammonium sulphate				
B	BE-AW	Ammonium water				
FR	FR-AS	Ammonium sulphate	FR-BC	Biochar		
FR	FR-LK	Liquid K-fertiliser				

Ficha Técnica Sulfato de amonio

AMMONIUM SULPHATE SOLUTION (NL-AS)

PRODUCT SUMMARY

PRODUCT INFORMATION

Country:	The Netherlands	**Density (kg/L)**	1.2
Type of fertiliser:	Mineral fertiliser	**Dry matter (g/kg)**	327
Main chemical species:	Ammonium sulphate	**Organic carbon (g/kg)**	0.7
Input material:	Cattle slurry manure	**Total nitrogen (g/kg)**	66
Product form:	Liquid	**Total phosphorous (g/kg)**	0.02
pH	5.5	**Total potassium (g/kg)**	0.2

Ficha Técnica Enmienda orgánica

BIODRIED SOLID FRACTION (ES - DSC)

PRODUCT SUMMARY

PRODUCT INFORMATION

Country:	Spain	**Density (kg/L)**	0.37
Type of fertiliser:	Organic amendment	**Dry matter (g/kg)**	502
Main chemical species:	Mixture	**Organic carbon (g/kg)**	251
Input material:	Solid fraction of pig slurry	**Total nitrogen (g/kg)**	11.4
Product form:	Solid	**Total phosphorous (g/kg)**	2.7
pH	7.1	**Total potassium (g/kg)**	5.0

Ficha Técnica Bioestimulante

AMINO-ACID BASED BIOSTIMULANTS (ES – AA)

PRODUCT SUMMARY

PRODUCT INFORMATION

Country:	Spain	**Density (kg/L)**	1
Type of fertiliser:	Bio-stimulant	**Dry matter (g/kg)**	40-50
Main chemical species:	Mixture	**Organic carbon (g/kg)**	/
Input material:	Raw pig slurry	**Total nitrogen (g/kg)**	5.12
Product form:	Solid	**Total phosphorous (g/kg)**	<1
pH	7.9	**Total potassium (g/kg)**	<1

Ficha Técnica Enmienda orgánica

BIOCHAR (DE - BC)

PRODUCT SUMMARY

PRODUCT INFORMATION

Country:	Germany	**Density (kg/L)**	0.5
Type of fertiliser:	Organic amendment	**Dry matter (g/kg)**	980
Main chemical species:	Mixture	**Organic carbon (g/kg)**	393
Input material:	Cattle dung	**Total nitrogen (g/kg)**	10.2
Product form:	Solid	**Total phosphorous (g/kg)**	30.4
pH	12.3	**Total potassium (g/kg)**	95

Ficha Técnica Enmienda orgánica

SOIL CONDITIONER (NL-SC)

PRODUCT SUMMARY

PRODUCT INFORMATION

Country:	The Netherlands	**Density (kg/L)**	0.4
Type of fertiliser:	Organic amendment	**Dry matter (g/kg)**	271
Main chemical species:	Mixture	**Organic carbon (g/kg)**	126
Input material:	Cattle slurry	**Total nitrogen (g/kg)**	6.5
Product form:	Solid	**Total phosphorous (g/kg)**	2.3
pH	8.5	**Total potassium (g/kg)**	4.9

Ficha Técnica Enmienda sólida

BIOCHAR (FR - BC)

PRODUCT SUMMARY

PRODUCT INFORMATION

Country:	France	**Density (kg/L)**	0.13
Type of fertiliser:	Soil amendment	**Dry matter (g/kg)**	955.6
Main chemical species:	Mixture	**Organic carbon (g/kg)**	436.5
Input material:	Solid digestate	**Total nitrogen (g/kg)**	17.9
Product form:	Solid	**Total phosphorous (g/kg)**	18.9
pH	10.05	**Total potassium (g/kg)**	41.2

Submit

Clear form

Cuestionario Plan de explotación y replicabilidad del proyecto Fertimanure en la región CELAC

* Indica que la pregunta es obligatoria

FERTIMANURE es un proyecto financiado por la UE, que desarrolla, integra, prueba y valida estrategias innovadoras de gestión de nutrientes para recuperar eficientemente nutrientes minerales y otros productos relevantes con valor agronómico, del estiércol animal.

1. Nombre y Apellido

2. Correo electrónico

3. País de residencia *

4. Rol en la industria *

Marca solo un óvalo.

- ◯ Industria Ganadera
- ◯ Agricultura
- ◯ Industria de fertilizante
- ◯ Academia/Investigación
- ◯ Organización de Fomento
- ◯ Organización Gremial
- ◯ Organismo del Estado
- ◯ Planta de Biogas
- ◯ Consultor
- ◯ Empresa tecnológica
- ◯ Otro: _____

5. A su entender, ¿Cuáles son **las tendencias y oportunidades actuales** del mercado para los fertilizantes de base biológica (biofertilizantes) en la región CELAC?. ¿Cómo las está abordando? (What are the **current market trends** and opportunities for BBFs in the CELAC region and how are you addressing them?)

_____

_____

_____

_____

_____

6. Ve usted que el uso/producción de fertilizantes de base biológica (biofertilizantes) **tiene futuro en la región CELAC?** ¿Cuál es tu opinión sobre estos productos? ¿Cree que tendrán aceptación por parte de los grupos de interés? (ganaderos, agricultores, empresas de fertilizantes, entre otros) (Do you see that the use/production of BBFs **has a future in the CELAC region**? What is your opinion about them? Do you think that they will be accepted by stakeholders?)

7. ¿Cuáles cree que son **los principales desafíos y barreras que deben abordarse para la adopción de los fertilizantes de base biológica** (biofertilizantes) en la región de la CELAC? ¿Cuál sería su recomendación para intentar solucionar estos desafíos/barreras? (What do you think **are the key challenges and barriers that need to be addressed for the adoption of Biofertilizers** in the CELAC region? What is your advice when it comes to solving these challenges/barriers?).

8. ¿Existe alguna **iniciativa o programa específico que se estén implementando para promover el uso** de fertilizantes de base biológica (biofertilizantes) en la región CELAC?. (Are there **any specific initiatives or programs being implemented by you to promote the use** of Biofertilizers in the CELAC region?).

9. A su entender. ¿Se han realizaron esfuerzos de investigación y desarrollo para mejorar **el uso/producción y el uso eficiente de los fertilizantes** de base biológica (biofertilizantes) para la agricultura en la región de la CELAC? (Were there any research and development efforts being undertaken to improve **the effectiveness and use/production of biofertilizer for CELAC agriculture**?).

10. ¿Cómo los fertilizantes de base biológica (biofertilizantes) generados en el FERTIMANURE **podrían llevarse "una porción del mercado" en la región de la CELAC**? ¿Tiene algún consejo sobre cómo poder cubrir algunos segmentos del mercado? (How FERTIMANURE biofertilizer **could take "a piece of cake" in the CELAC market**? Do you have any advice on how to be able to cover some segments of the market?).

11. Cuáles son los **requisitos regulatorios clave y los procesos de certificación** que deberían afrontar los fertilizantes de base biológica (biofertilizantes) en la región CELAC? ¿Tiene un impacto para ayudar en el proceso de aceptación y uso? (What are the **key regulatory requirements and certification processes** for Biofertilizars in the CELAC region? Do you have an impact on assisting and navigating these processes?).

12. ¿**Colabora con otras partes interesadas** (organizaciones de agricultores, gobierno, instituciones de investigación, etc.) **para promover la adopción y el desarrollo de nuevos productos en la región de la CELAC**? Si es así, ¿de qué manera?

    Do you **collaborate with other stakeholders** (farmers' organizations, government, research institutions, etc.) **in order to promote the adoption and development** of new products in the CELAC region? If yes, in what way?

13. ¿**Tienen un impacto en los fabricantes de fertilizantes** en el desarrollo de estrategias de marketing, marca, posicionamiento de productos, etc. para satisfacer las necesidades específicas de las partes interesadas en la región CELAC? En caso afirmativo, ¿de qué manera? Do **you have an impact on fertiliser manufacturers** in developing marketing strategies, branding, product positioning, etc. to fulfil specific needs of stakeholders in the CELAC region? If yes, in what way?

14. A su entender, ¿Tiene una visión de largo plazo sobre el ingreso al mercado y el crecimiento de los fertilizantes de base biológica (biofertilizantes) en la región CELAC? ¿**Cuáles serían las iniciativas o estrategias sugeridas para lograrlo?.** (Do you have a long-term vision regarding the market penetration and growth of biofertilizer in the CELAC region? **What would be suggested initiatives or plans to achieve it**?)

15. ¿Qué cree que es importante incluir en las **guías, para la industria de los fertilizantes y los agricultores**, si quisieran **usar o producir fertilizantes de base biológica (biofertilizantes)**? (procesos de fabricación, calidad del producto, etiquetado, almacenamiento, distribución, etc.). (What do you think is important to include in **the guidelines for the fertiliser industry/farmers** if they would like to use/produce Biofertilizer? (manufacturing processes, product quality, labeling, storage, distribution, etc**.**)

16. Si un productor agropecuario produjera fertilizantes de base biológica (biofertilizantes), **¿le interesaría comprárselos y usarlos/venderlos?** (If a farmer were to produce BBFs**, would you be interested in buying them from them and using/selling?)**