RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

Deliverable 8.12:

Practice Abstracts 2 - final batch

Project acronym	RUSTICA
Project title	Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities
Grant agreement number	101000527
Call identifier	H2020-RUR-2020-1
Project start date	01/01/2021
Project duration	48 months
Due date	M48 - 31/12/2022
Submission date	M48 - 18/12/2024
Lead	KU Leuven
Author(s)	Margo Heremans (KU Leuven), Marina Predic (IDC)
Contributor(s)	All partners
Dissemination level	Public

Table of Contents

THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020
RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT NO 101000527

Abstract

This deliverable contains a summary and the content of the final batch of 16 new Practice Abstracts developed under the RUSTICA project, organised into three main categories:

- **Stakeholder involvement** – related to the multi-actor approach and collaboration within and between RUSTICA regions.
- **Market & business development** – related to the development of new business models for bio-based fertilisers.
- **Technology development & demonstration** – related to the development and demonstration of RUSTICA technologies.

THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020
RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT NO 101000527

List of tables

THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020
RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT NO 101000527

Abbreviations

ABM	Agent-based modelling
BBF	Bio-based fertiliser
BM	Business model
CAP	Common Agricultural Policy
CMC	Component Material Category
EC	European Commission
EIP-AGRI	European Innovation Partnership for Agricultural Productivity and Sustainability
ENRD	European Network for Rural Development
EU	European Union
F&V	Fruit and vegetable
FPR	Fertilising Products Regulation
GA	Grant Agreement
GHG	Greenhouse gas
H2020	Horizon 2020
LCA	Life Cycle Assessment
LCC	Life Cycle Costing
LP	Linear programming
NPK	Natrium Phosphorus Potassium
PA	Practice Abstract
PB	Policy Brief
PFC	Product Function Category
RBBF	RUSTICA bio-based fertiliser
RBM	Residue-based model
S-LCA	Social Life Cycle Assessment
TRL	Technology Readiness Level
VC	Value Chains
VdC	Valle del Cauca

THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020
RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT NO 101000527

The RUSTICA consortium

The RUSTICA consortium, composed of university researchers, academics, consultants, scientists, businesses, and farmers, works together to achieve the project's common objective while stimulating an environment where each consortium partner shares and exchanges experiences to reach the set goals.

Table 1 - Overview RUSTICA consortium partners

Logo	Name	Short name	Country
	Catholic University of Leuven	KU Leuven	Belgium
	DRANCO NV	DRANCO	Belgium
	Chambre Régionale d'Agriculture des Pays de la Loire	CRAPDL	France
	BioSabor, S.A.T.	BioSabor	Spain
	Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria	CREA	Italy
	Fundación para las Tecnologias Auxiliares de la Agricultura	TECNOVA	Spain
	Avecom NV	AVECOM	Belgium
	Entomo Consulting S.L.	ENTOMO	Spain
	Particula Group d.o.o.	PAR	Croatia
	Wiedemann GmbH	WIED	Germany
	ID Consortium SL	IDC	Spain
	Stichting CropEye	CROPEYE	Netherlands
	Eigen Vermogen van het Instituut voor Landbouw, Visserij en Voedingsonderzoek	EV ILVO	Belgium
	The Netherland's Organisation of Applied Scientific Research	TNO	Netherlands
	Universiteit Gent	UGent	Belgium
	Centro Internacional de Agricultura Tropical	CIAT	Colombia

THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020
RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT NO 101000527

1. Introduction

The European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI) was launched by the European Commission (EC) in 2012. This initiative aimed to help all EU countries provide their citizens with a more competitive economy, better jobs, and improved living standards, fostering a competitive and sustainable agriculture and forestry sector that "achieves more from less." In 2022, the EIP-AGRI merged with the European Network for Rural Development (ENRD) to form the EU CAP Network. This consolidation aims to streamline efforts in supporting the design and implementation of Common Agricultural Policy (CAP) strategic plans, fostering innovation, and facilitating knowledge exchange among stakeholders.

The EU CAP Network serves as a forum for stakeholders—including national CAP networks, organisations, administrations, researchers, entrepreneurs, and practitioners—to share knowledge and information about agriculture and rural policy. It supports the design, implementation, and evaluation of CAP strategic plans, innovation, and knowledge exchange, including EIP-AGRI. In this sense, communicating about project activities and results is much easier through the use of a common format that facilitates knowledge flow and enables contact with farmers, researchers, and all other actors involved in innovation projects. The EU CAP Network common format consists of a set of basic elements characterising the project, including practice abstracts (PAs). This format is designed to facilitate contact with partners, encourage efficient knowledge exchange, and disseminate the project results in a concise and easily understandable way to practitioners.

All the PAs generated during the life cycle of the RUSTICA project are periodically uploaded to the EU CAP Network project database, a unique repository that supports the dissemination of results from all interactive innovation projects, sharing information at the EU level. In addition, these PAs will be a useful dissemination tool to share the updates and outcomes of RUSTICA with the EU CAP Network subgroup on innovation.

This document presents the remaining 16 PAs that have been developed based on the outcomes of the project.

2. Methodology

PAs are short summaries of around 1,000-1,500 characters (word count – no spaces) that describe the main information/recommendations and serve end users in their daily practice. All PAs have been prepared following the guidance and common format of EIP-AGRI. Every PA must be accompanied by a short title of no more than 150 characters.

This deliverable presents the practice abstracts in a design prepared for publishing the PAs on the project website. This design, however, includes the same information required within the EIP-AGRI format:

- Main results/outcomes of the activity (expected or final)
- Main practical recommendations, such as the added value, benefits, and opportunities for the end user.

Both the summary and the title may also be provided in the native language of the coordinator or one of the partners. However, an English version of the PA is always available.

THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020
RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT NO 101000527

3. Overview of final batch of practice abstracts

Table 2 - Overview final batch of practice abstracts

#	Partner involved	Topic	Language
25	WIED	Legislative aspects at national & regional level - Valle del Cauca	English / Spanish
26	TECNOVA	Business models - Almeria	English / Spanish
27	CREA	Business models - Friuli-Venezia Giulia	English / Italian
28	CIAT	Business models - Valle del Cauca	English / Spanish
29	KU Leuven	Business models - Flanders	English / Dutch
30	CRAPDL	Business models - Pays de la Loire	English / French
31	PAR	Final Life Cycle Assessment (LCA) report	English / English
32	PAR	Social and socio-economic impacts of BBFs evaluation	English / English
33	PAR	Final Life Cycle Costing (LCC) report	English / English
34	KU Leuven	PB1 - Reality check for circularity	English / Dutch
35	KU Leuven	PB2 - Biobased fertilisers as a piece of the puzzle in the transition towards more sustainable food systems	English / Dutch
36	WIED	PB3 - RUSTICA circular bio-based fertilisers and new policies	English / Spanish
37	CIAT	PB4 - Circular bio-based fertilisers in a global context	English / Spanish
38	KU Leuven	Combining LCA and linear programming to optimise social fertiliser costs	English / Dutch
39	EV ILVO	Sustainability transitions in agri-food systems through the lens of agent based modelling: a systematic review	English / Dutch
40	KU Leuven	Circular bioeconomy - concrete solutions to increase the added value of farming production: Report on the COPA COGECA panel debate	English / Dutch

THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020
RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT NO 101000527

4. Annex 1: Practice abstracts - final batch

THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020
RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT NO 101000527

#25

PRACTICE ABSTRACT

TEST CASE VALLE DEL CAUCA - LEGAL ASPECTS

RUSTICA TEST CASES - A VIEW ON LEGAL ASPECTS IN VALLE DEL CAUCA

SHORT SUMMARY FOR PRACTITIONERS

EN version

RUSTICA strives for technologies on bio-based fertilisers and soil improvers which are validated in four European test cases and in the Colombian test region Valle del Cauca. Targeting closed and sustainable nutrient cycles by using methods involving waste and by-products triggers the question on the situation in terms of legal frameworks either fostering or impeding an introduction onto the market. The Colombian Agricultural Institute is the competent authority for legal and technical matters as regards fertilisers and soil amendments in Colombia. There are five different main classes of fertilsers including organic fertilisers and organic conditioners while marketing of organic fertilisers needs to consider six subcategories.

Detailed prescriptions are laid down for compost and digestate from anaerobic digestion. Specific requirements are linked to biofertilisers. Organic farming is legally defined and represented by a dedicated national label. The stipulations of a registration process are very important if one intends to commercialise fertiliser materials, e.g., from insects or biochar.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

RUSTICA se esfuerza por desarrollar tecnologías en fertilizantes orgánicos y mejoradores del suelo que están siendo validados en cuatro casos de prueba europeos y en la región de prueba colombiana del Valle del Cauca. Al apuntar a ciclos de nutrientes cerrados y sostenibles mediante el uso de métodos que involucran residuos y subproductos, surge la pregunta sobre la situación en términos de marcos legales que ya sea fomenten o impidan su introducción en el mercado. El Instituto Colombiano Agropecuario es la autoridad competente en asuntos legales y técnicos relacionados con fertilizantes y enmiendas del suelo en Colombia. Existen cinco clases principales diferentes de fertilizantes, incluidos los fertilizantes orgánicos y los acondicionadores orgánicos, mientras que la comercialización de fertilizantes orgánicos considera seis subcategorías.

Se establecen prescripciones detalladas para el compost y el digestato de la digestión anaeróbia. Requisitos específicos están vinculados a los biofertilizantes. La agricultura orgánica está legalmente definida y representada por una etiqueta nacional. Las estipulaciones de un proceso de registro son muy importantes si se pretende comercializar materiales fertilizantes, por ejemplo, a partir de insectos o biocarbón.

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

RUSTICA

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#25

PRACTICE ABSTRACT

TEST CASE VALLE DEL CAUCA - LEGAL ASPECTS

RUSTICA TEST CASES - A VIEW ON LEGAL ASPECTS IN VALLE DEL CAUCA

CONTEXT

Currently, the Colombian legal and regulatory frameworks reflect detailed rules on a variety of organic fertilisers. Specifications on composting and digestate from anaerobic digestion are available while at the same time, imports of inorganic fertilisers are of particular relevance in the country. As to that, novel circular fertilising products could unfold a tailored plant nutrition, perfect soil condition and new perspectives for the entire sector in Valle del Cauca and Colombia.

PROBLEM

A multitude of possibilities on the use of fruit and vegetable residues for generating organic fertilisers and soil improvers is available in national legal frameworks as regards placing on the market in Colombia. However, a meticulous view on the rules of registration is requested if specific sectors like insects or biochar are addressed and compliance with legal frameworks shall be achieved.

SOLUTION

RUSTICA identifies, monitors and reports legal drivers and drawbacks related to circular bio-based fertilisers. Aside from international and European Union law, the project deals with situations and future outlooks at national and regional scale in Colombia and Valle del Cauca. Moreover, legal points of organic agriculture are evaluated and recorded in the project. Results of the work are published and available for policy makers and authorities.

OUTCOME

1. A detailed and publicly available report (D3.6) on national and regional legislation in the test regions in EU countries and Colombia revealing options and constraints of RUSTICA developments.
2. A dedicated summary on major criteria in national and regional legislation in Colombia and Valle del Cauca relevant for stakeholders and marketing of the new technologies.
3. An integration of the subject into workshops enabling a broad discussion on legal situations, positions and future needs in the Valle del Cauca test region has been made.

PRACTICAL RECOMMENDATIONS

- ✓ An evaluation of the feedstocks and precursors of fertilising products identifying their legal options for the individual value chains;
- ✓ A verification of the processing methods and comparison with legal requirements to recognise further needs;
- ✓ An assessment of contents, such as nutrient values, contaminants and pollutants of the fertilising products, blends and mixtures in terms of compliance with legislation;
- ✓ A consideration of legal sources addressing environmental issues (e.g., emissions) and fertiliser application;

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#26

PRACTICE ABSTRACT

BUSINESS MODEL ALMERIA

RUSTICA BUSINESS MODEL FOR ALMERIA REGION

SHORT SUMMARY FOR PRACTITIONERS

EN version

Intensive greenhouse agriculture in the Almería region produces approximately 2 million tons of organic waste annually, primarily derived from horticultural crops grown under plastic. These wastes pose management challenges due to their seasonality, the large volume generated, and the presence of non-biodegradable plastic materials such as polypropylene raffia. Although there are composting facilities that process some of this waste, the adoption of compost among farmers remains limited.

A biofertiliser blend specifically designed for the region's edaphology characteristics has been developed, consisting of 50% compost, 20% biochar, 20% insect biomass, and 10% insect frass. This formulation has the potential to improve soil fertility in organic greenhouse crops (4,245 ha), with a recommended application of 10.5 tons per hectare every three years. However, biochar production faces significant barriers in the region due to a shortage of woody biomass.

The proposed business model is based on a circular economy strategy, integrating farmer cooperatives, waste management companies, and providers of emerging technologies, such as waste bioconversion through insects. This strategy aims not only to reduce reliance on mineral fertilisers but also to efficiently manage the organic waste generated.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

La agricultura intensiva en invernaderos en la región de Almería produce aproximadamente 2 millones de toneladas de residuos orgánicos anualmente, principalmente derivados de cultivos hortícolas bajo plástico. Estos residuos presentan desafíos en su gestión debido a su estacionalidad, el gran volumen generado y la presencia de materiales plásticos no biodegradables como la rafia de polipropileno. Aunque existen plantas de compostaje que procesan algunos de estos residuos, la adopción de compost entre los agricultores sigue siendo limitada.

Se ha desarrollado una mezcla de biofertilizantes específicamente diseñada para las características edafológicas de la región, compuesta por 50% compost, 20% carbón vegetal (biochar), 20% biomasa de insectos y 10% excrementos de insectos. Esta formulación tiene el potencial de mejorar la fertilidad del suelo en cultivos orgánicos de invernadero (4.245 ha), con una aplicación recomendada de 10,5 toneladas por hectárea cada tres años. Sin embargo, la producción de carbón vegetal enfrenta barreras significativas en la región debido a la escasez de biomasa leñosa.

El modelo de negocio propuesto se basa en una estrategia de economía circular, integrando cooperativas de agricultores, empresas de gestión de residuos y proveedores de tecnologías emergentes, como la bioconversión de residuos a través de insectos. Esta estrategia busca no solo reducir la dependencia de fertilizantes minerales, sino también gestionar eficientemente los residuos orgánicos generados

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#26

PRACTICE ABSTRACT

BUSINESS MODEL ALMERIA

RUSTICA BUSINESS MODEL FOR ALMERIA REGION

CONTEXT

The Almería region, located in southeastern Spain, is renowned for its intensive agricultural activity, particularly in the production of greenhouse horticultural crops, which span approximately 32,000 hectares. This agricultural model generates around 2 million tons of organic waste annually, presenting a significant challenge for waste management
and valorisation. Farmer cooperatives play a crucial role in marketing agricultural products and adopting sustainable practices.

PROBLEM

The management of organic waste is hindered by the seasonality of waste generation, which is concentrated mainly between May and June and in February, at the end of harvest cycles. The logistical limitations of treatment plants, lack of space, and the presence of plastic waste (especially polypropylene raffia) constitute critical barriers to effective valorisation. These challenges have been validated through stakeholder workshops, highlighting the urgency of addressing these issues.

SOLUTION

A business model based on circular economy principles is proposed, integrating biofertiliser production from organic waste generated in agricultural activities.
This approach promotes collaboration between farmer cooperatives and waste management
companies, facilitating the conversion of waste into high-quality biofertilisers. The optimal blend designed to improve soil health consists of compost (50%), biochar (20%), insect biomass (20%), and insect frass (10%).

OUTCOME

The implementation of this business model could allow for the valorisation of up to 13% of the waste generated in the region, sustainably introducing biofertilisers into the agricultural market. This approach not only reduces dependence on mineral fertilisers but also promotes regenerative agricultural practices that enhance soil health and long-term sustainability. By effectively utilising the significant volumes of organic waste produced in the intensive horticulture of Almería, this model addresses waste management while fostering a more sustainable agricultural ecosystem. Additionally, it aligns with the interests of local cooperatives and waste management companies, creating a collaborative framework that improves resource efficiency and ultimately contributes to a more resilient agricultural system in the Almería region.

PRACTICAL RECOMMENDATIONS

It is recommended to implement training programmes aimed at farmers regarding the use and benefits of biofertilisers and compost. Additionally, it is crucial to promote synergies between farmer cooperatives and waste management companies to
facilitate the valorisation of organic waste. Lastly, establishing economic incentives to encourage the adoption of innovative technologies in biofertiliser production and waste management is suggested.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#27

PRACTICE ABSTRACT

Business Model FVG

Business Model scenarios Friuli-Venezia Giulia (Italy)

SHORT SUMMARY FOR PRACTITIONERS

EN version

Residues from fruit and vegetables are produced in significant amounts in Friuli-Venezia Giulia region (Italy), but not fully valorised to date. RUSTICA provides a technical solution for recovering nutrients and organic matter from wastes to convert them into innovative bio-based fertilisers (RBBF) of high quality.
To maximise the viability of RBBF production, feasible and robust value chains (VC) and business model (BM) scenarios need to be developed tailored to the region. This aim was achieved following a bottom-up approach in a multi-actor framework, considering stakeholders' contributions in defining BM scenarios fitted to current region conditions and needs. Two potential BM scenarios were identified based on the regionally established network of inter-municipal waste management companies integrating RUSTICA technologies in their current waste treatment processes.
The viability of the proposed BM scenarios can be increased by finding low-cost feedstocks, enhancing the production scale, integrating different conversion processes in the same plant, and properly considering the long-term positive effect of RBBF on soil fertility and ecosystem functions.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

In Friuli-Venezia Giulia si producono quantità significative di scarti di frutta e verdura che non sono al momento attuale pienamente valorizzati. RUSTICA offre una soluzione tecnica che consente di recuperare nutrienti e sostanza organica dagli scarti e di convertirli in fertilizzanti a base biologica (RBBF) innovativi e di alta qualità.
Per massimizzare la redditività del settore dei RBBF, è necessario sviluppare catene del valore e modelli di business solidi e sostenibili, adatti alla specifica regione. Questo obiettivo è stato raggiunto seguendo un approccio dal basso in un contesto multi-attoriale, prendendo in grande considerazione il contributo dei portatori di interesse del settore nella definizione di scenari di modelli di business adatti alle condizioni ed esigenze attuali della regione.
Sono stati identificati due potenziali scenari di modelli di business, basati sulla consolidata rete regionale di aziende municipalizzate per la gestione dei rifiuti e l'integrazione delle tecnologie Rustica nei correnti processi di trattamento dei rifiuti utilizzati dalle aziende.
La fattibilità degli scenari di modello di business proposti può essere aumentata identificando scarti con costo minore, aumentando la scala di produzione, integrando diversi processi di conversione nello stesso impianto e considerando adeguatamente l'effetto positivo a lungo termine dell'applicazione dei RBBF sulla fertilità e le funzioni ecosistemiche del suolo.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#27

PRACTICE ABSTRACT

Business Model FVG

Business Model scenarios Friuli-Venezia Giulia (Italy)

CONTEXT

Residues from fruit and vegetables are produced in significant amounts in Friuli-Venezia Giulia (Italy), but their nutrient and organic matter content is not fully valorised to date. Their recovery as fertilising products is relevant to decrease the use of mineral fertiliser and maintaining soil fertility, contributing to the sustainability of agricultural productions. RUSTICA provides a technical solution to convert residues in innovative bio-based fertilisers (RBBF) of high quality

PROBLEM

In order to maximise the viability of the RUSTICA end products, viable and robust value chains and business model (BM) scenarios need to be developed tailored to each region's specific economic, social, and environmental conditions.

SOLUTION

Values chain and BM scenarios were defined following a bottom-up approach in a multi-actor framework. In particular, the contribution of stakeholders to the definition of BM scenarios was highly considered in a series of 6 consecutive regional workshops. In this way, it was possible to consider the specific crop needs, pedoclimatic conditions, farmer requirements and locally available resources. This enabled the definition of robust and viable BM scenarios tailored to the region's actual conditions and needs.

OUTCOME

Two potential BM scenarios were identified, both based on the regional established network of inter-municipal waste management companies already operating in the region, and the integration of the new RUSTICA technologies in the current anaerobic digestion and composting processes to produce BBF blends.

The first business model scenario and value chain is based on an inter-municipal company, assuming that, apart from producing compost, it would also produce insect biomass and insect frass. In this BM scenario also biochar is needed, and it is foreseen that the coffee processing industry, generating significant amounts of organic wastes, will utilise them to produce biochar.

The second BM scenario is based on two inter-municipal companies, that form a cooperation for producing a RBBF blend. One inter-municipal company produces insect biomass and frass, but only frass is sent for RBBF production. The second inter-municipal company produces biochar from green waste and microbial protein from degradable waste, utilising energy (heat) from the pyrolysis process for drying the microbial protein.

PRACTICAL RECOMMENDATIONS

- ✓ The viability of identified BM scenarios and the competitiveness of RBBF in the region can be increased by finding low-cost feedstocks for the conversion processes (especially for pyrolysis) and increasing the amount of available waste to increase the production scale.
- ✓ Integration of different conversion processes in the same plant, utilising energy and byproducts from a process to enhance another process, allows for a decrease in RBBF cost production.
- ✓ High energy prices in Italy make the pyrolysis technology especially attractive in this country.
- ✓ Feasibility of the proposed BM scenario will be increased by the appropriate valorisation of the long-term positive effect of blend application to land on soil fertility and ecosystem functions, such as, for example, the acknowledgment of carbon credits.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#28

PRACTICE ABSTRACT

BUSINESS MODEL VdC

Business Model Valle del Cauca: CIAT

SHORT SUMMARY FOR PRACTITIONERS

EN version

Agriculture in Valle del Cauca, a key economic activity in western Colombia, is dominated by sugarcane cultivation alongside fruits and vegetables. However, the region faces significant challenges in organic waste management. The Residue-Based Model (RBM) utilises agro-industrial waste to produce sustainable organic fertilisers such as VdC/2, a blend of compost, biochar, and insect biomass. This blend enhances soil health and offers environmental benefits compared to chemical fertilisers. Initial trials on maize, beans, and pumpkin showed no significant differences due to previous overuse of chemical fertilisers. Nevertheless, the life cycle assessment highlights reduced environmental impacts, though costs per application remain high.

The adoption of organic fertilisers is hindered by economic and regulatory barriers, including the high cost of insect biomass production. Investments in infrastructure, improved production efficiency, and awareness campaigns on environmental benefits are crucial for wider adoption. Despite challenges, this model promotes sustainable waste management and environmentally conscious agriculture, addressing key ecological concerns while enhancing productivity.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

En el Valle del Cauca, la agricultura es una actividad económica clave, dominada por el cultivo de caña de azúcar, frutas y vegetales. Sin embargo, la región enfrenta retos importantes en la gestión de residuos orgánicos. El modelo de negocio basado en residuos (RBM) aprovecha desechos de la agroindustria para producir fertilizantes orgánicos sostenibles como el VdC/2, compuesto de compost, biochar y biomasa de insectos. Este blend mejora la salud del suelo y reduce el impacto ambiental frente a fertilizantes minerales. Ensayos iniciales en cultivos de maíz, frijol y calabaza no mostraron diferencias significativas debido a la saturación previa de fertilizantes químicos. No obstante, el análisis de ciclo de vida destaca su menor impacto ambiental, aunque con un mayor coste por aplicación.

La adopción de fertilizantes orgánicos enfrenta barreras económicas y regulatorias, además de altos costos en la producción de biomasa de insectos. Inversiones en infraestructura, mejora de la eficiencia productiva, y campañas de sensibilización sobre beneficios ambientales son esenciales para promover su adopción. A pesar de los desafíos, este modelo apunta a un manejo sostenible de residuos y una agricultura más consciente ambientalmente.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#28

PRACTICE ABSTRACT

BUSINESS MODEL VdC

Business Model Valle del Cauca: CIAT

CONTEXT

Valle del Cauca, a critical agricultural region in Colombia, faces challenges in managing organic waste sustainably. The production of organic fertilisers, such as VdC/2, utilises agro-industrial residues and offers an environmentally friendly alternative to chemical fertilisers. However, economic and regulatory barriers must be addressed to enhance adoption, ensuring the economic and environmental viability of these solutions for the agricultural sector.

PROBLEM

Inefficient organic waste management in Valle del Cauca contributes to environmental degradation and limits sustainable agricultural practices. Dependency on chemical fertilisers exacerbates these issues, while high production costs and regulatory hurdles impede the adoption of organic alternatives. Overcoming these barriers is vital for a sustainable transition in the region's agricultural practices.

APPROACH

The RBM in Valle del Cauca transforms agro-industrial residues into sustainable organic fertilisers, such as VdC/2, using innovative technologies like composting, biochar production, and insect cultivation. This approach enhances soil health, reduces environmental impact, and supports circular agriculture by optimising waste management to promote economic and ecological sustainability in the agricultural sector.

OUTCOME

1. Significant reduction in environmental impacts compared to chemical fertilisers.
2. Efficient composting and biochar production technologies.
3. High production costs for insect biomass remain a challenge.
4. Positive demand from environmentally conscious farmers.
5. Application rates require adjustment to optimise costs and yields.

PRACTICAL RECOMMENDATIONS

- ✓ Scale up insect biomass production to reduce costs.
- ✓ Optimise organic fertiliser formulations for local crop requirements.
- ✓ Strengthen awareness campaigns to promote adoption.
- ✓ Streamline regulatory processes for easier market access.
- ✓ Invest in advanced technologies like biochar and mobile pyrolysis units to diversify waste treatment methods.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#29

PRACTICE ABSTRACT

BUSINESS MODEL 1 FLANDERS

Business model based on microbial fertiliser development in Flanders

SHORT SUMMARY FOR PRACTITIONERS

EN version

The RUSTICA project aims to develop and implement bio-based fertiliser (BBF) technologies and business models using waste from the fruit and vegetable sectors. In Flanders, one of the business models centers on a start-up company collaborating with established players like fruit and vegetable processors, to convert their waste into microbial protein paste, a key component for BBF production. This model showcases a streamlined process where the waste undergoes treatment via the carboxylic acid platform technology, extracting valuable substrates for microbial biomass production. The microbial protein paste is produced and can be used as a liquid BBF. The remaining solid waste, rich in energy, can be sent to intermunicipal companies for further processing, such as anaerobic digestion or composting. However, high gate fees for waste disposal pose a challenge. An alternative would be integrating pyrolysis to convert the waste into biochar, offering higher economic and environmental value. While this business model demonstrates significant promise, it faces economic challenges. The current production costs for microbial protein paste are high, but scaling up operations could reduce these costs and improve financial viability. Collaboration with intermunicipal companies to manage waste streams efficiently, along with exploring advanced technologies such as pyrolysis, can create a mutually beneficial partnership.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

Het RUSTICA-project is gericht op het ontwikkelen en implementeren van biogebaseerde meststoffen (BBF) technologieën en bedrijfsmodellen met behulp van afval uit de fruit- en groentesector. In Vlaanderen is een van de bedrijfsmodellen gericht op een start-upbedrijf dat samenwerkt met gevestigde spelers zoals fruit- en groenteverwerkers om hun afval om te zetten in microbiële proteïnepasta, een belangrijk onderdeel voor BBF-productie. Dit model toont een gestroomlijnd proces waarbij het afval wordt behandeld via de carbonzuurplatformtechnologie, waarbij waardevolle substraten worden gewonnen voor microbiële biomassaproductie. De microbiële proteïnepasta wordt geproduceerd en kan worden gebruikt als een vloeibare BBF. Het resterende vaste afval, rijk aan energie, kan naar intercommunales worden gestuurd voor verdere verwerking, zoals anaërobe vergisting of compostering. Hoge toegangsprijzen voor afvalverwerking vormen echter een uitdaging. Een alternatief zou zijn om pyrolyse te integreren om het afval om te zetten in biochar, wat een hogere economische en ecologische waarde biedt. Hoewel dit bedrijfsmodel veelbelovend is, kent het economische uitdagingen. De huidige productiekosten voor microbiële proteïnepasta zijn hoog, maar opschaling van de activiteiten zou deze kosten kunnen verlagen en de financiële haalbaarheid kunnen verbeteren. Samenwerking met intergemeentelijke bedrijven om afvalstromen efficiënt te beheren, samen met het verkennen van geavanceerde technologieën zoals pyrolyse, kan een wederzijds voordelig partnerschap creëren.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#29

PRACTICE ABSTRACT

BUSINESS MODEL 1 FLANDERS

Business model based on microbial fertiliser development in Flanders

CONTEXT

In addition to providing a technical solution to convert organic residue streams from the fruit and vegetable sector into novel bio-based fertilisers (BBFs), the RUSTICA project also aims to develop economically viable and environmentally sustainable regional business models. In Flanders, a pioneering start-up collaborating with established fruit and vegetable processors presents an innovative approach to valorise organic waste by producing microbial biomass for fertiliser blends. This model emphasises resource efficiency and sustainability in line with circular economy goals.

PROBLEM

Flanders faces challenges in fully utilising its organic waste streams for BBF production. While some processing companies handle waste through anaerobic digestion or composting, a significant portion of agricultural residues remains underexploited. This limits the region's potential to maximise nutrient recovery and develop sustainable fertilisers, contributing to nutrient loss and underuse of circular economy principles.

APPROACH

The business model was refined through data collected from regional workshops and stakeholder interviews, focusing on the collaboration between a start-up and established F&V processors like ALLGRO. The model proposes transforming F&V waste into microbial biomass through carboxylic acid platform technology. By partnering with intermunicipal companies for further processing of residual solids, such as pyrolysis for biochar production, this approach maximises waste valorisation and creates high-value fertiliser components.

OUTCOME

1. The refined business model demonstrates how microbial protein paste can serve as a viable BBF component.
2. While scaling challenges remain, especially around reducing production costs, the model highlights a pathway for transforming fruit and vegetable waste into valuable resources.
3. This collaboration strengthens waste management and supports regional sustainability.

PRACTICAL RECOMMENDATIONS

- ✓ Start-ups and fruit and vegetable processors should explore advanced waste transformation technologies to improve the cost-effectiveness of microbial biomass production.
- ✓ To reduce production costs and achieve market competitiveness, the microbial protein production capacity should be increased, ideally reaching 10 000 ton/year to lower the breakeven price and increase profitability.
- ✓ Policymakers should provide financial incentives to reduce gate fees and support the integration of pyrolysis, for instance via intermunicipal companies, to enhance the economic value of waste.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#29

PRACTICE ABSTRACT

BUSINESS MODEL 2 FLANDERS

Business model based on intermunicipal collaboration in Flanders

SHORT SUMMARY FOR PRACTITIONERS

EN version

The RUSTICA project aims to develop and implement bio-based fertiliser (BBF) technologies and business models using waste from the fruit and vegetable sectors to close regional nutrient cycles. In Flanders, one of the business models focuses on intermunicipal waste management companies, which play a key role in waste collection and composting. These companies currently produce green waste and fruit and vegetable waste compost, which is sold at low prices. The business model suggests expanding their operations to cooperate with other intermunicipal companies, each producing either biochar, microbial biomass or insect biomass, jointly creating specialised nutrient blends from these building blocks. By integrating these advanced processes, intermunicipal companies could tap into untapped agricultural waste streams, fostering a more circular economy. However, challenges remain, including the high costs of production, particularly for microbial biomass and biochar, and lower agronomic performance compared to conventional mineral fertilisers. Additionally, stakeholders such as farmers are hesitant and need to be convinced by the blends' effectiveness and practical considerations such as machinery needs. Despite these barriers, rising mineral fertiliser costs and stricter environmental regulations present opportunities for adoption. Although not researched, long-term sustainability and improved soil health offer further potential benefits, but financial incentives and regulatory adjustments are needed to ensure this model's feasibility.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

Het RUSTICA-project heeft als doel om technologieën en bedrijfsmodellen voor biogebaseerde meststoffen (BBFs) te ontwikkelen die gebruik maken van afval uit de fruit- en groentesector om regionale nutriëntenkringlopen te sluiten. In Vlaanderen richt een van de bedrijfsmodellen zich op intercommunales die een sleutelrol spelen in afvalinzameling en compostering. Deze bedrijven produceren momenteel groenafval en compost van groente- en fruitafval, dat tegen lage prijzen wordt verkocht. Het bedrijfsmodel stelt voor om hun activiteiten uit te breiden en samen te werken met andere intergemeentelijke bedrijven, die elk ofwel biochar, microbiële biomassa of insectenbiomassa produceren en gezamenlijk gespecialiseerde BBF blends maken van deze bouwstenen. Door deze geavanceerde processen te integreren, zouden intercommunales onaangeboorde afvalstromen of gewasresten kunnen benutten en zo een meer circulaire economie bevorderen. Er blijven echter uitdagingen bestaan, zoals de hoge productiekosten, met name voor microbiële biomassa en biochar, en de lagere agronomische prestaties in vergelijking met conventionele minerale meststoffen. Daarnaast zijn belanghebbenden zoals boeren terughoudend en moeten ze overtuigd worden van de effectiviteit van de BBFs en praktische overwegingen, zoals de behoefte aan machines. Ondanks deze barrières bieden de stijgende kosten van minerale meststoffen en de strengere milieuwetgeving kansen voor toepassing. Hoewel dit niet is onderzocht, bieden duurzaamheid op lange termijn en een betere bodemgezondheid verdere potentiële voordelen, maar financiële prikkels en aanpassingen in de regelgeving zijn noodzakelijk.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#29

PRACTICE ABSTRACT

BUSINESS MODEL 2 FLANDERS

Business model based on intermunicipal collaboration in Flanders

CONTEXT

In addition to providing a technical solution to convert organic residue streams from the fruit and vegetable sector into novel bio-based fertilisers (BBFs), the RUSTICA project also aims to develop economically viable and environmentally sustainable regional business models. In Flanders, the role of intermunicipal companies in managing organic waste offers significant potential for expanding BBF production within the region.

PROBLEM

Flanders faces a challenge in fully utilising its organic waste streams, such as fruit and vegetable residues, for bio-based fertiliser production. Despite the existence of intermunicipal waste collection systems, agricultural residues and food industry waste remain underexploited. This gap in waste valorisation limits the region's ability to maximise nutrient recovery and integrate circular economy practices effectively.

APPROACH

The draft business model was refined and adjusted with data collected from different stakeholders. This included regional multi-stakeholder workshops as well as one-on-one interviews with key stakeholders such as intermunicipal companies, farmers and fruit and vegetable processors. Based on their input, one business model was tailored to focus on the role of intermunicipal companies. By fostering cooperation among these companies and introducing technologies such as biochar production, anaerobic digestion, and microbial protein generation, the model aims to enhance the recovery of valuable nutrients from organic waste streams.

OUTCOME

1. The refined business model enables intermunicipal companies to diversify their waste processing methods and increase the production of BBF blends.
2. These blends have been tested for their agronomic performance, economic viability and environmental impact.
3. While the blends deliver moderate nitrogen levels to crops, they are not yet cost-competitive with traditional mineral fertilisers. However, the environmental benefits, particularly reduced nitrogen leaching and the potential for negative carbon emissions, highlight the long-term sustainability of this approach.

PRACTICAL RECOMMENDATIONS

- ✓ Intermunicipal companies should invest in advanced waste (pre)treatment technologies to improve their processing efficiency and produce more valuable end products.
- ✓ Stakeholders should explore opportunities to scale biochar technology, which could reduce production costs and make bio-based fertilisers more competitive.
- ✓ Farmers should be supported with training and incentives to adopt BBFs, particularly in light of stricter nitrogen regulations.
- ✓ Policymakers should consider subsidies and financial incentives to encourage investment in BBF technologies and infrastructure.

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

RUSTICA

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#30

PRACTICE ABSTRACT

BUSSINES MODEL Pays de la Loire

Business model based on a collaborative network in France

SHORT SUMMARY FOR PRACTITIONERS

EN version

The RUSTICA project aims to develop bio-based fertiliser (BBF) technologies and business models (BM) using waste from the fruit and vegetable sectors to close regional nutrient cycles. In France, 3 theoretical BM have been designed with the focus on a collaborative network of companies. A fertiliser company plays a central role in the BM of solid fertiliser, to which a local insect producer could supply insect frass, while two anaerobic digestion facilities, which are located close to the fertiliser company, could produce and deliver microbial proteins. Remaining building blocks, such as biochar and compost, could be managed by waste management organisations operating in the region, which specialise in composting and plan to install biochar units in France. All this provided that the BM proves to be technically, economically and environmentally viable, which is not the case at the moment. The main challenges are the high costs of BBF production and low agronomic performance compared to the conventional mineral fertilisers. The BM for liquid fertiliser is also based on a fertiliser company, which could use the NPK concentrate, obtained via electrodialysis (a relatively young technology, which requires further testing, optimisation and validation) as a nutrient base supplemented by other NPK sources. Despite these barriers, continuously increasing prices of mineral fertilisers and stricter environmental regulations present opportunities for BBFs. Although not researched in the RUSTICA project, the long-term sustainability effect and improved soil health offer further potential benefits of BBFs, but financial incentives and regulatory adjustments are needed for their wider acceptance and adoption amongst farmers.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

Le projet RUSTICA vise à développer des technologies et des modèles économiques de fertilisants biosourcés (BBF) utilisant les déchets des secteurs des fruits et légumes pour fermer les cycles régionaux des nutriments. En France, 3 modèles économiques ont été conçus et ajustés et se concentrent sur un réseau d'entreprises. Une société distribuant des fertilisants joue un rôle central dans le modèle économique des fertilisants solides, à laquelle un producteur local d'insectes pourrait fournir de la déjection d'insectes, tandis que deux installations de digestion anaérobie, situées à proximité de la société pourraient produire et fournir des protéines microbiennes. Les éléments restants, tels que le biochar et le compost, pourraient être gérés par des organismes de gestion des déchets opérant dans la région, qui sont spécialisés dans le compostage et prévoient d'installer des unités de biochar en France. Tout cela à condition que le modèle d'entreprise s'avère viable sur les plans technique, économique et environnemental, ce qui n'est pas le cas actuellement. Les principaux défis sont les coûts élevés de la production de fertilisant biosourcé et les faibles performances agronomiques par rapport aux engrais minéraux conventionnels. Le modèle économique de l'engrais liquide repose également sur une entreprise du fertilisant qui distribuerait le concentré NPK, obtenu par électrodialyse (une technologie relativement jeune qui nécessite des essais, une optimisation et une validation supplémentaires) comme base nutritive complétée par d'autres sources de NPK. Malgré ces obstacles, l'augmentation constante des prix des fertilisants minéraux et les réglementations environnementales plus strictes offrent des opportunités pour les BBF. Bien qu'ils n'aient pas fait l'objet de recherches dans le cadre du projet RUSTICA, l'effet de durabilité à long terme et l'amélioration de la santé des sols offrent d'autres avantages potentiels des BBF, mais des incitations financières et des ajustements réglementaires sont nécessaires pour qu'ils soient plus largement acceptés et adoptés par les agriculteurs.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#30

PRACTICE ABSTRACT

BUSINESS MODEL Pays de la Loire

Business model based on a collaborative network in France

CONTEXT

In addition to providing a technical solution to convert organic residue streams from the fruit and vegetable sector into novel bio-based fertilisers (BBFs), the RUSTICA project also aims to develop economically viable and environmentally sustainable regional business models. In Pays de la Loire (France), agriculture is a cornerstone of the local economy, and the region has been proactive in fostering the bioeconomy, with a number of initiatives and collaborations between public and private stakeholders.

PROBLEM

The Pays de la Loire region faces a number of challenges: the decline in livestock farming, which provides producers with organic matter for the soil, the region's dependence on foreign synthetic fertilisers, and the need for more sustainable agriculture. On the other hand, even if there is potential competition for valorisation of certain residues, others could be better valorised.

APPROACH

Different drafts of business model were refined and adjusted with data collected from regional stakeholders during the multi-stakeholder workshops, as well as one-on-one interviews with relevant market players. Based on their input, three business models were tailored with the focus on a collaborative network involving waste management organisations, fertiliser companies, insect producer and anaerobic digestion facilities. By fostering cooperation among these companies and introducing new technologies, such as pyrolysis for biochar production, CAP Platform, and microbial biomass cultivation, the model aims to enhance the recovery of valuable nutrients from organic waste streams.

OUTCOME

1. The refined business model enables fertiliser companies to diversify their source of building blocks to increase the production of BBF blends.
2. These blends have been tested for their agronomic performance, economic viability and environmental impact.
3. While the blends deliver moderate nitrogen levels to crops, they are not cost-competitive compared to mineral fertilisers under the present market conditions (the upscaling of selected technologies could bring the cost of BBFs down)
4. The environmental performance is promising, especially if the long-term effect of BBFs on soil health are also taken into consideration.

PRACTICAL RECOMMENDATIONS

- ✓ The regional network must explore alternative solutions, building blocks or technologies that better meet economical and environmental expectations (e.g less and other source of protein, less biochar)
- ✓ The costs could decrease with larger–scale production, particularly for microbial proteins and frass.
- ✓ Farmers should be supported with training and incentives to adopt BBFs, particularly in light of stricter nitrogen regulations.
- ✓ Policymakers should consider subsidies and financial incentives to encourage investment in BBF technologies and infrastructure.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#31

PRACTICE ABSTRACT

REGIONAL BBF LCA

Final Life Cycle Assessment (LCA) report

SHORT SUMMARY FOR PRACTITIONERS

EN version

The Life Cycle Assessment (LCA) analysis was performed by evaluating the environmental performance of RUSTICA bio-based fertiliser (RBBF) over its life cycle (from waste collection and processing, RBBF production to field application), and comparing this performance with the reference scenario, which was individually defined for each RUSTICA region, that includes: Flanders (Belgium), Pays de la Loire (France), Almeria (Spain), Friuli-Venezia Giulia (Italy) and Valle del Cauca (Colombia). Based on the specific RBBF formulated for each region, and with the help of regional stakeholders, potential value chains and business model scenarios were defined for the project. These business models served as the basis for the formulation of regional product systems incorporating various technologies that result in the production of several fertiliser ingredients (microbial biomass, insect biomass, insect frass, nutrient concentrate, biochar, compost) utilised for RBBF formulation, each of which having own specific characteristics and composition that is linked to the regional inputs from which they are produced. Furthermore, RBBFs production (including blending of fertiliser ingredients), logistics, application of the fertiliser and any related field operations and emissions directly after fertiliser application in the field were also taken into account.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

The Life Cycle Assessment (LCA) analysis was performed by evaluating the environmental performance of RUSTICA bio-based fertiliser (RBBF) over its life cycle (from waste collection and processing, RBBF production to field application), and comparing this performance with the reference scenario, which was individually defined for each RUSTICA region, that includes: Flanders (Belgium), Pays de la Loire (France), Almeria (Spain), Friuli-Venezia Giulia (Italy) and Valle del Cauca (Colombia). Based on the specific RBBF formulated for each region, and with the help of regional stakeholders, potential value chains and business model scenarios were defined for the project. These business models served as the basis for the formulation of regional product systems incorporating various technologies that result in the production of several fertiliser ingredients (microbial biomass, insect biomass, insect frass, nutrient concentrate, biochar, compost) utilised for RBBF formulation, each of which having own specific characteristics and composition that is linked to the regional inputs from which they are produced. Furthermore, RBBFs production (including blending of fertiliser ingredients), logistics, application of the fertiliser and any related field operations and emissions directly after fertiliser application in the field were also taken into account.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#31

PRACTICE ABSTRACT

REGIONAL BBF LCA

Final Life Cycle Assessment (LCA) report

CONTEXT

Due to their very specific composition and general, low-cost availability, mineral fertilisers have been dominant in agriculture practices for decades, which has brought a range of serious ecological effects, such as contribution to climate change through CO_2 and N_2O emissions, eutrophication, decline in organic matter soil content, release of heavy metals into ecosystems, etc. Also, the production of mineral fertilisers can be highly energy demanding and it is usually based on fossil fuels and other non-renewable resources.

PROBLEM

The RBBF products are intended to provide agriculture with the same functional benefits as mineral fertilisers but sourced from locally available fruit and vegetable waste streams. It is expected that the substitution of mineral fertilisers with circular and bio-based alternatives can lead to environmental savings, which was determined and, whenever possible, quantified through LCA.

APPROACH

LCA was performed in a comparative way, which means that within a specified set of criteria, one product (in this case the RBBF life cycle) is compared to another representing the business-as-usual (individually defined for each RUSTICA region in the field experiments), from the environmental perspective and on a regional level.

OUTCOME

1. In most cases RBBFs perform environmentally much better than the reference per 1 tonne of fertiliser (apart when the reference is compost and manure).
2. The results vary from one region to another once the field application and crop production are also considered.
3. Normally, RBBFs demonstrate better, or at least comparable environmental performance than mineral and organo-mineral fertilisers
4. The comparison of RBBFs with other organic fertilisers depends on the region and the type of fertiliser used.
5. RBBFs performed better than cattle and dried-poultry manure in Italy and France, but worse than compost and semi-dried sheep manure in Spain.

PRACTICAL RECOMMENDATIONS

- ✓ There is a substantial difference in application rates (can be up to 35 times more for RBBF than the mineral fertiliser), which has a major impact on the fertilisation environmental performance per 1 tonne of crop per ha.
- ✓ The RBBF performs much better than the mineral fertiliser if the difference in application rates was less than 10.
- ✓ If the difference in application rate was more than 10, the RBBF usually performed better than the mineral fertiliser only in some environmental impact categories

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#32

PRACTICE ABSTRACT

SOCIAL LCA

Evaluating social and socio-economic impacts of bio-based fertiliser solutions in five regional value chains

SHORT SUMMARY FOR PRACTITIONERS

EN version

The Social Life Cycle Assessment (S-LCA) analysis was conducted of the full RUSTICA concept, including the integrated fruit and vegetable nutrient recovery value chains developed in the context of 5 RUSTICA regions: Flanders, Pays de la Loire, Almeria, Friuli-Venezia Giulia and Valle del Cauca (Colombia). RUSTICA concept incorporates various technologies for the production of several fertiliser ingredients (microbial biomass, insect biomass, insect frass, nutrient concentrate, biochar, compost), each of which having own specific characteristics and composition that is linked to the regional inputs from which they are produced. These different ingredients are applied as specific RUSTICA bio-based fertiliser (RBBF) blends formulated to match the current and future crop needs on a regional (or inter-regional) level, as defined by the regional multi-actor networks in 5 RUSTICA regions.

The aim of S-LCA was to determine the social and socio-economic aspects of RBBFs and technologies and their potential positive and negative impacts in the 5 RUSTICA test regions. Considering that RUSTICA technologies are still at an early development stage, a prospective S-LCA was performed from the sectoral perspective (the agricultural sector). The intended application of S-LCA in RUSTICA project was to identify social "hotspots" in the current agricultural practices in RUSTICA regions, as well as examine how the introduction of RUSTICA concept could influence (positively or negatively) these hotspots. Data for the S-LCA analysis was either derived from the project itself (e.g. market analysis), available public reports and databases, and through diverse interactions with RUSTICA partners and stakeholders.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

The Social Life Cycle Assessment (S-LCA) analysis was conducted of the full RUSTICA concept, including the integrated fruit and vegetable nutrient recovery value chains developed in the context of 5 RUSTICA regions: Flanders, Pays de la Loire, Almeria, Friuli-Venezia Giulia and Valle del Cauca (Colombia). RUSTICA concept incorporates various technologies for the production of several fertiliser ingredients (microbial biomass, insect biomass, insect frass, nutrient concentrate, biochar, compost), each of which having own specific characteristics and composition that is linked to the regional inputs from which they are produced. These different ingredients are applied as specific RUSTICA bio-based fertiliser (RBBF) blends formulated to match the current and future crop needs on a regional (or inter-regional) level, as defined by the regional multi-actor networks in 5 RUSTICA regions.

The aim of S-LCA was to determine the social and socio-economic aspects of RBBFs and technologies and their potential positive and negative impacts in the 5 RUSTICA test regions. Considering that RUSTICA technologies are still at an early development stage, a prospective S-LCA was performed from the sectoral perspective (the agricultural sector). The intended application of S-LCA in RUSTICA project was to identify social "hotspots" in the current agricultural practices in RUSTICA regions, as well as examine how the introduction of RUSTICA concept could influence (positively or negatively) these hotspots. Data for the S-LCA analysis was either derived from the project itself (e.g. market analysis), available public reports and databases, and through diverse interactions with RUSTICA partners and stakeholders.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#32

PRACTICE ABSTRACT

SOCIAL LCA

Evaluating social and socio-economic impacts of bio-based fertiliser solutions in five regional value chains

CONTEXT

The RBBFs are intended to provide agriculture with the same functional benefits as mineral fertilisers (well-defined composition and release rates) but sourced from locally available fruit and vegetable waste streams closing the nutrient cycles on a regional level. The potential replacement of mineral fertilisers with RBBFs will lead to the economic and environmental implications, but it could also affect various stakeholders and their well-being at the regional level, which was evaluated through S-LCA.

PROBLEM

To screen social and socio-economic aspects in agricultural systems in Belgium, Spain, Italy, France and Colombia and the presence of risky practices or outcomes that might negatively impact groups of stakeholders, and to evaluate the potential social and socio-economic impact (positive and negative) of the RUSTICA concept on these agricultural systems.

APPROACH

S-LCA was performed in a comparative way, which means that a business-as-usual scenario (the current agricultural practices in the regions) was compared with the RBBF business model scenarios in Belgium, Spain, Italy France and Colombia to assess the potential social and socio-economic changes (positive and negative) brought to the regions by the introduction of RBBFs.

OUTCOME

1. The initial screening analysis with regional stakeholders pre-selected stakeholder groups and social topics that were considered material for the regions.
2. The social implications (positive and negative) of introducing RBBFs for the pre-selected social topics varied across RUSTICA regions.
3. In all regions, the positive impact of RBBFs was identified for the following social topics: fair salary, health and safety living conditions, promoting social responsibility, employment (quantity and quality) product agronomic performance and technology development.
4. In all regions, the negative impact of RBBFs was identified for the following social topics: product application (affordability and complexity of application) by farmers.
5. The impact of RBBFs on other social topics was either neutral or varied from one region to another.

PRACTICAL RECOMMENDATIONS

- ✓ The introduction of RBBFs in the 5 RUSTICA test regions is largely positive or neutral for the well-being or regional stakeholders.
- ✓ The negative social impacts of RBBFs are mostly related with the high price of crop fertilisation by farmers compared to the current practices in the regions
- ✓ The high price of RBBFs is due to relatively low Technology Readiness Level (TRL) of RUSTICA technologies, but there is still a major potential for further improvement, optimisation and cost reduction.
- ✓ Tailored business development approaches are needed per region (based on regional waste streams, crop and soil needs and regional technological expertise and partnerships) to optimise the costs and maximise the potential social effects from the introduction of RBBFs.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#33

PRACTICE ABSTRACT

REGIONAL BBF COST ANALYSIS

Final Life Cycle Costing (LCC) report

SHORT SUMMARY FOR PRACTITIONERS

EN version

The Life Cycle Costing (LCC) analysis was conducted of the full RUSTICA concept, including the integrated fruit and vegetable nutrient recovery value chains developed in the context of 5 RUSTICA regions: Flanders, Pays de la Loire, Almeria, Friuli-Venezia Giulia and Valle del Cauca (Colombia). RUSTICA concept incorporates various technologies for the production of several fertiliser ingredients (microbial biomass, insect biomass, insect frass, nutrient concentrate, biochar, compost), each of which having own specific characteristics and composition that is linked to the regional inputs from which they are produced. These different ingredients are applied as specific RUSTICA bio-based fertiliser (RBBF) blends formulated to match the current and future crop needs on a regional (or inter-regional) level, as defined by the regional multi-actor networks in 5 RUSTICA regions.

The economic performance of RBBF over its life cycle (from waste collection and processing, RBBF production to field application) were assessed and compared with the reference scenario, which was individually defined for each RUSTICA region. Furthermore, RBBFs logistics and any costs related to field operations were also taken into account. Finally, the LCC study concerned both the internal costs (economic) and other external relevant costs (environmental and social) calculated from the results of the LCA studies.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

The Life Cycle Costing (LCC) analysis was conducted of the full RUSTICA concept, including the integrated fruit and vegetable nutrient recovery value chains developed in the context of 5 RUSTICA regions: Flanders, Pays de la Loire, Almeria, Friuli-Venezia Giulia and Valle del Cauca (Colombia). RUSTICA concept incorporates various technologies for the production of several fertiliser ingredients (microbial biomass, insect biomass, insect frass, nutrient concentrate, biochar, compost), each of which having own specific characteristics and composition that is linked to the regional inputs from which they are produced. These different ingredients are applied as specific RUSTICA bio-based fertiliser (RBBF) blends formulated to match the current and future crop needs on a regional (or inter-regional) level, as defined by the regional multi-actor networks in 5 RUSTICA regions.

The economic performance of RBBF over its life cycle (from waste collection and processing, RBBF production to field application) were assessed and compared with the reference scenario, which was individually defined for each RUSTICA region. Furthermore, RBBFs logistics and any costs related to field operations were also taken into account. Finally, the LCC study concerned both the internal costs (economic) and other external relevant costs (environmental and social) calculated from the results of the LCA studies.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#33

PRACTICE ABSTRACT

REGIONAL BBF COST ANALYSIS

Final Life Cycle Costing (LCC) report

CONTEXT

Mineral fertilisers are known from low-cost availability, but also from multiple serious ecological effects. It is expected that the substitution of mineral fertilisers with circular and bio-based alternatives can lead not only to environmental savings (e.g. reduced GHGs emissions, reduced emissions to air and water, improved soil quality or reduced soil contaminants), but also to economic sustainability. If both the environmental and economic criteria were fulfilled, there would be a chance for replacement of mineral fertilisers with their bio-based counterparts.

PROBLEM

To understand the economic performance of RBBF products throughout their life cycle (from production to their use), determine the hot-spots and identify opportunities for cost improvements.

APPROACH

LCC was performed in a comparative way, which means that within a specified set of criteria, one product (in this case the RBBF life cycle) is compared to another representing the business-as-usual (individually defined for each RUSTICA region in the field experiments), from the economic perspective and on a regional level.

OUTCOME

1. Currently RBBFs are not economically competitive with mineral fertilisers and selected organo-mineral and organic fertilisers considering the current market conditions
2. Although the price per tonne of fertilisers in most cases was lower for RBBF than the reference (except for other organic fertilisers, such as manure and compost), there is a substantial difference in application rates (even up to 35 times more of RBBF than the reference in some instances), which has a major impact on the fertilisation cost per 1 tonne of crop per ha.
3. The comparison looks more promising once environmental costs are included (especially in Spain, Italy and Colombia) but the cost of RBBF is still slightly higher than the reference fertilisers.

PRACTICAL RECOMMENDATIONS

- ✓ RBBFs can become more competitive once or if mineral fertiliser prices increase in the future, and at the same time the cost of fertiliser ingredients of RBBF declines.
- ✓ Due to relatively low Technology Readiness Level (TRL), most RUSTICA technologies have room for further improvement and cost optimisation.
- ✓ A stable, high-volume and relatively cheap source of biomass could be found for scaling-up production of RBBFs
- ✓ Formulation of biomass cascades demonstrated a potential for reducing the production of some RBBF ingredients (e.g. microbial proteins), which would otherwise be very expensive.
- ✓ Some regionally-available alternative waste processing technologies could effectively replace RUSTICA technologies that are considered expensive.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#34

PRACTICE ABSTRACT

REALITY CHECK FOR CIRCULARITY

Need for a reality check on the feasibility of circularity in the food system

SHORT SUMMARY FOR PRACTITIONERS

EN version

Europe emphasises the importance of circular bio-based fertilisers for sustainable food systems. This is also reflected in the Farm-to-Fork Strategy, which calls for the urgent need to reduce nutrient losses to the environment. In this strategy, the European Commission also refers to the production of bio-based fertilisers as a 'largely untapped potential for farmers and their cooperatives'. Moreover, Europe has set an ambitious goal to drastically reduce the use of mineral fertilisers by 2030. Europe also stresses the need for a transition towards a circular economy, which includes a circular food system where waste generation is reduced and the potential of by-products is fully exploited.
Several European H2020 projects focus on bio-based fertilisers. The RUSTICA project demonstrates that circular bio-based fertilisers have the potential to be as effective as mineral fertilisers.

In this practice abstract, we highlight the key challenges that must be taken into account when developing circular bio-based fertilisers. We focus on three challenges to realise Europe's ambition. First, bio-based fertilisers have high production and transportation costs. Second, bio-based fertilisers may contain impurities and contaminants. Third, sustainable solutions in the bioeconomy are region-specific.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

Europa benadrukt het belang van circulaire biogebaseerd meststoffen voor duurzame voedselsystemen. Dit komt ook tot uiting in de Farm to Fork-strategie, waarin wordt opgeroepen tot de noodzaak om het verlies van nutriënten te verminderen. In deze strategie verwijst de Europese Commissie ook naar de productie van 'bio-based' meststoffen als een 'grotendeels onbenut potentieel voor boeren en hun coöperaties'. Bovendien heeft Europa zich een ambitieus doel gesteld om het gebruik van minerale meststoffen tegen 2030 drastisch te verminderen. Europa benadrukt ook de noodzaak van een overgang naar een circulaire economie, die een circulair voedselsysteem omvat waarin de afvalproductie wordt verminderd en het potentieel van bijproducten ten volle wordt benut.
Verschillende Europese H2020-projecten richten zich op biogebaseerde meststoffen. Het RUSTICA-project laat zien dat circulaire biogebaseerde meststoffen de potentie hebben om net zo effectief te zijn als minerale meststoffen.
In deze praktijksamenvatting belichten we de belangrijkste uitdagingen waarmee rekening moet worden gehouden bij het ontwikkelen van circulaire biogebaseerde meststoffen. We staan stil bij drie uitdagingen om de Europese ambitie te realiseren. Ten eerste hebben biogebaseerde meststoffen hoge productie- en transportkosten. Ten tweede kunnen biogebaseerde meststoffen onzuiverheden en verontreinigingen bevatten. Ten derde zijn duurzame oplossingen in de bio-economie regiospecifiek.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#34

PRACTICE ABSTRACT

REALITY CHECK FOR CIRCULARITY

Need for a reality check on the feasibility of circularity in the food system

CONTEXT

Several European H2020 projects focus on bio-based fertilisers. The RUSTICA project demonstrates that circular bio-based fertilisers have the potential to be as effective as mineral fertilisers. However, several logistic and economic obstacles explain the slow market uptake of circular bio-based fertilisers.

PROBLEM

First, while the environmental impact of bio-based fertilisers is often lower compared to mineral fertilisers, their production costs are typically higher.

Second, circular bio-based fertilisers may contain impurities or contaminants. The key question is how to reconcile the possible presence of impurities and biotic or abiotic contaminants in residues or waste streams with the goal of reusing them in agricultural production systems. Impurities and contaminants do not necessarily represent an environmental or human health risk if concentrations remain below safe limits.

Finally, circularity ideally implies that the reuse or recycling of waste and residues is carried out at the regional level. Some solutions or technologies may be perfectly valid in one region but not necessarily feasible or sustainable in another.

APPROACH

For each of the obstacles, we analyse diverse solutions. We investigate Europe's strategy and ambition for circular bio-based fertilisers and compare this strategy and ambition against the demonstrated potential.

OUTCOME

1. There is gap between policy ambitions and the current investments, regulation and support measures.
2. Sustainability is a very broad concept and needs to be unraveled to apply at the regional level.

PRACTICAL RECOMMENDATIONS

- ✓ Europe should align investment, regulation, and support with its ambitions as outlined in the Farm-to-Fork Strategy and the Green Deal. Economic and legislative obstacles hinder research and innovation aimed at developing more circular food systems. Opportunities for improvement lie not only in incentivising bio-based fertilisers, but also in harmonising guidelines, communication, and awareness-raising about circular food systems.
- ✓ Additionally, there is a need to decouple sustainability concepts to gain support for hybrid products and to recognise that different regional contexts require different solutions. Regional diversity significantly impacts agricultural production, making circularity more sustainable in some regions than in others.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#35

PRACTICE ABSTRACT

BIO-BASED FERTILISERS: PART OF THE SOLUTION

Bio-based fertilisers as a piece of the puzzle in the transition towards more sustainable food systems

SHORT SUMMARY FOR PRACTITIONERS

EN version

With the Farm-to-Fork strategy, Europe formulates the ambition for a transition towards a more sustainable food system. Europe presents an integral and unique policy that covers the entire food chain: production, processing and consumption. The strategy breaths ambition and calls for, among others, the need to reduce mineral fertilisation. The European Commission also mentions the production of bio-based fertilisers as 'a largely untapped potential for farmers and their cooperative'.

In this practice abstract, we summarise three key challenges to the adoption of sustainable farming practices as a whole, and bio-based fertilisers in particular.

First, sustainable farming requires the integration of various farming practices. Second, there is a need for profitable business models related to sustainable farming systems. Third, research on the development of bio-based fertilisers should be organised in an interdisciplinary and transdisciplinary manner.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

Met de Farm-to-Fork-strategie formuleert Europa de ambitie voor een transitie naar een duurzamer voedselsysteem. Europa presenteert een integraal en uniek beleid dat de hele voedselketen bestrijkt: productie, verwerking en consumptie. De strategie ademt ambitie en roept onder meer op tot het terugdringen van minerale bemesting. Ook de Europese Commissie noemt de productie van biogebaseerde meststoffen als 'een grotendeels onbenut potentieel voor boeren en hun coöperaties'.

In deze praktijksamenvatting vatten we drie belangrijke uitdagingen samen voor de invoering van duurzame landbouwpraktijken in het algemeen, en biogebaseerde meststoffen in het bijzonder.

Ten eerste vereist duurzame landbouw de integratie van verschillende landbouwpraktijken. Ten tweede is er behoefte aan winstgevende bedrijfsmodellen die verband houden met duurzame landbouwsystemen. Ten derde moet het onderzoek naar de ontwikkeling van biogebaseerde meststoffen op een interdisciplinaire en transdisciplinaire manier worden georganiseerd.

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

RUSTICA

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#35

PRACTICE ABSTRACT

BIO-BASED FERTILISERS: PART OF THE SOLUTION

Bio-based fertilisers as a piece of the puzzle in the transition towards more sustainable food systems

CONTEXT

The RUSTICA projects provides a technical solution to convert organic residues from the fruit and vegetable sector into novel bio-based fertiliser products of high quality that address the needs of modern (organic) agriculture. The project's ambition goes beyond the simple recovery of nutrients and also includes the developments of economically viable and environmentally sustainable alternatives to mineral fertilisers with the same or improved agronomic value.

PROBLEM

- ✓ Sustainable farming includes various practices like organic, regenerative, and agroecological farming, which must coexist and adapt to different constraints.
- ✓ Combining mineral and bio-based fertilisers often enhances soil biodiversity and resilience.
- ✓ Viable business models are essential to support sustainable investments, considering both environmental and socio-economic diversity across regions.
- ✓ Interdisciplinary collaboration is crucial for addressing the broad impacts of sustainability, from agronomic to socio-economic factors.
- ✓ Early cross-sector cooperation is key to developing marketable bio-based fertilisers to maximise product viability and impact.

APPROACH

We adopt a comprehensive approach to addressing the challenges of developing more sustainable food systems. By evaluating the outcomes of the RUSTICA project, we critically assess these findings in the context of current European policies.

OUTCOME

International recognition of various sustainability approaches should encourage the coexistence of different farming practices. Bio-based fertilisers have the potential to contribute to sustainability across all farming systems. Furthermore, the economic realities of the international food system must be acknowledged. A significant opportunity lies in fostering stakeholder dialogue, which can help policy makers develop market-aligned policies and contribute setting realistic goals.

PRACTICAL RECOMMENDATIONS

- ✓ Encourage international recognition and coexistence of diverse sustainable farming practices, allowing bio-based and conventional methods to complement each other.
- ✓ Promote bio-based fertilisers as a sustainable option across all farming systems, recognising their contribution to overall agricultural resilience.
- ✓ Develop market-aligned policies that consider the economic realities of the global food system and regional differences in agricultural practices.
- ✓ Foster stakeholder dialogue to ensure that policy goals are realistic, regionally adaptable, and support both sustainability and economic viability.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#36

PRACTICE ABSTRACT

BIO-BASED FERTILISERS AND NEW POLICIES

RUSTICA - Circular bio-based fertilisers and new policies

SHORT SUMMARY FOR PRACTITIONERS

EN version

RUSTICA transforms redundant leftovers from agriculture into bio-based fertilisers towards optimal plant supply, soil enhancement and circularity of food and nutrition systems. European policies, such as the Farm-to-Fork Strategy, call for reduction of nutrient losses and draw attention to opportunities by indicating *"the production of bio-based fertilisers as a 'largely untapped potential for farmers and their cooperatives'.* Furthermore, research on new technologies to advance feasibility of innovative circular business models is strongly supported and promoted in the European Union.

By offering a range of Product Function Categories (PFCs) and Component Material Categories (CMCs), as well as replacing its predecessor, the Regulation EC No 2003/2003 mainly dealing with mineral fertilisers, a new EU Fertilising Products Regulation entered into force in 2022. EU-wide rules are offered, e.g., for organic fertilisers representing harmonised options against to national legal counterparts on fertilisers.

Striving for large-scale production of fertilisers from a more local origin, indicating valorisation of side streams, and following the nutrient recycling principles of the EU Circular Economy, the new Regulation reveals a number of opportunities, e.g., for compost and biochar. On the other hand, there are still restrictions for certain feedstocks, inputs and materials on vegetable and animal basis as regards their deployment for nourishment and support of crops.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

RUSTICA transforma los residuos sobrantes de la agricultura en fertilizantes de origen biológico para lograr un suministro óptimo de las plantas, la mejora del suelo y la circularidad de los sistemas alimentarios y nutricionales. Las políticas europeas, como la Estrategia de la Granja a la Mesa, exigen la reducción de las pérdidas de nutrientes y llaman la atención sobre las oportunidades indicando que "la producción de fertilizantes de origen biológico es un potencial en gran medida sin explotar para los agricultores y sus cooperativas". Además, la investigación sobre nuevas tecnologías para avanzar en la viabilidad de modelos comerciales circulares innovadores cuenta con un fuerte apoyo y promoción en la Unión Europea. Al ofrecer una gama de categorías de funciones de productos (PFC) y categorías de materiales componentes (CMC), además de reemplazar a su predecesor, el Reglamento CE n.º 2003/2003 que trata principalmente de fertilizantes minerales, en 2022 entró en vigor un nuevo Reglamento de la UE sobre productos fertilizantes. Se ofrecen normas a nivel de la UE, por ejemplo, para fertilizantes orgánicos que representan opciones armonizadas frente a las contrapartes legales nacionales sobre fertilizantes.El nuevo Reglamento, que aspira a una producción a gran escala de fertilizantes de origen más local, que valorice los flujos secundarios y que siga los principios de reciclaje de nutrientes de la economía circular de la UE, revela una serie de oportunidades, por ejemplo, para el compost y el biocarbón. Por otra parte, siguen existiendo restricciones para determinadas materias primas, insumos y materiales de origen vegetal y animal en lo que respecta a su utilización para la alimentación y el apoyo de los cultivos.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#36

PRACTICE ABSTRACT

BIO-BASED FERTILISERS AND NEW POLICIES

RUSTICA - Circular bio-based fertilisers and new policies

CONTEXT

To date, significant political efforts on progress in enabling the development and marketing of circular bio-based fertilisers are made in the EU. Policies and strategies encourage to unfold the potential of innovative bio-based fertiliser systems. A new EU Regulation is established to foster a mulitude of circular solutions for production and application of fertilising products, such as compost and biochar, in the EU and beyond.

PROBLEM

Albeit recent legal provisions aim to facilitate the use of secondary resources, vegetable- and animal-based feedstocks still face considerable restrictions. In particular, deliberating harmonised rules on fertilising products, there are still remaining gaps according to smooth valorisation, e.g., of waste and animal by-products into bio-based fertilisers.

APPROACH

RUSTICA comprehensively evaluates the political and legal frameworks, and in particular the EU harmonised rules on circular bio-based fertilisers. Apart from analysing the current obstacles and enablers, an outlook on expected future developments has been elaborated. Results of the work are published and available not only for policy makers and authorities but also further stakeholders, e.g., practitioners and advisors.

OUTCOME

1. A comprehensive outlook (D3.13) and further reports on international, European and national legislative and political aspects, as well as their alterations and trends;
2. A variety of published articles on major criteria in European, national and regional legislation in Europe and beyond relevant for producers, marketers and users of circular bio-based fertilisers;
3. A series of policy briefs addressing specific subjects in the legal and political area and formulating requests to policy makers;
4. A number of events, such as a Global Conference and a Final Project event to share insights and best practices to audiences;

PRACTICAL RECOMMENDATIONS

- ✓ A thorough definition of the value chain from feedstocks over processes to applications;
- ✓ An examination of legal stimuli and barriers by deciding the individual routes to the markets, as well as requirements to recognise further needs;
- ✓ An investigation of policies to identify the avenues of the future for the materials and products envisaged to be marketed and used for the purpose of sustainable provision of nutrients and protection of soils.

RUSTICA
Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#37

PRACTICE ABSTRACT

POLICY BRIEF 4

Circular bio-based fertilisers in a global context

SHORT SUMMARY FOR PRACTITIONERS

EN version

The transition to sustainable food systems, as outlined in the European Green Deal and Farm-to-Fork Strategy, underscores the importance of circular bio-based fertilisers. These fertilisers reduce dependency on synthetic inputs, improve soil health, and lower the carbon footprint of farming. However, global challenges and opportunities remain. Discrepancies in regulations across regions complicate international trade, while hotspots of nutrient-rich residues often do not align geographically with areas of high nutrient demand. International cooperation can bridge these gaps through research, innovation, and trade. For the Global South, bio-based fertilisers offer crucial benefits, addressing low agricultural productivity, soil degradation, and inefficient waste management. Transforming waste into competitive agricultural inputs can improve farmer incomes, enhance food security, and mitigate environmental impacts. However, implementing locally adapted technologies requires enabling policies, cost-effective approaches, and infrastructure development. Policy makers are urged to balance local adaptation with international cooperation. While supporting local value chains is critical, facilitating trade and knowledge transfer is equally essential to overcome resource disparities. Harmonising regulations and incentivising innovation can drive the development of bio-based fertilisers globally, fostering sustainable agriculture and resilience.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

La transición hacia sistemas alimentarios sostenibles, según lo establecido en el Pacto Verde Europeo y la Estrategia "De La Granja a la Mesa", destaca la importancia de los fertilizantes circulares de base biológica. Estos fertilizantes reducen la dependencia de insumos sintéticos, mejoran la salud del suelo y disminuyen la huella de carbono de la agricultura. Sin embargo, persisten desafíos y oportunidades a nivel global. Las discrepancias en las regulaciones entre regiones complican el comercio internacional, mientras que los puntos críticos de residuos ricos en nutrientes a menudo no coinciden geográficamente con las áreas de alta demanda de nutrientes. La cooperación internacional puede cerrar estas brechas a través de la investigación, la innovación y el comercio. Para el Sur Global, los fertilizantes de base biológica ofrecen beneficios cruciales, abordando la baja productividad agrícola, la degradación del suelo y la gestión ineficiente de residuos. Transformar los desechos en insumos agrícolas competitivos puede mejorar los ingresos de los agricultores, fortalecer la seguridad alimentaria y mitigar los impactos ambientales. No obstante, la implementación de tecnologías adaptadas localmente requiere políticas habilitadoras, enfoques rentables y el desarrollo de infraestructura. Se insta a los responsables políticos a equilibrar la adaptación local con la cooperación internacional. Si bien apoyar las cadenas de suministro locales es fundamental, facilitar el comercio y la transferencia de conocimientos es igualmente esencial para superar las disparidades de recursos. Armonizar las regulaciones e incentivar la innovación puede impulsar el desarrollo de fertilizantes de base biológica a nivel global, fomentando una agricultura sostenible y resiliente.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#37

PRACTICE ABSTRACT

POLICY BRIEF 4

Circular bio-based fertilisers in a global context

CONTEXT

The European Green Deal and Farm-to-Fork Strategy prioritise circular bio-based fertilisers as a sustainable solution for agriculture. These fertilisers address food security, reduce dependence on synthetic inputs, and improve soil health while lowering farming's carbon footprint. Globally, mismatches exist between nutrient-rich residue sources and areas with high nutrient demand, creating opportunities for international cooperation and trade to promote sustainable food systems.

PROBLEM

Regulatory discrepancies and infrastructure gaps complicate the production, utilisation, and trade of bio-based fertilisers globally. In the Global South, low agricultural productivity and inefficient waste management hinder sustainable farming. Developing locally adapted technologies and value chains is critical to address these challenges and promote cost-effective, sustainable agricultural inputs from waste.

APPROACH

The project emphasises context-relevant bio-based fertiliser technologies tailored to local resources and needs. It advocates for international cooperation in research, innovation, and trade while harmonising global regulations. Efforts include fostering local expertise, infrastructure, and cost-efficient approaches to transform nutrient-rich residues into viable agricultural inputs.

OUTCOME

1. Improved waste management and nutrient recycling in agricultural systems.
2. Increased availability of cost-effective bio-based fertilisers for farmers.
3. Enhanced soil health, productivity, and farmer incomes.
4. Strengthened agricultural value chains in the Global South.
5. Reduced greenhouse gas emissions through sustainable waste valorisation practices.

PRACTICAL RECOMMENDATIONS

- ✓ Adapt bio-based fertiliser technologies to local contexts, focusing on available resources and target crops.
- ✓ Develop enabling policies to incentivise innovation and infrastructure for bio-based value chains.
- ✓ Harmonise global regulations to facilitate trade and international cooperation.
- ✓ Promote capacity building and knowledge transfer to strengthen local expertise.
- ✓ Support integrated approaches that balance local supply chain development with international trade of bio-based fertiliser materials.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#38

PRACTICE ABSTRACT

OPTIMISING FERTILISER COSTS FOR SUSTAINABILITY

Combining life-cycle assessment and linear programming to optimise social fertiliser costs

SHORT SUMMARY FOR PRACTITIONERS

EN version

Bio-based fertilisers can contribute to regional nutrient circularity, but the question remains whether their production and use is beneficial to both the farmer and the environment. One way to investigate this, is to look closer into the farmer's private costs as well as the external costs to the environment, together referred to as total social costs. The external costs of fertiliser production and consumption can be estimated by means of life cycle assessment, of which the resulting impacts are transferred into monetary terms by means of monetary valuation coefficients. Based on these private and external costs, a social cost optimisation model can be formulated considering a range of fertilisers, to determine the optimal fertiliser mix. In this study, this social cost minimisation approach is applied to a conceptual Flemish leek farmer who aims to ensure sufficient nutrient uptake while being constrained by nutrient standards and the availability of on-farm residues. The results suggest that mineral fertilisers have an important role in the fertiliser mix despite their environmental externalities. Nevertheless, there is also a role for bio-based fertilisers such as compost and pig slurry, although the optimal application rates depend on their social costs, which are largely determined by ammonia emissions.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

Biogebaseerde meststoffen kunnen bijdragen aan regionale nutriëntencirculariteit, maar de vraag blijft of de productie en het gebruik ervan voordelig is voor zowel de landbouwer als het milieu. Een manier om dit te onderzoeken, is om zowel de private kosten van een boer als de externe kosten voor het milieu nader te bekijken, samen de totale maatschappelijke kosten genoemd. De externe kosten van de productie en consumptie van meststoffen kunnen worden geschat door middel van levenscyclusanalyses, waarvan de resulterende impacten in geld worden uitgedrukt door middel van monetaire waarderingscoëfficiënten. Op basis van deze private en externe kosten kan een maatschappelijk kostenoptimalisatiemodel worden geformuleerd dat een reeks meststoffen in beschouwing neemt om de optimale meststoffenmix te bepalen. In deze studie wordt deze aanpak voor maatschappelijke kostenminimalisatie toegepast op een conceptuele Vlaamse preiteler die streeft naar een voldoende nutriëntenopname terwijl hij wordt beperkt door nutriëntennormen en de beschikbaarheid van reststoffen op het bedrijf. De resultaten suggereren dat minerale meststoffen een belangrijke rol spelen in de meststoffenmix, ondanks hun externe milieueffecten. Toch is er ook een rol weggelegd voor biogebaseerde meststoffen zoals compost en varkensdrijfmest, hoewel de optimale toepassingsdosering afhangt van hun maatschappelijke kosten, die grotendeels worden bepaald door ammoniakemissies.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

De Keyser E., Rowe T., Giacomella L., Jansinski D., Mathijs E., Vranken L. (2024). Combining Life-Cycle Assessment and Linear Programming to Optimize Social Fertilizer Costs. *Journal of Environmental Managment.* https://doi.org/10.1016/j.jenvman.2024.122225

#38

PRACTICE ABSTRACT

OPTIMISING FERTILISER COSTS FOR SUSTAINABILITY

Combining life-cycle assessment and linear programming to optimise social fertiliser costs

CONTEXT

This study focuses on the role of fertilisers within regional nutrient cycles. Established technologies to convert organic residues into bio-based fertilisers include composting and anaerobic digestion. In order for the resulting fertilisers to be applied, they need to offer benefits to the farmer while avoiding environmental and health risks.

PROBLEM

Fertilisers bring along external costs related to their environmental emissions during production and application. Environmental impact assessment methods such as life-cycle assessment (LCA) provide a comprehensive evaluation of these impacts. By weighting the impacts according to their damage costs, these impacts can be translated into tangible costs borne by society, i.e., external costs. The combined total of private costs to the farmer and external costs to society, is referred to as social costs. While some example of environmental and economic optimisation studies exists in the fertiliser domain, determining optimal fertiliser mixes for certain case studies, the monetary valuation is currently still missing.

SOLUTION

This study aims to determine the socially optimal fertiliser mix on farm level, expressed as the application rates of different fertilisers, considering a Flemish leek farmer. Cost minimisation models are often solved using linear programming (LP) techniques in which the objective function is optimised subject to a set of linear constraints. In our study, this approach allows for cost accounting of private and external costs, the latter based on monetary valuation of environmental impacts estimated through LCAs of the studied fertilisers. The model constraints ensure resource optimisation and account for nutrient requirements and regulatory limits. Several sensitivity analyses are carried out to check the robustness of the results.

OUTCOME

1. Total social fertiliser costs for leek farming in Flanders amount to €3773-€8584/ha, where private costs contribute only €81/ha.
2. A mix of mineral fertiliser, animal manure (i.e., pig slurry) and compost is optimal in both the private and social optimum.
3. Compared to the private optimum, the societal optimum proves that it would be interesting to convert part of the leek residues into compost after anaerobic digestion instead of buying certified compost and leaving crop residues on the field after harvest.
4. Sensitivity analyses point out that the results change with higher social costs of pig manure and crop residues, which can be related to increases in ammonia emissions. In those cases, it becomes optimal to convert more crop residues into compost.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

De Keyser E., Rowe T., Giacomella L., Jansinski D., Mathijs E., Vranken L. (2024). Combining Life-Cycle Assessment and Linear Programming to Optimize Social Fertilizer Costs. *Journal of Environmental Managment.* https://doi.org/10.1016/j.jenvman.2024.122225

#38

PRACTICE ABSTRACT

OPTIMISING FERTILISER COSTS FOR SUSTAINABILITY

Combining life-cycle assessment and linear programming to optimise social fertiliser costs

PRACTICAL RECOMMENDATIONS

- ✓ Currently, many Flemish horticultural farmers use a combination of pig slurry and mineral nitrogen with application rates of roughly 20 ton/ha and 80 kg N/ha respectively. Our analyses point towards possible social and private cost savings by using less of both.
- ✓ Combined fertilisation strategies where both bio-based and mineral fertilisers are used, are favored.
- ✓ In contrast to the current practice of leaving crop residues on the field, it can be interesting to cooperate with value chain actors for the treatment of crop residues to compost.
- ✓ It is important to monitor ammonia emissions to ensure minimal external costs.

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

RUSTICA

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

De Keyser E., Rowe T., Giacomella L., Jansinski D., Mathijs E., Vranken L. (2024). Combining Life-Cycle Assessment and Linear Programming to Optimize Social Fertilizer Costs. *Journal of Environmental Managment.* https://doi.org/10.1016/j.jenvman.2024.122225

#39

PRACTICE ABSTRACT

ABM FOR AGRI-FOOD SUSTAINABILITY

Sustainability transitions in agri-food systems through the lens of agent-based modelling: a systematic review

SHORT SUMMARY FOR PRACTITIONERS

EN version

RUSTICA is aimed at developing circular business models for bio-based fertilisers, what implies a sustainability transition of the agri-food sector. Dynamic and diverse agri-food systems still need a better understanding of the evolving environmental, economic, and social dimensions of sustainability. These transitions of complex systems is not evident, and a systemic approach is required to represent the complexity of the context and processes involved.

Modelling approaches are well suited to provide insights into transitions toward sustainability, however such modelling of sustainability transitions in agri-food systems has been generally overlooked in the past. Agent-based models are computational resources that represent individuals or agents in an environment in which they interact with each other. The performed systematic review revealed that agent-based models capture core characteristics of sustainability transitions, resulting in a powerful method to understand transitions in agri-food systems. Here, we present some recommendations for researchers that could beneficiate from using this modelling approach in the study of sustainability transitions.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

RUSTICA is gericht op de ontwikkeling van circulaire bedrijfsmodellen voor biogebaseerde meststoffen, wat een duurzaamheidstransitie van de agrovoedingssector impliceert. Dynamische en diverse agrofoodsystemen hebben nog steeds een beter begrip nodig van de evoluerende ecologische, economische en sociale dimensies van duurzaamheid. Deze transities van complexe systemen zijn niet vanzelfsprekend en er is een systemische aanpak nodig om de complexiteit van de context en de betrokken processen weer te geven.

Modelleringstechnieken zijn zeer geschikt om inzicht te verschaffen naar duurzaamheidstransities, maar dergelijke modellering van duurzaamheidstransities in agrovoedselsystemen is in het verleden over het hoofd gezien. Agent-gebaseerde modellen zijn computermiddelen die individuen of agenten voorstellen in een omgeving waarin ze met elkaar interageren. De uitgevoerde systematische review toonde aan dat agent-gebaseerde modellen de belangrijkste kenmerken van duurzaamheidstransities vastleggen, wat resulteert in een krachtige methode om transities in agrofoodsystemen te begrijpen. Hier presenteren we enkele aanbevelingen voor onderzoekers die baat zouden kunnen hebben bij het gebruik van deze modelbenadering in de studie van duurzaamheidstransities.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#39

PRACTICE ABSTRACT

ABM FOR AGRI-FOOD SUSTAINABILITY

Sustainability transitions in agri-food systems through the lens of agent-based modelling: a systematic review

CONTEXT

Agri-food systems and their value chains are currently under pressure to minimise environmental degradation and secure a more sustainable future. RUSTICA's objective to develop circular bio-based fertilisers requires the understanding of such sustainability transitions in agri-food systems. Sustainability transitions in complex systems like agri-food systems must take the complexities, non-linearity, and interactions involved into consideration.

PROBLEM

Investigating the potential and suitability of agent-based modelling for improving our understanding of sustainability transitions in agri-food systems by reviewing a variety of transition models in agri-food system studies.

APPROACH

A sustainability transition characteristics framework is proposed, covering feedback loops between social and environmental systems, the detection of systemic change, temporal and spatial scales, changes in social values in transitions, diversity and heterogeneity, uncertainty and non-linearity, and multidisciplinary approaches. Furthermore, generic elements of models such as the representation of sustainability dimensions, sectors within agri-food systems, and complementary methods used in the study are analysed.

OUTCOME

1. Recently, there is an increasing interest in studying sustainability transitions using agent-based models, specifically for agri-food systems. In the past, agri-food system transitions have been overlooked.
2. Characteristics of sustainability transitions like detection of systemic change, temporal and spatial scales, changes in social values and norms, diversity and heterogeneity, uncertainties and non-linearities, and multidisciplinary approaches can be observed and represented using agent-based models. This helps in understanding sustainability transitions in agri-food systems.
3. An advantage of agent-based models is that they are flexible to represent processes that require either a longer time span, such as landscape transformations, or shorter temporal scales. Furthermore, they can combine multiple timescales in one model by using a multiscale modelling approach that incorporates both social and biophysical dynamics. However, the understanding of a system in the past cannot guarantee the prediction of future behaviours and long-system dynamics in a complex system.
4. Agent-based models currently have limited consideration of social learning, risk aversion, social norms, or social aspects contributing to social norms, in contrast to natural system components that often appear in models. Surveys, expert knowledge, interviews, and participatory approaches are helpful methods to include the behaviour characteristics in agent-based models.

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#39

PRACTICE ABSTRACT

ABM FOR AGRI-FOOD SUSTAINABILITY

Sustainability transitions in agri-food systems through the lens of agent-based modelling: a systematic review

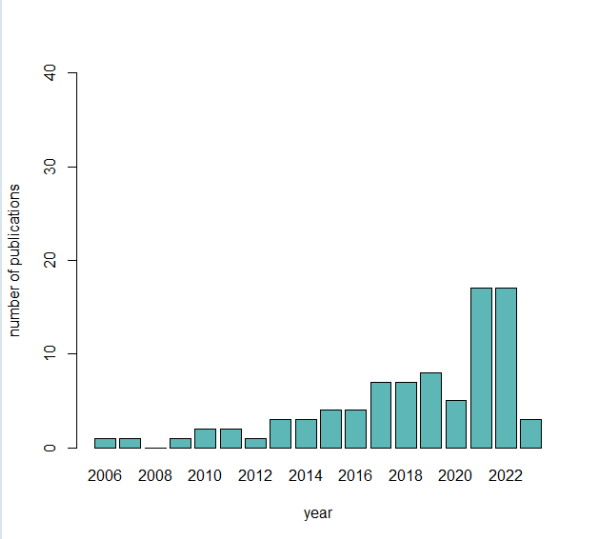
OUTCOME

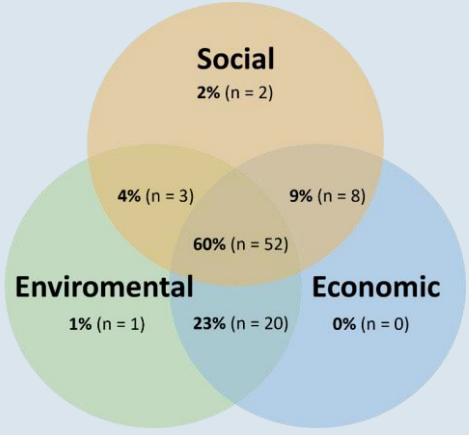
5. A focused study of at least two activities of the agri-food supply chain can still provide valuable insights regarding sustainability transitions. Activities such as processing and distribution are still lacking in models.
6. It is highly recommended to follow a participatory approach, especially in agri-food systems sustainability transition papers using agent-based models, as these tend to be broad, multidisciplinary systems.
7. The combination of agent-based model with other suitable methods like GIS can increase the power of these analyses.

PRACTICAL RECOMMENDATIONS

- ✓ Due to the urgent need to understand sustainability transitions, using agent-based models to simulate agri-food systems could help researchers, together with other stakeholders, to understand how transitions happen. Exploring potential sustainable solutions, like the development and adoption of bio-based fertilisers, could be done by using this modelling approach.
- ✓ Agri-food models could benefit from using complementary methods adapted to the needs of the simulation. It must first be evaluated which complementary methods should be integrated, and what outcomes may they yield.
- ✓ Good code publishing practices could be done by keeping modelling notebooks, which helps to communicate and share models' results.
- ✓ However, it should be noted that agent-based modelling is highly time-intensive and requires some degree of expertise in software tools. Therefore, we should critically think about what can we achieve with this modelling method versus the time and effort we need to invest in it.

FIGURES





Sustainability dimensions included in the analysis of the selected final records

RUSTICA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#40

PRACTICE ABSTRACT

Opportunities of the circular bioeconomy

Circular bioeconomy – concrete solutions to increase the added value of farming production: Report of the COPA COGECA panel debate

SHORT SUMMARY FOR PRACTITIONERS

EN version

Since the first EU Bioeconomy Strategy was adopted in 2012, positive changes have enabled European farmers and agri-cooperatives to adapt or create new business models, ranging from biorefineries to new types of energy production and materials for bio-based industries.
However, there is still room for growth. By utilising EU research funds and supporting private-public partnerships such as Circular bio-based Europe, the integration of primary producers into value chains can be further enhanced. In addition to this, by highlighting the key role of cooperatives in building a strong bioeconomy, promoting collaboration across value chains, and sharing added value, will increase the awareness of the benefits for the entire EU.

During the 2024 Congress of European Farmers, organised by COPA-COGECA, a panel of experts discussed the circular bioeconomy and its concrete solutions to increase the added value of farming production. The panel consisted of Enda Buckley (Director of Sustainability at Carbery Group Dairy Co-operative), Pedro Luis Cordero Castillo (President, FEFAC), Iulia Sima (Vice-President, Agroplant, U.N.C.S.V) and Virginia Puzzolo (Head of Programme, Circular Bio-based Europe Joint Undertaking). Tessa Avermaete (KU Leuven) moderated the panel.

The panel concluded that there is need for more coherence, transparency and stability in policies to boost the development of the circular bioeconomy.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

De eerste EU-strategie voor de bio-economie, ingesteld in 2012 heeft geleid tot positieve veranderingen. Europese boeren en agrocoöperaties hebben zich aangepast en nieuwe bedrijfsmodellen werden ontwikkeld, variërend van bioraffinaderijen tot nieuwe soorten energieproductie en materialen voor biogebaseerde industrieën.
Er is echter nog ruimte voor groei. Door gebruik te maken van EU-onderzoeksmiddelen en privaat-publieke samenwerkingen zoals Circular Bio-based Europe te ondersteunen, kan de integratie van primaire producenten in waardeketens verder worden verbeterd. Door de sleutelrol van coöperaties bij het opbouwen van een sterke bio-economie te benadrukken, samenwerking in de ketens te bevorderen en toegevoegde waarde te delen, zal het bewustzijn van de voordelen voor de hele EU toenemen.
Tijdens het Congres van Europese Boeren 2024, georganiseerd door COPA-COGECA, besprak een panel van experts de circulaire bio-economie en de concrete oplossingen om de toegevoegde waarde van de landbouwproductie te vergroten. Het panel bestond uit Enda Buckley (Director of Sustainability bij Carbery Group Dairy Co-operative), Pedro Luis Cordero Castillo (President, FEFAC), Iulia Sima (Vice-President, Agroplant, U.N.C.S.V) en Virginia Puzzolo (Head of Programme, Circular Bio-based Europe Joint Undertaking). Tessa Avermaete (KU Leuven) modereerde het panel.
Het panel concludeerde dat er behoefte is aan meer samenhang, transparantie en stabiliteit in beleid om de ontwikkeling van de circulaire bio-economie te stimuleren.

RUS TI CA

Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527

#40

PRACTICE ABSTRACT

Opportunities of the circular bioeconomy

Circular bioeconomy – concrete solutions to increase the added value of farming production: Report of the COPA COGECA panel debate

CONTEXT

It is acknowledged and accepted that to better tackle climate changes the EU needs concrete solutions to replace fossil-based fuels and materials (for energy, textile, construction etc..). The circular bioeconomy can provide these alternatives and can also create an added value for farmers and farmer cooperatives.

PROBLEM

Many technologies that have the potential to replace fossil based fuels have already been developed. However, the uptake is slow. This slow uptake has several reasons, among others the fact that alternatives are not always economically performing better than conventional products. Also, there is inherent aversion against significant changes in the agrofood sector especially when these changes require high investments and come with significant risks. Finally, the pressure on farmers is high in all European regions and across all subsectors, which leaves little space and means to explore new pathways that may potentially fail.

APPROACH

During this session at the COPA COGECA congress, experts were brought together to share their experiences. The panel included both entrepreneurs and policy experts. From the business side, Mr Buckley and Ms Sima outlined how they implemented the bioeconomy in their companies. Mr Cordero Castillo emphasised the importance of the bioeconomy for feed manufacturers in Europe and also pointed on the global perspective. Ms Puzzolo provided information on how the European Commission supports consortia to invest in the bioeconomy.

OUTCOME

1. Cooperation between actors in the agro food chain is a key to success for the development of the bioeconomy in Europe.
2. Implementation of bio-based alternatives within a company or at the farm level takes time.
3. Europe has several means to support consortia that explore and develop bio-based alternatives for the agri food system.

PRACTICAL RECOMMENDATIONS

- ✓ Regional specificities need to be taken into account when setting up initiatives to stimulate the bio-based economy
- ✓ Sharing best practices and field visits pave the way to the acceptance of new technologies and process.
- ✓ There is need for more coherence, transparency and stability in policies to boost the development of the circular bioeconomy.

RUSTICA
Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 101000527