RUSTICA

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

Deliverable 8.11:

Practice Abstracts - first bench

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Abstract

This deliverable contains the resume and content of the 24 abstracts already developed under the RUSTICA project. 16 More practice abstracts are expected to be delivered in the second batch, resulting in a total of 40 practice abstracts by the end of the project.

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Abbreviations

EC	European Commission
EIP-AGRI	European Innovation Partnership for Agricultural Productivity and Sustainability
EU	European Union
GA	Grant Agreement
H2020	Horizon 2020
MA	Multi-Actor
PA	Practice Abstract
RUR	Rural Renaissance
WP	Work Package

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The RUSTICA consortium

The RUSTICA consortium, composed of university researchers, academia, 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 achieve the goals set-forth.

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'Agricultures 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
	Fundacion 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
	IDConsortium 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

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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 to provide their citizens with a more competitive economy, better jobs, and life standards, fostering a competitive and sustainable agriculture and forestry sector that "achieves more from less".

The EIP-AGRI adheres to the "interactive innovation model", which brings together specific actors (e.g., farmers, advisors, researchers, business, etc.) to work in multi-actor projects to find a solution for a specific issue or develop a concrete opportunity. In this sense, communicating about project activities and results is much easier through the use of a common format which facilitates the knowledge flow and enables contacting farmers, researchers and all the other actors involved in innovation projects. The EIP common format consists of a set of basic elements characterising the project, including practice abstracts (Pas). The format is developed with the aim to enable the contact with partners, incentivize efficient knowledge exchange and disseminate the results of the project in a concise and easily understandable way to practitioners.

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

This document presents 24 PAs that have been mainly 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) which 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 in the shape of an excel template. 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 to publish the PAs on the project website. This design however, includes the same information as required within the EIP-AGRI format:

- Main results/outcomes of the activity (expected or final)
- Main practical recommendations such as the main added value, benefit, opportunities to 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. In addition to the PAs, the excel template contains general information about the project, including keywords, list of partners and contacts, website and audio visual material

Please note that the following practice abstracts have not yet been validated by the EIP-AGRI.

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3. Overview of first bench of practice abstracts

Table 2 - Overview first bench of practice abstracts

#	Partner involved	Topic	Language
1	TECNOVA	Results RUSTICA external stakeholder workshop 1 - Almeria	English/Spanish
2	CREA	Results RUSTICA external stakeholder workshop 1 - Friuli-Venezia Giulia	English/Italian
3	EV ILVO	Results RUSTICA external stakeholder workshop 1 - Flanders	English/Dutch
4	CRAPDL	Results RUSTICA external stakeholder workshop 1 - Pays de la Loire	English/French
5	CIAT	Results RUSTICA external stakeholder workshop 1 - Valle del Cauca	English/Spanish
6	TECNOVA	Results RUSTICA external stakeholder workshop 2 - Almeria	English/Spanish
7	CREA	Results RUSTICA external stakeholder workshop 2 - Friuli-Venezia Giulia	English/Italian
8	EV ILVO	Results RUSTICA external stakeholder workshop 2 - Flanders	English/Dutch
9	CRAPDL	Results RUSTICA external stakeholder workshop 2 - Pays de la Loire	English/French
10	CIAT	Results RUSTICA external stakeholder workshop 2 - Valle del Cauca	English/Spanish
11	CROPEYE	Regional business sheets	English/Dutch
12	WIEDEMANN	Valorisation concepts in the EU legislation framework	English/German
13	DRANCO	Technical report on nutrient release potential from fruit and vegetable waste using a carboxylic acid platform	English
14	TNO	Technical report on biochar production from lignocellulosic residues from the fruit and vegetable industry as soil amendment ingredient	English
15	AVECOM	Technical report on the conversion of CAP-effluent to microbial biomass	English/Dutch
16	UGent	Technical report on the separation efficiency using electrodialysis to recover a mineral concentrate from CAP-effluent	English
17	ENTOMO	Technical report on the potential to recover nutrient from fruit and vegetable residues through insect production	English/Spanish
18	CROPEYE	Preliminary report on lab)scale fertiliser ingredient characterisation	English/Dutch
19	CROPEYE	Final report on lab scale fertiliser ingredient characterisation	English/Dutch
20	CROPEYE	Market analysis report	English/Dutch
21	WIEDEMANN	Legislative aspects Almeria	English/Spanish
22	WIEDEMANN	Legislative aspects Friuli-Venezia Giulia	English/Italian
23	WIEDEMANN	Legislative aspects Flanders	English/Dutch
24	WIEDEMANN	Legislative aspects Pays de la Loire	English/French

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4. Annex 1: Practice abstracts - first bench

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#1

PRACTICE ABSTRACT

RESULTS WORKSHOP 1 ALMERIA

Results RUSTICA external stakeholder workshop 1 - Almeria

SHORT SUMMARY FOR PRACTITIONERS

EN version

In autumn 2021, the first RUSTICA multi-stakeholder regional workshop for Almeria region took place. 10 People involved in different parts of the bio-based fertilisers (BBFs) value chain attended. The goals of the workshop were to improve the connection among the regional BBFs stakeholders, define expected results of the project, get feedback about a regional market analysis fact sheet, collect input on the regional whishes about BBFs characteristics, identify the most important factors favoring BBFs and future scenarios for BBFs development for this region, and enlarge the regional stakeholders list. Outcomes of the workshop were the following. Stakeholder expectations of the RUSTICA project were identified. The main properties required for BBFs in Almeria were high release of nutrients during a short period of several weeks, high mineralisation capacity, capacity to increase water retention of soil, carbon sequestration and soil resilience. Comments and improvements of the market analysis fact sheet were discussed. A roadmap was identified with the stakeholders of the BBFs production sector from organic residues coming from the vegetable production system under greenhouse of south of Spain. Social, environmental, political, economic and technical factors of the expected future scenarios of BBFs production in Spain were identified. Main needs identified have been clear fact sheets of each BBFs and demonstrative actions of agronomic and environmental benefits produced; formation of advisors specialised to manage "alive soils"; improvement of farmers awareness; estimation of energetic cost and efficiency of BBFs production processes and, harmonisation of legislation. Main obstacles identified were seasonality of waste production; lack of information about availability of organic residues to be valorised; not harmonised local legislation; lack of information about economic cost and technical problems associated to possible valorisation chains. Main drivers identified for the future development of BBFs were the existence of technology maturity; interconnection between research centers and private companies; actions promoting circular economy.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

En otoño de 2021 ha tenido lugar el primer workshop regional de RUSTICA en la región de Almería. Asistieron 10 actores de la cadena de valor de los biofertilizantes (BBFs). Los objetivos de este workshop fueron: mejorar la interconexión entre las partes interesadas en la producción de BBFs, definir los resultados esperados del proyecto, obtener comentarios sobre una ficha descriptiva del mercado regional, conocer las propiedades demandadas en los BBFs, identificar los factores más importantes que afectan al desarrollo y al uso de BBFs en esta región, y ampliar la lista de actores regionales. Durante este workshop se han identificado las expectativas que tienen los asistentes del proyecto RUSTICA y las principales propiedades requeridas en los BBFs en Almería, como son una alta capacidad de liberación de nutrientes en un corto período de tiempo, una elevada capacidad de mineralización, capacidad para aumentar la retención de agua del suelo, el secuestro de carbono y la resiliencia del suelo. Se han recopilado mejoras y comentarios referentes a la ficha informativa de análisis del mercado regional actual. Se ha identificado a todos los posibles actores que podrían estar involucrados en la producción de BBFs a partir de residuos orgánicos procedentes del sistema de producción de hortalizas bajo invernadero del sur de España. Los factores sociales, ambientales, políticos, económicos y técnicos de los escenarios futuros esperados de producción de BBFs en España han sido identificados. Las principales necesidades identificadas han sido hojas informativas claras de cada BBF y acciones demostrativas de los beneficios agronómicos y ambientales que producen; formación de asesores especializados para el manejo de "suelos vivos"; sensibilización de los agricultores; estimación del coste y de la eficiencia energética de los procesos de producción de BBFs y; armonización de la legislación. Los principales obstáculos identificados han sido la estacionalidad de la producción de residuos; la falta de información sobre la disponibilidad de residuos orgánicos para ser valorizados; la legislación local no armonizada; y la falta de información sobre costes económicos y problemas técnicos asociados a posibles cadenas de valorización. Los principales impulsores identificados para el desarrollo futuro de los BBFs han sido la existencia de tecnologías maduras; la interconexión entre centros de investigación y empresas privadas; y el fomento de acciones que promueven la economía circular.

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

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#1

PRACTICE ABSTRACT

RESULTS WORKSHOP 1 ALMERIA

Results RUSTICA external stakeholder workshop 1 - Almeria

CONTEXT

On the 10th November 2021, TECNOVA organised the first RUSTICA external multi-stakeholder workshop for the Almeria region. The assistants were 10 attendees from different parts of the bio-based fertilisers (BBFs) value chain including research organisations, farmers associations, waste management company, regional agencies, environmental associations, agronomy advisors and policymakers.

PROBLEM

The bio-based fertiliser value chain to make progress in the development of BBFs is in need of updated information about availability of organic residues to be valorised and location of these residues, well defined production processes of BBFs, harmonised legislation, protocols of management and application of BBFs and advisors specialised on the use of BBFs.

SOLUTION

Regional RUSTICA stakeholder workshops connect stakeholders and project partners related to different parts in the bio-based fertiliser value chain. The workshop setting is used to explore and discuss questions such as project goal definitions, regional market analysis, customer wishes for BBFs, potential value chains, future scenarios for the development of BBFs.
Project results are shared and discussed with the stakeholders during the workshops.

OUTCOMES

1. Roadmap of stakeholders in the Almeria region.
2. List of stakeholders' expectations about the RUSTICA project. In the short term: knowledge about new technologies adapted to actual needs, actors involved and future market scenarios, and analysis of actual legislation. In the long term: information about economics and technical issues related to BBFs production, update about advances on waste valorisation, development of new nutritional products, reinforcement of BBFs use, improvement of agricultural productive procedures and establishment of a multi-actor working group.
3. Improvements of Almeria market analysis fact sheet.
4. Main functions required for BBFs: high release of nutrients at a short period of weeks duration, high mineralisation capacity, capacity to increase water retention of soil, carbon sequestration and soil resilience.
5. Social, political, technological, economic and environmental factors related to BBFs development and use were identified.

PRACTICAL RECOMMENDATIONS

- It is necessary to provide information about possible BBFs to be produced and its production processes.
- Protocols about management and use of BBFs must be elaborated.
- Information about agronomic and environmental benefits produced by BBF use must be available.
- Training actions to improve farmer awareness and to get advisor specialisation on BBFs management and use are necessary.
- Legislation must be continuously harmonised and updated.

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#2

PRACTICE ABSTRACT

RESULTS WORKSHOP 1 FRIULI-VENEZIA GIULIA

Results RUSTICA external stakeholder workshop 1 - Friuli-Venezia Giulia

SHORT SUMMARY FOR PRACTITIONERS

EN version

In 2021, the first RUSTICA multi-stakeholder workshop for the Friuli-Venezia Giulia region took place. 15 People involved in different parts of the bio-based fertilisers (BBFs) value chain attended. The goals of the workshop were to improve the connection among the regional BBFs stakeholders, define expected results of the project, collect input on the regional whishes about BBFs characteristics, enlarge the regional stakeholders list, identify the most important factors favoring BBFs and future scenarios for BBFs development.
Outcomes of the workshop entailed a list of short- and long-term goals of the project. The main properties required for BBFs are controlled release of nutrients and soil-improving capacity. The workshop attendees integrated the stakeholders map and identified the main interlinked factors related to BBFs production and use. Practical recommendations include the need to obtain more detailed information on the availability of residues from fruit and vegetables and ensure the economic and environmental sustainability of the BBFs value chain. Main drivers identified by participants for the future development of BBFs are qualitative and economic competitiveness; low environmental impact; effective technology; availability, stability and homogeneity of BBFs; increased environmental awareness of citizens and farmers; clear legislation and regulation; measures supporting circular economy.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

Nel 2021 si è svolto il primo workshop dei portatori di interesse di RUSTICA per la regione Friuli Venezia Giulia. All'evento hanno partecipato 15 persone coinvolte in diverse parti della catena del valore dei fertilizzanti a base biologica (FBB). Gli obiettivi del workshop erano migliorare il collegamento tra i portatori di interesse regionali, definire i risultati attesi dal progetto, ricevere input sulle caratteristiche dei FBB richieste a livello regionale, ampliare l'elenco dei portatori di interesse regionali, identificare i fattori più importanti e gli scenari futuri per lo sviluppo dei FBB.
I risultati del workshop includono un elenco di obiettivi a breve e lungo termine del progetto. Le principali proprietà richieste per i FBB sono il rilascio controllato di nutrienti e la capacità di migliorare il suolo. I partecipanti al seminario hanno inoltre integrato la mappa dei portatori di interesse e hanno identificato i principali fattori interconnessi relativi alla produzione e all'uso dei FBB. Le raccomandazioni pratiche includono la necessità di ottenere informazioni più precise sulla disponibilità di residui del settore ortofrutticolo e di garantire la sostenibilità economica e ambientale della catena di valore dei FBB. I principali fattori trainanti lo sviluppo dei FBB identificati dai partecipanti al workshop sono: competitività qualitativa ed economica, basso impatto ambientale, sviluppo di tecnologie efficaci; disponibilità, stabilità e omogeneità dei FBB; maggiore consapevolezza ambientale di cittadini e agricoltori; legislazione e regolamentazione chiare; misure a sostegno dell'economia circolare.

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#2

PRACTICE ABSTRACT

RESULTS WORKSHOP 1 FRIULI-VENEZIA GIULIA

Results RUSTICA external stakeholder workshop 1 - Friuli-Venezia Giulia

CONTEXT

On the 18th October 2021, CREA organised the first RUSTICA external multi-stakeholder workshop for the Friuli-Venezia Giulia region. There were 15 attendees involved from different parts of the bio-based fertilisers (BBFs) value chain including research organisations, farmers associations, waste management company, regional agencies, environmental associations, agronomy advisors and policymakers.

PROBLEM

The bio-based fertiliser value chain to make progress in the development of BBFs is in need of a better knowledge about regional fruit and vegetable production, enhanced connection among stakeholders, more insights on desirable properties of BBFs and potential customer demand, identification of most important factors favoring BBFs production and use.

SOLUTION

Regional RUSTICA stakeholder workshops connect stakeholders and project partners related to different parts in the bio-based fertiliser value chain. The workshop setting is used to explore and discuss questions such as project goal definitions, regional market analysis, customer wishes for BBFs, potential value chains, future scenarios for the development of BBFs.
Project results are shared and discussed with the stakeholders during the workshops.

OUTCOME

1. List of long term and short term goals to be pursued by the RUSTICA network. In the short term: identification of the amount of fruit and vegetable wastes available to produce BBFs, technological knowledge required for BBFs, identification of enhanced transformation opportunities along the value chain as strategy to integrate processes and reduce production costs, achievement of economic sustainability and reduction of legal constraints related to the production and use of BBFs. In the long term: fostering a perception of organic residues as valuable resource for both farmers and citizens; achieving a separate collection of fruit and vegetable wastes from household organic wastes; increasing networking actions between actors in the supply chain.
2. Detailed overview of stakeholders in the Friuli-Venezia Giulia region.
3. Main functions required for BBFs are the controlled release of nutrients and soil-improving capacity for the recovery of degraded soils.
4. Social, political, technological, economic and environmental factors related to BBFs development and use were scored on relevance and interlinked.

PRACTICAL RECOMMENDATIONS

- Need to obtain more precise and detailed information on the availability of residues from the fruit and vegetable sector.
- It is essential to achieve the economic and environmental sustainability of the value chain.
- Main drivers for the future of BBFs were identified: qualitative and economic competitiveness, low environmental impact, competitive price compared to current fertilisers; development of effective technology; availability; stability and homogeneity of BBFs; increased environmental awareness of citizens and farmers; clear legislation and regulation; measures supporting circular economy

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

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#3

PRACTICE ABSTRACT

RESULTS WORKSHOP 1 FLANDERS

Results RUSTICA external stakeholder workshop - Flanders

SHORT SUMMARY FOR PRACTITIONERS

EN version

In 2021, the first RUSTICA multi-stakeholder workshop for the Flemish region took place. 20 People involved in different parts of the bio-based fertiliser (BBF) value chain attended. The goals of the workshop were to better connect the regional network to make progress in the development of BBFs, to gain more insights in potential customer demand, as well as in legal and market related challenges and to share project (intermediate) results.

Outcomes of the workshop entailed an overview of most important regional stakeholders in the Flemish region, a list of long term and short term goals to be pursued by the RUSTICA network, leek as choice of crop for the development of a BBF blend for the Flemish region, and most crucial interlinked social, political, technological, economic and environmental factors related to BBF development and use. Practical recommendations include the need to have a more clear legal framework and to ensure a clear economic benefit for potential waste stream suppliers. Additionally, three main drivers for the future of BBFs were identified: 1) Public sustainability awareness; 2) A competitive price of BBFs compared to current fertilisers; 3) Affordable and innovative technologies to develop BBFs. During future workshops, stakeholders suggested to provide more details on technological methods in RUSTICA and market data.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

In 2021 vond de eerste RUSTICA multi-stakeholderworkshop voor de Vlaamse regio plaats. 20 Mensen die betrokken zijn bij verschillende delen van de waardeketen van biogebaseerde meststoffen (BBF) waren aanwezig. De doelstellingen van de workshop waren om het regionale netwerk beter te verbinden om vooruitgang te boeken in de ontwikkeling van BBF's, om meer inzicht te krijgen in de potentiële vraag van klanten en in juridische en marktgerelateerde uitdagingen en om (tussentijdse) projectresultaten te delen.

De resultaten van de workshop omvatten een overzicht van de belangrijkste regionale stakeholders in Vlaanderen, een lijst van lange- en kortetermijndoelstellingen om na te streven door het RUSTICA-netwerk, prei als gewaskeuze voor de ontwikkeling van een BBF-mengsel voor Vlaanderen, en de meest cruciale sociale, politieke, technologische, economische en milieufactoren met betrekking tot de ontwikkeling en het gebruik van BBF. Praktische aanbevelingen zijn onder meer de behoefte aan een duidelijker juridisch kader en aan een duidelijk economisch voordeel voor potentiële leveranciers van afvalstromen. Daarnaast werden drie belangrijke drijvende krachten voor de toekomst van BBF's geïdentificeerd: 1) het duurzaamheidsbewustzijn van het publiek; 2) een concurrerende prijs van BBF's in vergelijking met de huidige meststoffen; 3) betaalbare en innovatieve technologieën om BBF's te ontwikkelen. Tijdens toekomstige workshops stelden de stakeholders voor meer details te verstrekken over technologische methoden in RUSTICA en marktgegevens.

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#3

PRACTICE ABSTRACT

RESULTS WORKSHOP 1 FLANDERS

Results RUSTICA external stakeholder workshop - Flanders

CONTEXT

On the 18th of October 2021, EV ILVO organised the first RUSTICA external multi-stakeholder workshop for the Flemish region. There were about 20 attendees involved in different parts of the bio-based fertiliser (BBF) value chain including farmers association, fertiliser companies, technology providers, policymakers and research organisations.

PROBLEM

The bio-based fertiliser value chain is in need of better connected regional networks to make progress in the development of BBF. More insights in potential customer demand related to characteristics of future BBF blends is needed, as well as in legal and market related challenges.

SOLUTION

Regional RUSTICA stakeholder workshops connect stakeholders and project partners related to different parts in the bio-based fertiliser value chain. The workshop setting is used to explore and discuss questions such as customer wishes for BBF blends, market value chains, future scenarios for the development of BBF blends, technology developments and legal frameworks. Project results are shared and discussed with the stakeholders during the workshops.

OUTCOME

1. Detailed overview of regional stakeholders in the Flemish region
2. List of long term and short term goals to be pursued by the RUSTICA network. In the short term: enhanced networking opportunities throughout the value chain, solutions for technical and legal issues related to the production and use of BBF and expanding scientific and technological knowledge on the topic. In the long term: more circularity in the agricultural sector, increased soil quality, BBF commercialisation opportunities, enhanced public awareness on bio-based alternatives and broadening the scope of the results beyond the fruit and vegetable waste streams.
3. 2 potential crops with list of detailed characteristics for development of a matching BBF. Leek was then chosen by the RUSTICA partners as crop for the Flemish region.
4. In-depht reflection of stakeholders on the Flemish market context for future BBF development.
5. Social, political, technological, economic and environmental factors related to BBF development and use were scored on relevance and interlinked.

PRACTICAL RECOMMENDATIONS

- Need to have clear regulations and certification on the use of waste streams.
- It is crucial to have an economic benefit for potential waste stream suppliers.
- Three main drivers for the future of BBF were identified: 1) Public sustainability awareness; 2) A competitive price of BBF compared to current fertilisers; 3) Development of affordable and innovative technologies to develop BBF.
- During future workshops, stakeholders suggested to provide more details on technological methods in RUSTICA and market data.

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#4

PRACTICE ABSTRACT

RESULTS WORKSHOP 1 PAYS DE LA LOIRE

Results RUSTICA external stakeholder workshop 1 - Pays de la Loire

SHORT SUMMARY FOR PRACTITIONERS

EN version

The first regional multi-stakeholder RUSTICA workshop for the Pays de la Loire region (France) was held on October 21, 2021 in Angers, France, with 17 participants. Everyone was involved in the different steps of the value chain of the bio-based fertilisers (BBF). This workshop aimed to communicate about the H2020 RUSTICA project: objectives, expected results, technologies used, partners and other pilot regions. It also aimed to map the stakeholders of the Pays de la Loire region in order to create a network of local actors to co-construct the project. The actors were brought to reflect together on the needs of fertiliser users, the composition of future RUSTICA bio-sourced fertilisers, or future scenarios promoting the development of such a sector in the region. The results of the workshop is a list of short, medium and long term objectives of the project, according to different degrees of priority. Main priorities rely on the identification of regional resources, the assessment of the process feasibility of RUSTICA technologies and a balanced price in order to replace mineral into organic fertilisers. The recommendations made by the participants emphasize the need to obtain more detailed information on the availability of fruit and vegetable residues and to ensure the economic and environmental sustainability of the BBF value chain. The main levers identified for the development of the BBF value chain are essentially the qualitative and economic (price) competitiveness of BBF compared to mineral fertilisers, the low environmental impact, the availability, stability and homogeneity of BBF and an adequate legal regulatory framework.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

Le premier atelier régional multi-acteurs RUSTICA pour la région Pays de la Loire (France) s'est tenu le 21 octobre 2021 à Angers, accueillant 17 participants. Chacun était impliqué dans les différentes étapes de la chaîne de valeur de la filière des engrais bio-sourcés (« *Bio-Based Fertilisers* » - *BBF*). Cet atelier avait pour but de communiquer autour du projet H2020 RUSTICA: les objectifs, les résultats attendus, les technologies utilisées, les partenaires et autres régions pilotes. Il s'agissait également de cartographier les parties prenantes de la région Pays de la Loire afin de créer un réseau d'acteurs locaux pour co-construire le projet. Les acteurs ont été amenés à réfléchir ensemble sur les besoins des utilisateurs d'engrais, la composition des futurs engrais bio-sourcés RUSTICA, ou encore les futurs scénarios favorisant le développement d'une telle filière dans la région. Les résultats de l'atelier ont donné lieu à une liste d'objectifs à court, moyen et long terme du projet, selon différents degrés de priorité. Les principales priorités reposent sur l'identification des ressources régionales, l'évaluation de la faisabilité du processus des technologies RUSTICA et un prix équilibré afin de remplacer les engrais minéraux par des engrais organiques. Les recommandations émises par les participants soulignent ainsi la nécessité d'obtenir des informations plus détaillées sur la disponibilité des résidus des fruits et légumes et d'assurer la durabilité économique et environnementale de la chaîne de valeur des BBF. Les principaux leviers identifiés pour le développement de la filière des BBF sont essentiellement la compétitivité qualitative et économique (prix) des BBF par rapport aux engrais minéraux, le faible impact environnemental, la disponibilité, la stabilité et l'homogénéité des BBF ainsi qu'un cadre légal et réglementaire adéquate.

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

#4

PRACTICE ABSTRACT

RESULTS WORKSHOP 1 PAYS DE LA LOIRE

Results RUSTICA external stakeholder workshop 1 - Pays de la Loire

CONTEXT

On the 21th October 2021, the Chamber of Agriculture of Pays de la Loire Region (CAPDL) organised the first RUSTICA external multi-stakeholder workshop for the Pays de la Loire region in France. There were 17 attendees involved in different parts of the bio-based fertilisers (BBFs) value chain including research organisations, farmers associations, waste management company, regional agencies, environmental associations, agronomy advisors and policy makers.

PROBLEM

The bio-based fertiliser value chain to make progress in the development of BBFs is in need of a better knowledge about regional fruit and vegetable production, enhanced connection among stakeholders, more insights on desirable properties of BBFs and potential customer demand, identification of most important factors favoring BBFs production and use.

SOLUTION

Regional RUSTICA stakeholder workshops connect stakeholders and project partners related to different parts in the bio-based fertiliser value chain. The workshop setting is used to explore and discuss questions such as project goal definitions, but also to analyse the regional market and the need of end-users (with BBFs), potential value chains, future scenarios for the development of BBFs. Project results are shared and discussed with the stakeholders all along the workshops.

OUTCOME

1. List of long term and short term goals to be pursued by the RUSTICA network. In the short term: identification of the amount and quality of fruit and vegetable wastes available at regional level to produce BBFs; improving cooperation between upstream and downstream actors of the value-chain; getting balanced prices; enhancing this process to valorise final products instead of anaerobic digestion. In the long term: reuse biowastes into a circular model in agriculture; change the practice of the main actors of the value chain and, in a more general way, raise awareness of bioresources issues from the producer to the consumer.
2. Detailed overview of stakeholders in the Pays de la Loire region.
3. Main functions required for BBFs are the increase of organic matter in the soil and the control of release of nutrients needed. It is also important to decrease chemicals residues and sanitary risks.
4. Social, political, technological, economic and environmental factors related to BBFs development and use were scored on relevance and interlinked.

PRACTICAL RECOMMENDATIONS

- Need to obtain more precise and detailed information on the availability of residues from the fruit and vegetable sector.
- It is essential to achieve the economic and environmental sustainability of the value chain.
- Main drivers for the future of BBFs were identified: qualitative and economic competitiveness, low environmental impact, competitive price compared to current fertilisers; development of effective technology; availability of BBF (quantity); stability and homogeneity of BBFs; clear legislation and regulation; measures supporting circular economy

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

#5

PRACTICE ABSTRACT

RESULTS WORKSHOP 1 VALLE DEL CAUCA

Results RUSTICA external stakeholder workshop 1 - Valle del Cauca

SHORT SUMMARY FOR PRACTITIONERS

EN version

In 2021, the first RUSTICA multi-stakeholder workshop for the Valle del Cauca region took place. 18 People involved in different parts of the bio-based fertiliser (BBF) value chain attended. The goals of the workshop were to provide a space for the exchange of ideas and knowledge, to learn about waste recovery initiatives for generating organic fertilisers in the region, and to map the most feasible/promising value chains and technologies in order to build together a future scenario for the Valle Cauca.

Outcomes of the workshop entailed: the definition of a common goal for RUSTICA project in the region, validation of the regional market analysis presented on the fact sheet as well as the regional stakeholder network, and the identification of most important external and internal factors, obstacles, opportunities, and threats, that, may have an impact on bio-based fertilisers. For future workshops, stakeholders suggested to present more information about the project methodology, future activities, designate activities to participants that allow them to have an active role in the project and to involve more actors.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

En 2021 se realizó el primer taller de RUSTICA para la región del Valle del Cauca. Asistieron 20 personas involucradas en diferentes partes de la cadena de valor de los fertilizantes de base biológica (BBF). Los objetivos del taller fueron proporcionar un espacio para el intercambio de ideas y conocimientos, conocer las iniciativas de recuperación de residuos para la generación de fertilizantes orgánicos en la región, y mapear las cadenas de valor y tecnologías más factibles / prometedoras con el fin de construir juntos un escenario futuro para el Valle Cauca.
Los resultados del taller incluyeron: la definición de un objetivo común para el proyecto RUSTICA en la región, la validación del análisis del mercado regional presentado en la hoja de datos, así como la validación de la red de actores regionales; la identificación de los factores externos e internos más importantes, los obstáculos, las oportunidades y las amenazas, que, pueden tener un impacto en los fertilizantes de base biológica. Para futuros talleres, los participantes sugirieron: presentar más información sobre la metodología del proyecto y las actividades futuras, designar actividades a los participantes que les permitan tener un papel activo en el proyecto e involucrar a más actores.

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

RUS TI CA

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#5

PRACTICE ABSTRACT

RESULTS WORKSHOP 1 VALLE DEL CAUCA

Results RUSTICA external stakeholder workshop 1 - Valle del Cauca

CONTEXT

On the 5th of November 2021, the Alliance Bioversity-CIAT organised the first RUSTICA external multi-stakeholder workshop for the Valle del Cauca region. There were about 18 attendees involved in different parts of the bio-based fertiliser (BBF) value chain including farmers association, fertiliser companies, technology providers, policymakers, academia and research organisations.

PROBLEM

The Valle del Cauca bio-based fertiliser value chain presents external and internal factors, that, influence its production and diffusion. There is a need to better understand these features to find solutions for the progressive development of BBF in the region.

SOLUTION

Regional RUSTICA stakeholder workshops connect stakeholders and project partners related to different parts in the bio-based fertiliser value chain. This setting was used to identify the most important factors, obstacles, opportunities, and threats, that, with reference to the region, may have an impact on bio-based fertilisers, which actors should be involved for the development of these factors, how to overcome obstacles, how to take advantage of the opportunities and prevent threats.

OUTCOME

1. Detailed overview of regional stakeholders in Valle del Cauca region, as well as new actors to involve.
2. List of long term and short term goals to be pursued by the RUSTICA network. In the short term: Define solubility and availability of final products, identify industry by-products for use in agriculture, available technologies match to regional residues and identify local raw materials and available organic wastes. In the long term: to analyse biofertiliser production strategies, to replace fertiliser ingredients in agriculture, to find the best blends (organic: mineral), that maximise productivity and to implement public policies that promote circularity
3. In-depht reflection of stakeholders on the Valle del Cauca market context for future BBF development.
4. Social, political, technological, economic and environmental factors related to BBF development and use were scored on relevance and interlinked.
5. A list of ideas to overcome obstacles, and to take advantage of opportunities to prevent threats

PRACTICAL RECOMMENDATIONS

- It is crucial to create and promote technological solutions to produce organic fertilisers at local/regional level plus incentives for their implementation in different contexts.
- Need to foster a culture of recycling through education and institutional training
- Three main factors for the future of BBF were identified: 1) Raw materials (residues) are readily available ; 2) An increasing number of producer organisations that promote the use of bio-based fertilisers; 3) an increasing awareness and interest in organic production
- During future workshops, stakeholders suggested to provide more details on technological methods in RUSTICA and market data.

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

RUS TI CA

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#6

PRACTICE ABSTRACT

BBF VALUE CHAINS ALMERIA

Results RUSTICA external stakeholder workshop 2 - Almeria

SHORT SUMMARY FOR PRACTITIONERS

EN version

In June 2022, the second RUSTICA multi-stakeholder regional workshop for Almeria region took place. 12 Stakeholders involved in different parts of the bio-based fertilisers (BBFs) value chain including farmers, farmers associations, waste management companies, agronomy advisors and BBFs producer companies, attended this workshop. The goals of the workshop were: (1) to inform about the progress achieved from the beginning of the project, (2) to explain future actions to be developed during the next months, (3) to identify the key market players, processes & activities and support services of possible valorisation processes to be implemented in Almeria, (4) to identify the main barriers and promoters associated to each group of actors involved in the organic waste valorisation chains and, (5) to identify the six ideal valorisation chains to be implemented in Almeria. Outcomes of the workshop were the following. The key market players, processes & activities and support services of the possible valorisation processes to be implemented in Almeria have been identified in all the phases of the value chains (waste production, waste collection, waste processing, fertiliser mixing/blending, sale & distribution, and use & application). Stakeholders have been organised in two different working groups (the green group with farmers, farmers associations and technical advisors and; the blue group with waste processors and biofertiliser producers) to identify from two different points of view the main barriers and promoters of each phase of the value chains from different perspectives (financial, organisational, knowledge, institutional, supply chain and market). Finally, six possible value chains have been identified for the valorisation of organic wastes produced in the vegetable production system under greenhouse of Almeria, with the identification of the respective key players for each phase of the valorisation chains and the different possible interlinks between the key market players.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

En junio de 2022 ha tenido lugar el segundo workshop regional de RUSTICA en la región de Almería. Asistieron 12 actores de la cadena de valor de los biofertilizantes (BBFs) entre los que se encontraban agricultores particulares y asociaciones de agricultores, empresas gestoras de residuos, técnicos asesores y empresas productoras de BBFs. Los objetivos de este workshop fueron: (1) informar sobre los progresos realizados desde el inicio del proyecto, (2) explicar las futuras acciones que serán llevadas a cabo durante los próximos meses, (3) identificar los actores clave, procesos & actividades y servicios asociados de las posibles cadenas de valorización de interés para su implementación en Almería, (4) identificar las principales barreras y los impulsores asociados a cada grupo de actores clave involucrados en las cadenas de valorización de residuos orgánicos e, (5) identificar las seis cadenas ideales de valorización a implementar en la provincia de Almería. Los resultados de este workshop fueron los siguientes. Para cada una de las etapas de los procesos de valorización (producción de residuos, recolección de residuos, procesado de residuos, formulación & mezcla de biofertilizantes, venta & distribución, y uso & aplicación) han sido identificados los actores clave, procesos & actividades y los servicios externos asociados. Los stakeholders han sido organizados en dos grupos de trabajo diferentes (el grupo verde, formado por agricultores individuales, asociaciones de agricultores y técnicos asesores; y el grupo azul, formado por empresas gestoras de residuos y por empresas productoras de BBFs) para identificar desde distintos puntos de vista las principales barreras y los impulsores de cada una de las fases de los procesos de valorización desde diferentes perspectivas (financiera, organizacional, del conocimiento, institucional, de la cadena de valor y del mercado). Finalmente, se han identificado las seis posibles cadenas de valorización de los residuos orgánicos producidos en el sistema de producción de hortalizas bajo invernadero en Almería, los respectivos actores clave de cada una de las fases de las cadenas de valorización y las diferentes interconexiones posibles entre ellos.

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

RUSTICA

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#6

PRACTICE ABSTRACT

BBF VALUE CHAINS ALMERIA

Results RUSTICA external stakeholder workshop 2 - Almeria

CONTEXT

On the 15th June 2022, TECNOVA organised the second RUSTICA external multi-stakeholder workshop for the Almeria region. 12 Participants attended involved in different parts of the bio-based fertilisers (BBFs) value chain including farmers, farmers associations, agronomy advisors, waste management companies and BBFs producer companies.

PROBLEM

The key actors involved in the possible value chains are diverse and were not always interconnected. Different processes, activities and support services are involved in the value chain of organic wastes, and make its implementation complex. Different points of view about barriers and promoters associated to each group of actors involved in the value chains and to its phases, can make more difficult the value chain implementation. Ideal possible value chains are different for each region. Local key actors are the appropriate stakeholders to identify the ideal and possible value chains for each specific region.

SOLUTION

The second regional RUSTICA stakeholder workshop connected key actors involved in different phases of organic waste value chains. Their opinions have been crucial to identify the key market players, processes & activities and support services of possible valorisation processes to be implemented in Almeria, the main barriers and promoters associated to each group of actors involved in the organic waste valorisation chains and, the six ideal valorisation chains to be implemented in Almeria. Project advances and preliminary results have been shared and discussed with the stakeholders during the workshops.

OUTCOME

1. Valorisation map of the value chain of organic wastes produced by the vegetable production system under greenhouse of Almeria.
2. List of barriers and promoters of each phase of the value chains from different perspectives (financial, organisational, knowledge, institutional, supply chain and market).
3. Six possible ideal value chains to valorise the organic wastes produced by the vegetable production system under greenhouse of Almeria, with the identification of the respective key players for each phase of the valorisation chains and the different possible interlinks between the different key market players.

PRACTICAL RECOMMENDATIONS

- Waste collection should be improved taking into consideration all the different waste producers (farmers and consumers).
- It should be practical to organise central services such as waste storage stations and waste pre-treatment companies before beginning the waste processing phase.
- It is necessary the creation and the implementation of a database of available organic wastes updated at real time, indicating its location, volume and main characteristics, as a tool for BBFs producer companies to plan the annual BBFs production.
- The legal framework must be updated periodically taking into account novel valorisation technologies.
- Formation activities should be organised to specialise the technical staff of BBFs companies about different protocols of management and application of BBFs.

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

RUSTICA

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#7

PRACTICE ABSTRACT

BBF VALUE CHAINS FRIULI-VENEZIA GIULIA

Results RUSTICA external stakeholder workshop 2 - Friuli-Venezia Giulia

SHORT SUMMARY FOR PRACTITIONERS

EN version

The second round of RUSTICA workshops was organised in June 2022. In the Friuli-Venezia Giulia region, 21 people attended the workshop, 13 of them stakeholders from different categories (associations, policy makers, farmers, technology providers...). All participants were brought together to discuss potential value chains for the development of innovative bio-based fertilisers (BBFs).

The value chain mapping revealed that waste collection companies and organisations are recognised as key players in the Friuli-Venezia Giulia BBFs value chain for both waste collection and waste treatment. The most frequently used sales and distribution channels are identified mainly in fertiliser distributors, cooperatives, garden centres, buying groups and farm shop associations. With regard to the end-user of BBFs, in addition to farmers, other actors were mentioned, such as hobby farmers, horticulturists, private citizens and public sports and recreational parks. It also emerged from the meeting that citizens' associations or communities can play multiple roles in the value chain, as regional legislation supports citizens' associations in order to foster the sustainable use of resources, environmental protection and the promotion of community recycling of organic waste. At the supply chain level, important support services are considered to be those related to waste production and collection, the promotion of better waste recycling and sorting, and environmental education, including through information campaigns. These activities are carried out by environmental associations, regional environmental agencies, universities and research centres, and policy makers.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

Il secondo ciclo dei workshop RUSTICA è stato organizzato nel giugno 2022. In Friuli Venezia Giulia hanno partecipato al workshop 21 persone, di cui 13 stakeholder di diverse categorie (associazioni, responsabili politici, aziende agricole, fornitori di tecnologie...). Tutti i partecipanti sono stati riuniti per discutere le potenziali catene di valore per lo sviluppo di fertilizzanti innovativi a base biologica (FBB). La mappatura della catena del valore ha rivelato che le aziende e le organizzazioni che si occupano della raccolta dei rifiuti sono riconosciute come attori chiave nella catena del valore regionale dei FBB sia per la raccolta che per il trattamento dei rifiuti. I canali di vendita e distribuzione più utilizzati sono identificati principalmente nei distributori di fertilizzanti, nelle cooperative, nei centri di giardinaggio, nei gruppi di acquisto e nelle associazioni di negozi agricoli. Per quanto riguarda l'utilizzatore finale dei FBB, oltre agli agricoltori, sono stati citati altri attori, come hobbisti, orticoltori, privati cittadini e parchi pubblici sportivi e ricreativi. Dall'incontro è emerso anche che un attore che può svolgere molteplici ruoli nella catena del valore è rappresentato dalle associazioni dei cittadini o dalle comunità, in quanto la legislazione regionale sostiene le associazioni di cittadini che promuovono l'uso sostenibile delle risorse, la tutela dell'ambiente e il riciclo comunitario dei rifiuti organici. A livello di filiera, sono considerati servizi di supporto importanti quelli relativi alla produzione e alla raccolta dei rifiuti, alla promozione di un migliore riciclaggio e selezione dei rifiuti e all'educazione ambientale, anche attraverso campagne informative. Queste attività sono svolte da associazioni ambientali, agenzie regionali per l'ambiente, università e centri di ricerca e decisori politici.

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

RUSTICA

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#7

PRACTICE ABSTRACT

BBF VALUE CHAINS FRIULI-VENEZIA GIULIA

Results RUSTICA external stakeholder workshop 2 - Friuli-Venezia Giulia

CONTEXT

Residues and waste streams from the fruit and vegetable agri-food system can be used as fertiliser resources by employing innovative soil improvement production technologies. This can stimulate the development of sustainable alternatives to mineral fertilisers, since the result of the development of these technologies can be a valuable bio-based fertiliser (BBF) tailored to regional needs.

PROBLEM

Questions remain on the establishment of regional value chains and business models centred around these technologies. It is necessary to map the current value chain in order to understand each regional context before processing on potential new BBFs value chains and business models.

SOLUTION

In June 2022, the second regional RUSTICA-workshop was organised in Friuli-Venezia Giulia: in a first excercise, the regional bio-based fertiliser value chains were mapped. In a second excercise, barriers and drivers towards BBF-technology investment were identified. Finally, potential circular value chain configurations were designed.

OUTCOME

1. Farmers: the difficulty is represented by the cost of the technology, the lack of knowledge about technology and the quality of the end products, together with the lack of sufficient wastes as the small size of the farms involved in the horticultural sector does not guarantee a sufficient amount of waste.
2. Farmers cooperatives: the value chain would benefit from limited legislative burdens and the fact that the farmers of the cooperative are both the providers of wastes, and the users of fertilisers would avoid problems related to logistic and the establishment of a supply chain. Moreover, farmer cooperatives have a greater potential for investment in the technologies and could implement the more sophisticated technologies.
3. Waste management companies: this configuration is more complex and it is focused on the intermunicipal waste management company as the main actor responsible for the waste treatment and fertiliser formulation. An important driver for the implementation of this configuration is the production of high-quality fertilisers characterised by a marketable value.
4. Waste management companies and fertiliser producers: it is very similar to the previous one, the only difference is related to the stage of fertiliser preparation and blending which is carried out by a fertiliser company. This configuration takes advantage of the structure and technologies of the company to fulfill this task. At present the main obstacles for this value chain are the willingness of waste company to invest in the new technologies and the lack of fertiliser industry in the region that would imply the need to transport the BBF building blocks out of the region for the fertiliser final formulation.

PRACTICAL RECOMMENDATIONS

- Stakeholders believe that negative public perception of the waste treatment plants can have significant consequences on the development of the BBF technologies.
- Stakeholders generally agreed that the best approach to implement new bio-based fertiliser value chains is to build on existing networks and business models.

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

RUSTICA

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#8

PRACTICE ABSTRACT

BBF VALUE CHAINS FLANDERS

Results RUSTICA external stakeholder workshop 2 - Flanders

SHORT SUMMARY FOR PRACTITIONERS

EN version

The development and implementation of RUSTICA bio-based fertiliSer (RBBF) production technologies contributes to the provision of sustainable alternatives to mineral fertiliSers. However, questions remain on the establishment of viable regional value chains and business models. In May and June 2022, the second round of RUSTICA-workshops were organised in the 5 partnering regions. In all of these regions, stakeholders from the agri-food, fertiliser and waste treatment sector were brought together to discuss potential value chains for innovative bio-based fertilisers.

In all regions, the value chain mapping revealed that some actors carry out multiple stages of the value chain. Similar actors were identified as potential adopters of RBBF-technologies. Stakeholders agreed that small waste producers such as farmers would not be interested in adopting RBBF-technologies given organisational barriers such as lack of infrastructure and time. High energy and mineral fertiliser prices were identified as a great opportunity for bio-based fertilisers, while complexity of legislation was considered a critical threat. Finally, stakeholders generally agreed that the best approach to implement new bio-based fertiliser value chains is to build on existing networks and business models.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

De ontwikkeling en toepassing van RUSTICA biogebaseerde meststoffen (RBBF) technologieën draagt bij tot het verschaffen van duurzame alternatieven voor minerale meststoffen. Er blijven echter vragen over de totstandbrenging van adequate regionale waardeketens en bedrijfsmodellen. In mei en juni 2022 werd de tweede ronde van RUSTICA-workshops georganiseerd in de 5 partnerregio's. Belanghebbenden uit de agrovoedingssector, de meststoffensector en de afvalverwerkingssector werden samengebracht om potentiële waardeketens voor innovatieve biogebaseerde meststoffen te bespreken.

In alle regio's bleek uit het in kaart brengen van de waardeketen dat sommige actoren meerdere activiteiten van de waardeketen uitvoeren. Soortgelijke actoren werden geïdentificeerd als potentiële adopters van de RBBF-technologieën. De belanghebbenden waren het erover eens dat kleine afvalproducenten zoals landbouwers niet geïnteresseerd zouden zijn in het invoeren van RBBF-technologieën gezien organisatorische belemmeringen zoals gebrek aan infrastructuur en tijd. De hoge energie- en minerale meststoffenprijzen werden beschouwd als een grote kans voor biogebaseerde meststoffen, terwijl de complexiteit van de wetgeving als een belangrijke barrière werd beschouwd. Tot slot waren de belanghebbenden het erover eens dat de beste aanpak om nieuwe waardeketens te implementeren, is om voort te bouwen op bestaande netwerken en bedrijfsmodellen.

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

RUSTICA

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#8

PRACTICE ABSTRACT

BBF VALUE CHAINS FLANDERS

Results RUSTICA external stakeholder workshop 2 - Flanders

CONTEXT

Residues and waste streams from the fruit and vegetable agri-food system can be used as fertiliser resources by employing innovative soil improvement production technologies. This can stimulate the development of sustainable alternatives to mineral fertilisers, since the result of the development of these technologies can be a valuable bio-based fertiliser (BBF) tailored to regional needs.

PROBLEM

Questions remain on the establishment of regional value chains and business models centred around these technologies. It is necessary to map the current value chain in order to understand each regional context before elaborating on potential new BBF value chains and business models.

SOLUTION

In May and June 2022, the second regional RUSTICA-workshops were organised in the 5 partnering regions: Flanders, Friuli-Venezia Giulia, Almería, Pays de la Loire and Valle del Cauca. In a first excercise, the regional bio-based fertiliser value chains were mapped. In a second excercise, barriers and drivers towards BBF-technology investment were identified. Finally, potential circular value chain configurations were designed.

OUTCOME

1. In all regions, the value chain maping revealed that some actors carry out multiple stages of the value chain at once, such as waste production and treatment. Additionally, similar potential adopters of innovative BBF-technologies were identified: either individual adopters such as waste management companies or fertiliser producers, or adopting networks of waste producers or technology providers.
2. Stakeholders agreed that small waste producers such as farmers would not be as interested in adopting the BBF-technologies as waste collectors, processors or fertiliser producers. They stressed the importance of organisational barriers such as lack of infrastructure and time. Additionally, stakeholders considered the high energy and mineral fertiliser prices as a great opportunity for bio-based fertilisers, while they considered complexity of legislation as a critical threat.
3. Across regions, all stakeholders agreed that it would be easier to build on existing networks and business models such as well-organised collection systems.

PRACTICAL RECOMMENDATIONS

- Small waste producers should not be targeted as key operating actors for complex waste conversion technologies given knowledge barriers and organisational hurdles such as lack of infrastructure and time.
- Key hurdles to be overcome include the complexity of legislation and the logistic difficulties of cooperation between actors.
- To build regional bio-based value chains and business models, it is most feasible to build on existing systems of waste collection and fertiliser production. These existing systems are different across regions. Therefore, value chains and business models can differ regionally.

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

RUSTICA

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#9

PRACTICE ABSTRACT

BBF VALUE CHAINS PAYS DE LA LOIRE

Results RUSTICA external stakeholder workshop 2 - Pays de la Loire

SHORT SUMMARY FOR PRACTITIONERS

EN version

The second regional multi-stakeholder RUSTICA workshop for the Pays de la Loire region (France) was held on June 16, 2022 in Angers, with 19 participants. Everyone was involved in the different steps of the value chain of the bio-based fertilisers (BBF). This workshop aimed to communicate about the H2020 RUSTICA project: blends of future BBFs and regional needs, regulation at different levels for BBFs. It aimed to exchange with technological partners to understand better the processes and validating the stakeholders' regional value-chain map concerned by BBFs that was build previously. It also aimed to analyse in detail the boundaries and measures that can encourage investment in RUSTICA technologies by different actors (farmers, cooperatives, companies…). Finally, the stakeholders had to discuss on different configurations depending the actors of the value chain who would be able to do the waste treatment process. As results, the main configuration voted was where both fertiliser and waste treatment companies are the ones integrating RUSTICA technologies and processes. Nevertheless, a single company should not install all the 5 technologies on its site because of the cost. The RUSTICA technologies should be installed throughout the region.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

Le deuxième atelier régional multi-acteurs RUSTICA pour la région Pays de la Loire (France) s'est tenu le 16 juin 2022 à Angers, avec 19 participants. Tous étaient impliqués dans les différentes étapes de la chaîne de valeur des engrais biosourcés (BBF). Cet atelier avait pour objectif de communiquer sur le projet H2020 RUSTICA: les mélanges des futurs engrais bio-sourcés et les besoins régionaux, les réglementations autour des engrais bio-sourcés. L'objectif était également d'échanger avec les partenaires technologiques pour mieux comprendre les processus et validation de la carte de la chaîne de valeur régionale des acteurs concernés par les BBF qui a été construite précédemment. Il s'agissait également d'analyser en détail les freins et les leviers qui peuvent encourager l'investissement dans les technologies RUSTICA par les différents acteurs (agriculteurs, coopératives, entreprises...). Enfin, les parties prenantes devaient discuter de différentes configurations possibles selon les acteurs de la chaîne de valeur pouvant travailler sur le traitement des déchets et les process RUSTICA. La configuration choisie par l'ensemble des parties prenantes était celle où les fabricants des engrais et les entreprises de traitement de déchets sont les acteurs qui seraient à même de s'approprier ses technologies. Néanmoins, une seule entreprise ne devrait pas installer les 5 technologies sur son site en raison de leur coût. Les technologies RUSTICA devraient être installées dans toute la région.

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

#9

PRACTICE ABSTRACT

BBF VALUE CHAINS PAYS DE LA LOIRE

Results RUSTICA external stakeholder workshop 2 - Pays de la Loire

CONTEXT

On the 21th October 2021, The Chamber of Agriculture of Pays de la Loire Region (CAPDL) organized the first RUSTICA external multi-stakeholder workshop for the Pays de la Loire region in France. There were 19 attendees involved in different parts of the bio-based fertilizers (BBFs) value chain including research organizations, farmers associations, waste management company, regional agencies, environmental associations, agronomy advisors and policy makers.

PROBLEM

The bio-based fertiliser value chain to make progress in the development of BBFs is in need of a better knowledge about regional fruit and vegetable production, enhanced connection among stakeholders, more insights on desirable properties of BBFs and potential customer demand, identification of most important factors favoring BBFs production and use.

SOLUTION

Regional RUSTICA stakeholder workshops connect stakeholders and project partners related to different parts in the bio-based fertiliser value chain. The workshop setting is used to explore and discuss questions on matching BBF blends with crops needs, but also on RUSTICA technologies and processes, identification of most relevant actors of the value chain who will integrate these processes.

OUTCOME

1. In Pays de la Loire region, needs in fertiliser blends are different depending on the target production. In viticulture, farmers would need BBFs with a slow release of nutrients, increasing soil organic matter and soil carbon storage. For other crops such as vegetables, BBFs have to release nutrients for 4 to 6 weeks after application. These BBFs would have to stimulate soil life, but also ensure crop protection, soil biodiversity, and limite nitrate leaching and GHG emissions. Concerning the soil amendment, the future BBFs developped would have to get positive effect on soil resilience, crop protection and environmental parameters. Moreover, in Pays de la Loire, there is real demand on a liquid BBF due to the importance of soilless production in the region (for vegetables in particular).
2. Validation of stakeholders' roles in Pays de la Loire region.
3. Vote for the most relevant configuration in the value chain : fertiliser and waste treatment companies would be the best actor to integrate RUSTICA processes and be mainly involved in the BBFs production. These companies would be the more relevant actors to invest in RUSTICA technologies, without centralising all of them at the same place.

PRACTICAL RECOMMENDATIONS

- Need to obtain more precise and detailed information on the IPR and commercialisation of RUSTICA technologies
- It is essential to achieve the economic and environmental sustainability of the value chain.
- Fertilisers and waste treatment companies seems to be the most relavant actor for investing in RUSTICA technologies, as it is too risky and difficult for farmers and cooperatives.

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

RUSTICA

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#10

PRACTICE ABSTRACT

BBF VALUE CHAINS VALLE DEL CAUCA

Results RUSTICA external stakeholder workshop 2 - Valle del Cauca

SHORT SUMMARY FOR PRACTITIONERS

EN version

In May 2022, the second RUSTICA multi-stakeholder workshop for the Valle del Cauca region took place. 19 people involved in different parts of the bio-based fertiliser (BBF) value chain attended. The goals of the workshop were to connect with stakeholders in the different parts of the organic fertiliser value chain, to present an update on the project, to identify other actors to be involved in and to receive feedback on the value chain proposed structure and future scenarios for new bio-based fertilisers and related market issues, both upstream and downstream.

Outcomes of the workshop entailed: main barriers, drivers and opportunities for improvement, missing actors and activities required to improve the value chain. A map of actors involved in the value chain was obtained, providing a glimpse of the links in the chain influenced by different organizations represented at the event.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

En mayo del 2022 se realizó el segundo taller de RUSTICA para la región del Valle del Cauca. Asistieron 19ersonas involucradas en diferentes partes de la cadena de valor de los fertilizantes de base biológica (BBF). Los objetivos del taller fueron: Conectar con actores interesados en las diferentes partes de la cadena de valor de los fertilizantes orgánicos; presentar los avances del proyecto, obtener una visión clara de a quién más se debe involucrar en el proyecto RUSTICA para lograr sus objetivos y recibir comentarios de los actores interesados sobre escenarios futuros para nuevos fertilizantes de base biológica y cuestiones relacionadas con el mercado, tanto en sentido ascendente como descendente.

Los resultados del taller incluyen la identificación de las principales barreras, dinamizadores y oportunidades de mejora, actores ausentes y actividades necesarias para mejorar la cadena de valor. Se obtuvo un mapa de los actores implicados en la cadena de valor, lo que permite vislumbrar los eslabones de la cadena en los que influyen las diferentes organizaciones representadas en el evento.

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

RUSTICA

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#10

PRACTICE ABSTRACT

BBF VALUE CHAINS VALLE DEL CAUCA

Results RUSTICA external stakeholder workshop 2 - Valle del Cauca

CONTEXT

On May 27th 2022, the Alliance Bioversity-CIAT organised the second RUSTICA external multi-stakeholder workshop for the Valle del Cauca region with 19 attendees involved in different parts of the bio-based fertiliser (BBF) value chain including farmers associations, fertiliser companies, technology providers, academia, research organisations and the regional food supply center

PROBLEM

The Valle del Cauca bio-based fertiliser value chain presents external and internal factors, that, influence its production and diffusion. There is a need to better understand these features to find solutions for the progressive development of BBF in the region as well as the actors involved and their role.

SOLUTION

Regional RUSTICA stakeholder workshops connect stakeholders and project partners related to different parts in the bio-based fertiliser value chain. This time, this setting was used to identify main barriers, drivers and opportunities for improvement, missing actors and activities that may have an impact on the development of the bio-based fertilisers value chain.

OUTCOMES

1. A map of actors (participating in RUSTICA) within the BBF value chain, providing information about existing interactions among them, the role each actor plays in each link and the activities they consider necessary for the proper functioning of the chain.

2. In-depht reflection of stakeholders on the Valle del Cauca market context for future BBF development around main barriers and drivers from markets, food supply, institutions, finances and laws.

3. An "implementation traffic light" showing progress in implementing chain activities to improve enabling conditions like waste collection, adequate transportation, selective route, process and product certification.

4. A list of the opportunities for chain improvement, the challenges to overcome and the potential benefits derived from strengthening the linkage, from the perspective of the workshop participants

PRACTICAL RECOMMENDATIONS

- Strengthen stakeholder platforms or networks.
- Coordination with other chains (intersectoral work).
- Promote and certify traditional knowledge.
- Generate more opportunities through associativity
- During future workshops, stakeholders suggested to provide more details on technological methods in RUSTICA and market data.

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

RUS TI CA

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#11

PRACTICE ABSTRACT

REGIONAL BUSINESS SHEETS

Regional business sheets

SHORT SUMMARY FOR PRACTITIONERS

EN version

For Flanders, Friuli-Venezia GiuliA, Almeria, Pays de la Loire and Valle del Cauca, a market and business prefeasibility about the RUSTICA bio-based fertilisers (RBBFs) was carried out. The essentiality of RBBFs is the circular valorisation of vegetable - and fruit waste streams into fertilisers using five technologies for upgrading vegetable and fruit waste streams to building blocks of RBBFs. A successful regional implementation of RBBFs depends on:

- Availability and quality of vegetable and fruit waste
- Feasibility for regional adoption of RUSTICA technologies
- Feasibility for regional acceptance of RBBFs by agricultural segments
- Feasibility for business-wise embedding of the RUSTICA BBF value chain

To realise an evaluation a questionnaire was completed at regional RUSTICA workshops and using other sources. This information was processed via a SWOT- and a DESTEP-environmental analysis, summarised and visualised in business data sheets as input for regional workshops and discussions, and will be further elaborated by regional expertise and recent information.

A few observations: acceptance of RBBF by farmers still needs to be explored. This also applies to the extent to which ecosystem services such as climate-resilient agriculture, reduction of GHG emissions and CO_2 capture are seen as relevant. Most promising markets for RBBFs seem to be the biological/organic segment, and farmers in transition to more ecological impact. The forming of a value chain RBBF is essential for business implementation knowing that vegetable and fruit waste management in itself is hardly profitable.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

Voor Vlaanderen, Friuli-Venezia Giulia, Almeria, Pays de la Loire en Valle del Cauca is een markt- en bedrijfshaalbaarheid m.b.t. RUSTICA biogebaseerde meststoffen (RBBFs) uitgevoerd. De essentie van RBBFs is de circulaire valorisatie van groente- en fruitreststromen tot meststoffen d.m.v. vijf technologieën voor het opwaarderen van groente- en fruitreststromen tot bouwstenen van RBBFs. Een succesvolle regionale implementatie van RBBFs hangt af van:

- Beschikbaarheid en kwaliteit van groente- en fruitafval
- Haalbaarheid voor adoptie van RUSTICA-technologieën
- Haalbare acceptatie van RBBFs door agrarische segmenten
- Haalbare bedrijfsmatige inbedding van de RUSTICA RBBF-waardeketen

Ter evaluatie is een vragenlijst ingevuld tijdens regionale RUSTICA-workshops en m.b.v. van andere bronnen. Via een SWOT- en een DESTEP-omgevingsanalyse is deze info verwerkt, samengevat en gevisualiseerd in business sheets als input voor regionale workshops en discussies, en zal verder worden uitgewerkt door regionale expertise en m.b.v. recente informatie.

Algemene observaties: acceptatie van RBBF door eindgebruikers moet nog onderzocht worden. Dat geldt ook voor de mate waarin ecosysteemdiensten als klimaatbestendige landbouw, reductie van broeikasgasemissies en CO_2-opslag als relevant worden gezien. De meest veelbelovende markten voor RBBFs lijken het biologische segment te zijn, en boeren in de overgang naar meer ecologische impact. Het vormen van een waardeketen RBBF is essentieel voor de bedrijfsimplementatie, wetende dat het beheer van groente- en fruitafval op zich nauwelijks winstgevend is.

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RUSTICA

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#11

PRACTICE ABSTRACT

REGIONAL BUSINESS SHEETS

Regional business sheets

CONTEXT

RUSTICA's ambition to develop circular plant-based fertilisers must be implemented in the 5 regions. Every region is different and therefore there is a need for a start-feasibility sketch per region.

PROBLEM

The challenge is to develop technologies and knowledge centrally in RUSTICA and to color and implement this regionally. From the start, the central process must be fed with regional information in order to monitor technical and economic feasibility. That is why an initial business profile per region was created in the beginning.

APPROACH

To streamline the collection of regional information, a questionnaire has been developed as an instrument for the workshops. The required information concerns the availability of suitable waste streams, the presence of relevant technologies, the profile of regional agriculture, and horticulture, key crops, regional legislation, other relevant regional special features and the willingsness to innovate or to change of the farmers.

OUTCOME

1. The open and protected soil-bound food horticulture of the regional agricultural is apparently a good choice to start the RBBF market intro because valorisation of RBBFs added value in that market.
2. The farmer as a producer of plant material and as a user of plant-based RBBF should be in the business consortium.
3. The quantities of suitable vegetable waste streams are not yet large enough for large-scale production, partly due to quality, competition or unfamiliarity.
4. For regional specific outcome is referred to that specific business sheet.

PRACTICAL RECOMMENDATIONS

- Be aware: The business implementation and realisation of the RBBF concept requires a multi-actor approach in which the initial focus on knowledge and technology shifts to business development and organisation
- Legislation is changing, so what is not allowed today may be allowed tomorrow. Multi-year product and business forecast is also important for that reason.

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RUSTICA

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#12

PRACTICE ABSTRACT

EU LEGAL ASPECTS

From the European Point of View: Legal Aspects of RUSTICA

SHORT SUMMARY FOR PRACTITIONERS

EN version

The RUSTICA project strives for novel solutions towards optimal plant nutrition and soil quality. At the same time, tremendous efforts are undertaken in policy and lawmaking to pave the way for new products towards sustainability in agriculture. In the EU, the new Fertilising Products Regulation (EU)2019/1009 repeals its predecessor mainly covering inorganic fertilisers and presents new options for developing circular fertiliser models. Taking into account inter alia waste and by-products for component materials, valorisation routes via compost and anaerobic digestion are mainly reflected in the new legal instrument. Rules on contaminants are thoroughly defined towards protecting humans and the environment.

On the other hand, considering RUSTICA and its technologies, comprehensive stipulations on animal by-products are quite missing in the new EU Regulation on fertilising products at the moment. Furthermore, certain restrictions apply to the use of waste and by-products for some component materials. As such, producing a specific fertiliser material requires a thorough verification of the feedstock under use, the required processing steps and the final destination by means of product function.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

Das RUSTICA-Projekt strebt nach neuartigen Lösungen für eine optimale Pflanzenernährung und Bodenqualität. Gleichzeitig werden in Politik und Gesetzgebung enorme Anstrengungen unternommen, um neuen Produkten den Weg in Richtung Nachhaltigkeit in der Landwirtschaft zu ebnen. In der EU hebt die neue Düngemittelverordnung (EU) 2019/1009 ihre Vorgängerin auf, die hauptsächlich anorganische Düngemittel abdeckte, und bietet neue Optionen für die Entwicklung von zirkulären Düngemodellen. Unter Berücksichtigung von unter anderem Abfällen und Nebenprodukten als Ausgangsstoffe spiegeln sich hauptsächlich Verwertungswege über Kompost und anaerobe Vergärung im neuen Rechtsinstrument wider. Vorschriften zu Schadstoffen sind zum Schutz von Mensch und Umwelt sorgfältig definiert.

Andererseits fehlen in Anbetracht von RUSTICA und seinen Technologien in der neuen EU-Verordnung für Düngemittelprodukte derzeit umfassende Bestimmungen zu tierischen Nebenprodukten. Darüber hinaus gelten für einige Komponentenmaterialien bestimmte Einschränkungen für die Verwendung von Abfällen und Nebenprodukten. Daher erfordert die Herstellung eines bestimmten Düngemittels eine gründliche Überprüfung des verwendeten Ausgangsmaterials, der erforderlichen Verarbeitungsschritte und der endgültigen Verwendung anhand der Produktfunktion.

RUSTICA

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

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#12

PRACTICE ABSTRACT

EU Legal Aspects

From the European Point of View: Legal Aspects of RUSTICA

CONTEXT

Hitherto, a huge amount of leftovers from fruit and vegetable production, processes and distribution containing valuable nutrient substances is either not available for circular fertilising products or optimal valorisation technologies are not yet developed. This untapped potential can be harnessed for innovative value chains and fertilising materiials in the EU and beyond.

PROBLEM

Even though a broad gate has recently been opened by EU legislation on fertilising products resulting from waste and by-products, there are still issues to be discussed, such as the missing of final conditions on the use of animal by-products and limitations of waste-based input to certain types of component materials.

SOLUTION

The RUSTICA project thoroughly analyses legal aspects concerning its feedstocks, methods of manufacture, and final products. It identifies not only current legal barriers and stimuli but also opportunities and future developments for its five main technologies. Results are documented and forwarded to policy makers and institutions responsible for lawmaking procedures. The scope of the first assessment includes international agreements and EU secondary law affecting the RUSTICA scheme.

OUTCOME

1. A detailed and publicly available report (D3.2) on international policy and agreements with focus on EU and Colombia, as well as further EU legislation on the options and constraints of RUSTICA developments
2. A dedicated summary on major criteria in EU legislation relevant for stakeholders and marketing of the new technologies
3. A set of articles on the project website informing professional and private audience on specific legal highlights and challenges of RUSTICA value chains.

PRACTICAL RECOMMENDATIONS

- It is necessary to evaluate the feedstocks and precursors of fertilising products and their legal options for the individual value chains.
- It is necessary to verify the processing methods and compare them with legal requirements.
- It is necessary to assess contents, such as nutrient values, contaminants and pollutants of the fertilising products in terms of compliance with legislation.
- It is necessary to investigate the pecularities of fertiliser mixtures and blends and their positions in legal frameworks.
- It is necessary to refer to legal sources addressing environmental issues, e.g., water (nitrate), energy and GHG emissions relating to fertiliser application.

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

RUSTICA

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#13

PRACTICE ABSTRACT

TECHNICAL REPORT CAP

Nutrient release potential from fruit and vegetable waste using a Carboxylic Acid Platform

SHORT SUMMARY FOR PRACTITIONERS

EN version

The RUSTICA project aims to develop an adaptable, ecofriendly bio-based fertiliser. This fertiliser will consist out of 6 different building blocks, each with their own specific properties. These building blocks will be produced by 5 ecofriendly technologies. Furthermore, these building blocks will be derived from agricultural side streams. This to upcycle otherwise unused side streams and bringing back nutrients to the soil.

DRANCO nv developed the Carboxylic Acid Platform (CAP): a new adaptable process based on anaerobic fermentation technology. Using the CAP, a nutrient- and carboxylic acid rich solution can be derived from all types of organic waste streams. Within the first stage of the RUSTICA project, all parameters involved in this process were tested with the goal to find an optimal set of parameters which can convert organic waste streams, derived from agriculture, into a CAP solution with a carboxylic acid spectrum which is rich in nutrients and has an organic fraction, which can easily be converted in useful building blocks by other (RUSTICA) technologies.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

The RUSTICA project aims to develop an adaptable, ecofriendly bio-based fertiliser. This fertiliser will consist out of 6 different building blocks, each with their own specific properties. These building blocks will be produced by 5 ecofriendly technologies. Furthermore, these building blocks will be derived from agricultural side streams. This to upcycle otherwise unused side streams and bringing back nutrients to the soil.

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

RUSTICA

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rusticaproject.eu

#13

PRACTICE ABSTRACT

TECHNICAL REPORT CAP

Nutrient release potential from fruit and vegetable waste using a carboxylic acid platform

CONTEXT

One of the 5 technologies is the Carboxylic Acid Platform (CAP), an anaerobic fermentation process which allows the conversion of organic materials like fruit and vegetable waste into a nutrient and carboxylic acid rich solution. This solution can than be used to separate the nutrients or as a starting material to produce microbial proteins, a building block which boost microbial diversity and activity in the soil.

PROBLEM

Different agricultural side streams have different proportions and nutrient contents. Furthermore, the RUSTICA technology CAP is rather new, and the quality of the produced CAP solution can vary depending on the type of fruit and vegetable waste used. The suitability of the agricultural side streams for the CAP process needs to be tested and the most optimal conditions optimal for the CAP process, which depend on the used substrate, should be determined.

SOLUTION

DRANCO nv developed lab scale test to determine the feasibility different organic substrates to be converted into CAP solution. Over 25 different agricultural side streams, derived from different regions in Europe and one region in Columbia, were tested. Furthermore, these tests were modified allowing to test the effect of different operational parameters on the CAP process. For the most promising substrates, continuous tests were set up, allowing to optimise the CAP process and stabilise the qualitative of the CAP solution.

OUTCOME

1. Over 25 different agricultural waste streams, from all over Europe and one region from Columbia, were tested.
2. The final composition of the CAP-solution strongly depends on the type of fruit and vegetable waste used.
3. Pre-fermented substrates are less feasible
4. Optimal pH and temperature ranges were determined
5. Optimal continuous parameters were determined
6. The CAP process was optimised

PRACTICAL RECOMMENDATIONS

- Homogeneous side streams give more stable results. When using heterogenous substrates, the quantities should be high to reduce batch variations.
- Pre-fermented substrates lost a lot of their nutrient value and should be avoided.
- The optimal parameters for the CAP process should be adjusted depending on the substrate used and on the technologies which will convert the CAP solution.

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

RUSTICA

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#14

PRACTICE ABSTRACT

TECHNICAL REPORT BIOCHAR

Biochar production from dry bio-residues as bio-fertiliser ingredient

SHORT SUMMARY FOR PRACTITIONERS

EN version

TNO was concerned with the production of biochar as one of the building blocks of the RUSTICA fertiliser mix. The technological process involves the heating of bio-residues to temperatures in the range 350-650°C, and for a period of 30 to 60 minutes. Heating is under oxygen-deficient concentrations and thus called gasification. Approximately 20-30% of the bio-residue is maintained as a very porous, carbon-rich product that is defined as biochar. The gasses released form a burnable gas that can replace natural gas in bio-energy generation. Quality of the biochars is essential for the use in a fertiliser and hereby we follow the guidelines of the European Biochar Certificate (EBC).
In total 18 biochars were produced from 15 different bio-residue feedstock. Three biochars were produced at low temperatures which potentially can be used as a slow-release fertiliser and will show faster decay than the biochars produced at the higher temperatures. However, the 350°C biochars did not comply with the EBC requirement of >50% carbon. As a result, it was decided to focus on the higher temperature production condition, at 650°C. High quality biochars were produced that can be a light-weight and structural element in the fertiliser mix as well as a form of carbon sequestration due to its very high stability.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

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

RUSTICA

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#14

PRACTICE ABSTRACT

TECHNICAL REPORT BIOCHAR

Biochar production from dry bio-residues as bio-fertiliser ingredient

CONTEXT

The overall objective of the RUSTICA project is the technical validation, demonstration and implementation of bio-based fertiliser and soil improvement production techniques. Input streams are residues from the fruit and vegetable production. The bio-fertiliser thereby closes the nutrient cycles.

WHY BIOCHAR?

The woody type- and dryer plant residue materials can be composted at a relatively slow rate, transformed into bio-energy, or alternatively as done for RUSTICA, used to combine the production of biochar plus bio-energy. Biochar is a very porous and light-weight carbon product that has a number of advantages. In soil, the biochar provides good structural component qualities, such as air and water access. In addition, the very stable biochars also provide a form of carbon sequestration and have been shown to adsorb organic matter, increase micro-aggregate formation and thus fighting climate change while improving agricultural soils.

APPROACH

In total 18 type of bio-residues from 4 different regions, were converted in biochar and bio-energy at TNO in a lab-scale screw feeder reactor under slow-gasification conditions. Temperatures used were between 350-650°C and the residence time were 30-60 minutes. The biochars produced were all analysed to make sure that quality was excellent, following the European Biochar Certificate (EBC) guidelines. Material was sent back to consortium partners for pot trails and lessons learnt are being taking to upscaling the biochar production in the ENERCHAR pilot for future field trials.

OUTCOME

1. The three lower temperature (350°C) biochars, being less stable, can be used as a slow release fertiliser. However, these biochars did not comply with the EBC guidelines which requires a carbon content >50%.
2. It was decided then to use the higher temperature (650°C) conditions. A high ash content in the biochar was associated with a high salt and relatively low carbon content due to fertigation schemes for all greenhouse residues. Biochar qualities, however, were all excellent.
3. In order to come to a mixing procedure for the different regions, the biochars were grouped according to the ash and salts content in low, intermediate and high concentrations. Biochars can then be exchanged, depending on availability. E.g. Apple/Pear- versus Almond tree clippings.

PRACTICAL RECOMMENDATIONS

- It is recommendated to use the biochar in the fertiliser mix as a light-weight structural material providing air and water access in soil.
- It is recommended to group the biochars according to the ash content which can directly be related to the fertigation scheme.
- Of the highly fertigated bio-residues it is recommendated to use only 10-20% in combination with woody clippings to avoid high salt concentrations.
- In case of other high-nutrient streams to be used in the mixture, it is adviced to only use woody-sources for the biochar.

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

RUSTICA

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#15

PRACTICE ABSTRACT

TECHNICAL REPORT MICROBIAL BIOMASS

Conversion of CAP-effluent to microbial biomass

SHORT SUMMARY FOR PRACTITIONERS

EN version

The RUSTICA project aims to develop an adaptable, eco-friendly bio-based fertiliser from agricultural side streams, in this way upcycling unused bio waste and increasing the recovery of valuable nutrients. This fertiliser will consist of different building blocks, each with their own specific properties, and will be produced by 5 innovative technologies. One of these technology providers is Avecom.
In the context of the RUSTICA project, Avecom assessed the feasibility of the production of Microbial Protein (MP) from pretreated biowaste or CAP solutions (Carboxylic Acid Platform). The CAP-solutions are produced by DRANCO NV by anaerobically digesting the organic residues. In the following MP production process, the carbon and nutrients in the CAP solution are converted into microbial biomass, rich in proteins, by means of a mixed-culture aerobic fermentation process. This MP is subsequently dewatered and dried.
A total of 11 lab-scale fermentation tests to optimise and produce MP were performed from diverse CAP-samples. These samples all contained high COD concentrations and variable short chain carboxylic acid (SCCA) profiles. In general, over 90% of the initial COD concentration of all samples was converted into microbial biomass. This indicates that the SCCA profile has no significant impact on the MP production, which emphasises the robustness of the technique. The produced microbial biomass was consistently of high quality and contained protein percentages up to 70%, which makes MP suitable as a slow releasing nitrogen source. Moreover, a high biomass yield of 0.35 g TSS/g COD was obtained, which corresponds with a protein production of 200 mg protein per g of COD added. These results prove the suitability of CAP waters for the production of MP.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

Het RUSTICA-project heeft tot doel een aanpasbare, milieuvriendelijke bio-gebaseerde meststof te ontwikkelen uit agrarische zijstromen en op deze manier ongebruikt bioafval te upcyclen en waardevolle voedingsstoffen terug te winnen. De bio-gebaseerde meststof zal bestaan uit verschillende bouwstenen met elk hun eigen specifieke eigenschappen en deze bouwstenen zullen geproduceerd worden door 5 innovatieve technologieën. Eén van deze technologie leveranciers is Avecom.
In de context van het RUSTICA project onderzocht Avecom de haalbaarheid van de productie van Microbieel Eiwit (MP) uit voorbehandeld bio afval of CAP-oplossingen (Carboxylic Acid Platform). De CAP-oplossingen worden geproduceerd door DRANCO NV door organische reststromen anaëroob te vergisten. In het daaropvolgende MP-proces worden de koolstof en nutriënten in de CAP-oplossing omgezet in microbiële biomassa, rijk aan eiwitten, door middel van een aëroob fermentatieproces met gemengde culturen. De geproduceerde MP wordt vervolgens ontwaterd en gedroogd.
In totaal werden 11 laboratoriumschaal fermentatie testen uitgevoerd om MP te optimaliseren en te produceren op basis van verschillende CAP-stalen. Deze stalen bevatten allemaal hoge COD-concentraties en variabele korte keten carboxylzuur profielen (SCCA). In het algemeen werd meer dan 90% van de oorspronkelijke COD-concentratie van alle monsters omgezet in microbiële biomassa, wat aangeeft dat het SCCA-profiel geen significante invloed heeft op de MP-productie. De geproduceerde microbiële biomassa was van hoge kwaliteit en bevatte eiwitpercentages tot 70%. Bovendien werd een hoge biomassa opbrengst van 0.35 g TSS/g COD verkregen, wat overeenkomt met een eiwitproductie van 200 mg eiwit per g toegevoegd COD. Deze resultaten bewijzen de geschiktheid van CAP-water voor de productie van MP.

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

#15

PRACTICE ABSTRACT

TECHNICAL REPORT MICROBIAL BIOMASS

Conversion of CAP-effluent to microbial biomass

CONTEXT

As one of the technology providers within the RUSTICA project, Avecom is responsible for the production of microbial protein (MP) from CAP waters. The protein-rich dried biomass has the ability to act as a slow-release nitrogen source and will be used as a building block to the final RUSTICA bio-based fertiliser/blend.

PROBLEM

The RUSTICA technology for CAP production from biowaste is rather new and the quality and composition of the produced CAP solutions can vary, depending on the type of fruit and vegetable waste used as feedstock and on the process conditions that were applied during the CAP treatment by the partner DRANCO. The suitability of different types of CAP waters for optimal MP production needs to be tested and the most optimal conditions for the MP process, which also depend on the used CAP solutions, should be determined.

APPROACH

AVECOM developed lab scale tests to determine the feasibility of different organic substrates to be converted into microbial protein. Over 10 different CAP solutions, produced by DRANCO from different agricultural side streams, were analysed and tested for MP production at lab-scale. Furthermore, the operation conditions of the MP fermentation reactors were modified to optimise the process and assess the effect of different operational parameters on the MP process.

OUTCOME

1. Waste-derived CAP waters showed to be a very suitable feedstock for the production of MP
2. The SCCA profile of the CAP waters did not have an important impact on MP production, which emphasises the robustness of this technology.
3. A conversion of the organic compounds (COD) of more than 90% was obtained
4. A high MP yield or biomass growth up to 0.35 g TSS/g COD was achieved
5. A protein content of more than 70% on dry matter of MP was reached

PRACTICAL RECOMMENDATIONS

- For an optimal MP production process with CAP waters as feedstock, the use of calcium hydroxide during the CAP pretreatment should be avoided, since this results in poor microbial protein quality. Instead, sodium or potassium hydroxide can be used. Furthermore, the CAP waters need to be diluted to 20-30 g COD/L and the TSS concentration in these wates must be limited.

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

RUSTICA

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#16

PRACTICE ABSTRACT

TECHNICAL REPORT ELECTRODIALYSIS

Separation efficiency using electrodialysis to recover mineral concentrate from CAP

SHORT SUMMARY FOR PRACTITIONERS

EN version

Separating Nitrogen, Phosphorus, and Potassium (NPK) nutrients from carboxylic acids (CAP solutions) via Electrodialysis (ED) is proposed as the main research route to producing liquid bio-based fertiliser on the RUSTICA project. Recovering at least 90% plant nutrients (i.e., K^+, NH_4^+, NO_3^-, PO_4^{3-}, and SO_4^{2-}), concentrating the nutrients to 2-5 fold, and separating 80% of the 90% recovered nutrients from the Volatile Fatty Acids (VFAs) in the CAP solution have been the initial targets. The electrodialysis separating the nutrients from various fruits and vegetables such as paprika, leek, mango wastes, etc., named Gross Market Wastes and Allgro produced various liquid nutrient concentrates comprising 8403-22 728 mg/L K^+, 2703-14525 mg/L NH_4^+, 256-5385 mg/L NO_3^-, 727-2809 mg/L SO_4^{2-}, and 592-5744 mg/L PO_4^{3-}. About 90-99% of nutrient was recovered and concentrated to a maximum range of 7-15 fold. A separation efficiency of 47-70% was attained between the VFAs and the nutrients, indicating that 47-70%g/g of the VFAs was removed from the 90-99% recovered nutrients concentrate. However, due to the very low concentrations (200-400 mg/L) of NO_3^- and PO_4^3 in the CAP solution fed to the electrodialysis, their amount compared with K^+ is still limited. Hence, UGent is improving the electrodialysis to boost the nitrate and phosphate concentrations as close as possible to potassium. Overall, the findings suggest that it is feasible to recover and concentrate nutrients from the CAP solution via electrodialysis. However, the quality and quantity of the liquid nutrient concentrate strongly depend on the CAP solution.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

Separating Nitrogen, Phosphorus, and Potassium (NPK) nutrients from carboxylic acids (CAP solutions) via Electrodialysis (ED) is proposed as the main research route to producing liquid bio-based fertiliser on the RUSTICA project. Recovering at least 90% plant nutrients (i.e., K^+, NH_4^+, NO_3^-, PO_4^{3-}, and SO_4^{2-}), concentrating the nutrients to 2-5 fold, and separating 80% of the 90% recovered nutrients from the Volatile Fatty Acids (VFAs) in the CAP solution have been the initial targets. The electrodialysis separating the nutrients from various fruits and vegetables such as paprika, leek, mango wastes, etc., named Gross Market Wastes and Allgro produced various liquid nutrient concentrates comprising 8403-22 728 mg/L K^+, 2703-14525 mg/L NH_4^+, 256-5385 mg/L NO_3^-, 727-2809 mg/L SO_4^{2-}, and 592-5744 mg/L PO_4^{3-}. About 90-99% of nutrient was recovered and concentrated to a maximum range of 7-15 fold. A separation efficiency of 47-70% was attained between the VFAs and the nutrients, indicating that 47-70%g/g of the VFAs was removed from the 90-99% recovered nutrients concentrate. However, due to the very low concentrations (200-400 mg/L) of NO_3^- and PO_4^3 in the CAP solution fed to the electrodialysis, their amount compared with K^+ is still limited. Hence, UGent is improving the electrodialysis to boost the nitrate and phosphate concentrations as close as possible to potassium. Overall, the findings suggest that it is feasible to recover and concentrate nutrients from the CAP solution via electrodialysis. However, the quality and quantity of the liquid nutrient concentrate strongly depend on the CAP solution.

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

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#16

PRACTICE ABSTRACT

TECHNICAL REPORT ELECTRODIALYSIS

Separation efficiency using electrodialysis to recover mineral concentrate from CAP

CONTEXT

One-third (1.3 billion tons) of food waste is generated annually worldwide. However, the rapid population growth increases the stress on food demands. Meanwhile, the depletion of inorganic phosphorus and potassium reserves for conventional fertilisers may cause a scarcity of inorganic fertilisers for food production. Therefore, the world is strategically transitioning to bio-based plant nutrients via fermentation using food wastes and other bio-based streams as sustainable feedstock, contributing to the loop of circular bio-economy.

PROBLEM

The very low plant nutrients, especially nitrate, phosphate, ammonium, and sulfate concentrations in the fermented food wastes (CAP solution), the complexity of the CAP solution, and the major presence of non-nutritional substances such as volatile fatty acids (VFAs), sugars, lactic acid, alcohols, and proteins limit the direct application of the fermented food wastes as bio-based fertilisers.

APPROACH

Innovative technologies are required to overcome these problems by increasing nutrient concentrations and largely reducing non-nutritional substances from the recovered nutrients. Electrodialysis is a competitive technology applied to recover and increase nutrient concentrations from fermented food wastes. It utilises an electrical current to transport and concentrate the nutrients from the fermented food wastes to water forming a liquid nutrient concentrate potential for bio-based fertiliser.

OUTCOME

1. The electrodialysis separated the plant nutrients from the CAP solution, producing various bulk liquid nutrient concentrates comprising 8403-22 728 mg/L K^+, 2703-14525 mg/L NH_4^+, 256-5385 mg/L NO_3^-, 727-2809 mg/L SO_4^{2-}, and 592-5744 mg/L PO_4^{3-}.
2. About 90-99% of nutrients were recovered and concentrated to a maximum of 7-15 fold.
3. A separation efficiency of 47-70% was achieved between the VFAs and nutrients, indicating that 47-70%g/g of the VFAs was removed from the 90-99% recovered nutrients concentrate.

PRACTICAL RECOMMENDATIONS

- The quality and quantity of the liquid nutrient concentrate depends on the CAP solution. Thus, ions such as Sodium, Chloride, and Lactic acid strongly compete with the plant nutrients during electrodialysis, hence reducing the quality of the liquid nutrient concentrate. Therefore, any additive containing Sodium and Chloride or generation of more Lactic acid compared to the nutrients must be avoided. Either Calcium or Magnesium concentration of more than 1200mg/L in the CAP solution must be avoided since they induce membrane fouling which increases the energy consumption of the electrodialysis

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

RUSTICA

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#17

PRACTICE ABSTRACT

TECHNICAL REPORT INSECT PRODUCTION

The potential to recover nutrient from fruit and vegetable residues through insect production

SHORT SUMMARY FOR PRACTITIONERS

EN version

Plant waste produced in agriculture is abundant and, if treated adequately, can be an important source of nutrients to nourish the soil. One way to recover those nutrients is by using insects which could be fed with the plant material, and in a period of just 14 days convert this highly fermentable and unstable waste in nutrient and carbon rich fertiliser (also known as insect frass). Furthermore, the insects produced in the process can be used to fertilise the soil, with the amino acids and chitin, or simply commercialised in other applications, making the process more sustainable, circular and with virtually no waste produced.

Black soldier fly has shown to be the most efficient insect species tested. To use the larvae as a waste converter, the substrate is first prepared. The plant material must be grinded and reduced in other to make the nutrients accessible to the insects. Moisture of the substrate should be kept above 65%, while maintaining warm temperatures during the insect bio-digestion. Insects are added to the prepared substrate when they are still small. If all goes smoothly, we can expect, for every ton of plant material, mainly fruit smash and leaves, a production of ca. 90kg of frass and 43kg of insect biomass. At the end of the insect bio-digestion, larvae (already grown) can be separated from the frass by sieving. The frass is usable as fertiliser while the insect biomass can be used to extract other components.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

Los residuos agrícolas son abundantes y si se tratan de forma adecuada pueden ser un recurso importante para nutrir el suelo. Una de las formas para recuperar dichos nutrientes es por medio de insectos que pueden ser alimentados con el material vegetal y en un periodo de tan solo 14 días convertir este residuo fermentable e inestable, en un fertilizante rico en nutrientes y carbono (también conocido como frass). Además, los insectos producidos en el proceso pueden fertilizar el suelo con aminoácidos y quitina o simplemente comercializados en otras aplicaciones, haciendo el proceso más sostenible, circular y virtualmente exento de residuos.

La mosca soldado negra ha mostrado ser el insecto más eficiente probado. Para usar las larvas como conversores de residuo, el sustrato tiene que ser preparado. El material vegetal tiene que ser triturado y reducido para que los nutrientes queden accesibles al insecto. La humedad del sustrato tiene que ser superior al 65% y además se tiene que mantener el sustrato cálido durante todo el proceso de bio-digestión. Los insectos se añaden al sustrato cuando aún son pequeños. Si todo el proceso ocurre correctamente, podemos esperar, por cada tonelada de material vegetal, principalmente frutas trituradas y hojas, una producción de aproximadamente 90kg de frass y 43 kg de biomasa larvaria. Al final de la bio-digestión con insectos, las larvas (ya crecidas) pueden ser separadas del frass mediante cribado. El frass se puede usar como fertilizante mientras que la biomasa larvaria se puede utilizar para extraer otros componentes.

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

RUSTICA

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#17

PRACTICE ABSTRACT

TECHNICAL REPORT INSECT PRODUCTION

The potential to recover nutrient from fruit and vegetable residues through insect production

CONTEXT

Agricultural organic waste is a nutrient rich source widely available in many places. In Almería (Spain) ca.1.5 million tons of greenhouse organic waste are produced every year. Those nutrients could be returned to the soil, to fertilise the plants, if they are treated properly. One way is by using insects that feed on the plant waste material, and in the same time, producing a by-product called "frass" (equivalent to manure but from insects) to fertilise the soil.

PROBLEM

Many insect species could feed on plant material, specially on decomposing plant material, as it is the main constituent of the agricultural waste in Almeria. But, in order to achieve an efficient waste treatment with insects, to be implemented at large scale, it is necessary to select an insect species that is easily and steadily produced using plant waste, and produces good quantities of frass to nourish the soil.

APPROACH

To know which insect is the best to produce frass, experiments were done with 6 different insect species (beetles, flies, crickets, and roaches, which are known for their ease in reproduction/breeding) that were fed with 16 different agricultural waste (fruits, leaves, stems from greenhouse crops, plus other waste like olive pomace or broccoli or mushrooms). Evaluation was on which insect grew faster, ate a certain food, and produced more frass to be used as fertiliser, and had more insect biomass for product extraction.

OUTCOME

1. From all the insects used in the experiment, black soldier fly stood out for its fast development, the ability to feed on all kinds of materials, and producing a good amount of frass rich in cellulose.
2. The best source of food for the insect was fruits and vegetables puree, while for frass production, plant leaves gave the best results..
3. Per tonne of plant material treated, ca. 90 kg of frass and 43 kg of insect biomass can be produced

PRACTICAL RECOMMENDATIONS

- Insects are good to treat plant waste, passing in a period of 14 days from a fermentable plant material high in moisture, to a low moisture and stabilized frass.
- Best plant material to produce frass are plant leaves, but if it is desired to give the insect a boost, best is to add fruits to the mix having as a result, more frass and more insect biomass.
- Pesticides are detrimental to the insect, so the best choice is to use organic plant material, or allowing a security period after spraying with pesticides.

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

RUSTICA

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#18

PRACTICE ABSTRACT

CHARACTERISATION RUSTICA BUILDING BLOCKS

Preliminary report on lab-scale fertiliser ingredient characterisation

SHORT SUMMARY FOR PRACTITIONERS

EN version

RUSTICA's core: Looking for a technical solution to convert organic fruit and vegetables residues into novel RUSTICA bio-based fertilisers (RBBFs) that address the needs of modern (organic) agriculture: economically viable and environmentally sustainable alternatives to mineral fertilisers. Modern agriculture will become increasingly nature-, climate- and soil-inclusive. RBBF ambitions to contribute to

- CO_2 capture
- Lower nitrate and greenhouse gas emissions
- Erosion control
- Improved water retention
- More climate resilient agriculture
- Increasing soil biodiversity; beneficial for soil and crop resistance.

Five technologies deliver the building blocks, microbial biomass, mineral nutrient concentrates, insect biomass, insect frass, insect chitin and biochar will be combined to realise regional customer wish for RBBF functionalities concerning crop performance, soil quality and societal services. The building blocks will be analysed for their composition and characteristics and categorised for hypothetical agricultural and environmental value (nutritional, plant protection, soil quality). The fertiliser components will be characterised for the following parameters: humidity, ashes, organic matter content, pH, conductivity, total organic C, total N, water soluble C and N, NO_3^-, NH_4^+, P_2O_5, Fe Ca, Mg, micronutrients and other relevant parameters.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

De kern van RUSTICA: Op zoek naar een technische oplossing om groente- en fruit afvalstromen om te zetten in nieuwe RUSTICA biogebaseerde meststoffen (RBBFs) die voldoen aan de behoeften van de moderne (biologische) landbouw: economisch levensvatbare en ecologisch duurzame alternatieven voor minerale meststoffen. De moderne landbouw wordt steeds meer natuur-, klimaat- en bodeminclusief. RBBF ambieert om hieraan bij te dragen:

- CO_2 vastlegging
- Lagere uitstoot van nitraat en broeikasgassen
- Erosie controle
- Verbeterde waterretentie
- Meer klimaatbestendige landbouw
- Verhogen van de bodembiodiversiteit; gunstig voor bodem- en gewasweerbaarheid.

Vijf technologieën leveren de bouwstenen, microbiële biomassa, minerale nutriëntenconcentraten, insectenbiomassa, insectenfrass, insectenchitine en biochar worden gecombineerd om de regionale klantwens voor RBBF-functionaliteiten op het gebied van gewasprestatie, bodemkwaliteit en maatschappelijke dienstverlening te realiseren. De bouwstenen worden geanalyseerd op hun samenstelling en eigenschappen, en gecategoriseerd op hypothetische landbouw- en milieuwaarde (voedingswaarde, gewasbescherming, bodemkwaliteit). De componenten van de meststof worden gekarakteriseerd op de volgende parameters: vochtigheid, as, organische stofgehalte, pH, geleidbaarheid, totaal organische C, totaal N, wateroplosbare C en N, NO_3^-, NH_4^+, P_2O_5, Fe, Ca, Mg, micronutriënten en andere relevante parameters.

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

RUSTICA

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#18

PRACTICE ABSTRACT

CHARACTERISATION RUSTICA BUILDING BLOCKS

Preliminary report on lab-scale fertiliser ingredient characterisation

CONTEXT

RUSTICA's ambition to develop regionally based circular plant-based fertilisers depends technologically on the characteristics of the chosen building blocks and their synergistic effects. Some regions have stated in advance that not all building blocks will be available: an additional challenge.

PROBLEM

- Chemical caracterisation of the building blocks for their agronomic value in the broad sense.
- To evaluate the characterisation for their feedstock dependency.
- Provisional ranking of the building blocks according to their nutritional value, contribution to biological activity and build-up of physical soil parameters

APPROACH

Each of the 5 technologies has used 5 or more different types of feedstock to produce their building blocks. The chemical and biological characterisation of all these building blocks should show what influence the type of feedstock has on the relevant building block. Furthermore, there is a search for where the building blocks complement each other functionally.

OUTCOME

1. RUSTICA has chosen a set of promising building blocks to produce local blends RBBF
2. The building blocks complement each other nicely concerning biodegradability of organic matter, direct plant available mineral nutrients, CEC etc.
3. The effect of different kinds of feedstock is as yet insufficiently studied
4. Up to now the capacity to produce the building block is firmly limiting, except for compost.

PRACTICAL RECOMMENDATIONS

- Be aware: the properties of the building blocks cannot simply be added together; there are undoubtedly synergistic interactions
- The relevance of the variations in the characteristics of a building block should be evaluated; in addition to factors such as economics and upscaling, the precision of the final administration is also important.

	Soil organic matter content (SOM)			Mineral availability	Activation of bioactivity
	Easy	Medium	Recalcitrant		
Biochar		+	++	-	-
Mineral concentrate	-	-		+	-
Microbial biomass	+/-	-	-	-	+
Insect frass	+	+/-		+/-	+
Insect biomass /chitin	+	+/-		+/-	+
Compost	++	+		+	+

Effects of the RUSTICA building blocks on soil properties (personal communication).

- Easy: biodegradable within 2 years;
- Medium: biodegradable 2> years > 5;
- Recalcitrant: biodegradable >5 years

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

RUSTICA

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rusticaproject.eu

#19

PRACTICE ABSTRACT

CHARACTERISATION RUSTICA BUIDLING BLOCKS

Final report on lab-scale fertiliser ingredient characterisation

SHORT SUMMARY FOR PRACTITIONERS

EN version

The RUSTICA technologies will result in the production of several building blocks (microbial biomass, insect biomass and chitin, mineral concentrate, insect frass, biochar, compost), with a composition that is linked to the regional inputs from which they are produced. Each ingredient has specific fertiliser characteristics: for instance microbial biomass provides mainly N and P, and is slow-release; insect biomass is besides N, P and K rich in micronutrients and is also slow-release; insect chitin is a polymer with known biopesticide properties; mineral concentrate contains relatively pure nutrients in their mineral/inorganic form and are readily plant available; insect frass is mainly composed of insect faeces and contains both macronutrients and micronutrients and stabilised organic matter; biochar is mainly a soil amendment poor in nitrogen and stabilised carbon with a known beneficial effect on the water holding capacity of soils, but also prevents nutrient leaching; compost finally is a known soil amendment with slow nutrient release and stabilised organic matter, improving soil quality in water holding capacity and biodiversity. These different building blocks will be specific blended after the formulation based on regional customer wish, as defined by the regional multi-actor networks.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

De RUSTICA-technologieën zullen resulteren in de productie van verschillende bouwstenen (microbiële biomassa, insectenbiomassa en chitine, mineralenconcentraat, insectenfrass, biochar, compost), met een samenstelling die is gekoppeld aan de regionale inputs waaruit ze worden geproduceerd. Elk ingrediënt heeft specifieke eigenschappen van meststoffen: zo levert microbiële biomassa voornamelijk N en P, en komt het langzaam vrij; insectenbiomassa is naast N, P en K rijk aan micronutriënten en komt ook langzaam vrij; insectenchitine is een polymeer met bekende biopesticide-eigenschappen; mineralenconcentraat bevat relatief zuivere voedingsstoffen in hun minerale/anorganische vorm en is direct plantbaar; insectenfrass bestaat voornamelijk uit insectenpoep en bevat zowel macronutriënten als micronutriënten en gestabiliseerde organische stof; biochar is voornamelijk een bodemverbeteraar arm aan stikstof en gestabiliseerde koolstof met een bekend gunstig effect op het waterhoudend vermogen van bodems, maar voorkomt ook uitspoeling van voedingsstoffen; compost tot slot is een bekende bodemverbeteraar met een langzame afgifte van voedingsstoffen en gestabiliseerd organisch materiaal, waardoor de bodemkwaliteit wat betreft het waterhoudend vermogen en de biodiversiteit verbetert. Deze verschillende bouwstenen zullen na de formulering specifiek worden gemengd op basis van de regionale klantwens, zoals gedefinieerd door de regionale multi-actornetwerken.

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PRACTICE ABSTRACT

CHARACTERISATION RUSTICA BUIDLING BLOCKS

Final report on lab-scale fertiliser ingredient characterisation

CONTEXT

RUSTICA's ambition to develop circular plant-based fertilisers must be implemented in the 5 regions. The regional customer wishes about soil functioning because of RUSTICA fertiliser must be linked to the characterisation of the building blocks, and translated to measurable soil functionalities.

PROBLEM

Ranking the building blocks according to their nutritional value, or their contribution to soil biological activity (soil resilience, crop protection and mineralisation), or their impact on physical soil parameters.

APPROACH

The final results of characterisation of the building blocks are translated into nutritional value (= N:P:K availability for the crop), the EOM (remaining organic matter after 1 year) number as an indicator for soil structure improvement and the degree of biodegradability of the building blocks as indicator for biological activity.

OUTCOME

1. Biochar, preferentially produced from woody materials at 650°C, is not relevant for its nutritional value, however being valuable as a soil amendment for improvement of physical soil characteristics
2. Mineral concentrates is a liquid building block containing only mineral nutrients serving direct crop needs
3. Insect frass is a rather easy biodegradable building block suitable as a booster of soil life but also containing moderate levels of crop available nutrients, however rather rich in potassium
4. Insect biomass is an easy biodegradable building block suitable as a booster of soil life and supplying high levels of nitrogen to agricultural crops, potassium level is lower than in insect frass and phosphate is similar
5. Microbial biomass is a very easy biodegradable building block serving as a soil life booster, but at the same time containing high level of easily available nitrogen, phosphate and potassium.

PRACTICAL RECOMMENDATIONS

RBBF is an integral fertiliser, applied during and after a transition to a cultivation without or low input of mineral fertilisers. This transition basically involves:

- Building a "soil-inclusive" cultivation; namely, making use of the potential of the soil to feed and protect the crop itself (wholly or partly)
- Maintaining an acceptable harvest level (economy)

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

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PRACTICE ABSTRACT

CHARACTERISATION RUSTICA BUIDLING BLOCKS

Final report on lab-scale fertiliser ingredient characterisation

EFFECTS OF RUSTICA BUILDING BLOCKS ON SOIL PROPERTIES

	Soil organic matter content (SOM)			Mineral availability	Activation of bioactivity
	Easy	Medium	Recalcitrant		
Biochar		+	++	-	-
Mineral concentrate	-	-		+	-
Microbial biomass	+/-	-	-	-	+
Insect frass	+	+/-		+/-	+
Insect biomass /chitin	+	+/-		+/-	+
Compost	++	+		+	+

Easy: biodegradable within 2 years;
Medium: biodegradable 2> years > 5;
Recalcitrant: biodegradable >5 years

CORRELATION MATRIX SOIL PROPERTIES AND SOIL FUNCTIONALITIES

Soil functionalities	Higher mineralisation	Higher resilience	Change in plant available nutrients	Higher water holding capacity	Lower erosion sensitivity + CO_2 capture
Soil properties					
Biological activity	+	+	+/-	-	-
Easy bio-degradable SOM	+	+	+/-	-	-
Medium bio-degradable SOM	+	+	-	+/-	+/-
Recalcitrant SOM	-	-	-	+	+
"Free" minerals	-	-	+	-	-

SOM: Soil Organic Matter
Easy biodegradable within 1 year
Medium biodegradable 1-2 years
Recalcitrant biodegradable >3 years
+: there is a correlation
+/-: there could be a correlation
-: there is no correlation

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

#20

PRACTICE ABSTRACT

MARKET ANALYSIS REPORT

Market analysis report

SHORT SUMMARY FOR PRACTITIONERS

EN version

The benefits and risks of the RUSTICA technology integration to make and apply RUSTICA bio-based fertlisers (RBBFs) will be evaluated against the background of the conditions in the 5 RUSTICA regions: Flanders, Pays de la Loire, Almeria, Friuli-Venezia Giulia and Valle del Cauca. This analysis gives an insight in the state-of-the-art of by-product availability and fertiliser use. The regional fact sheets include i.e. waste streams, current treatments of these waste streams, major agricultural practices, potential for the RUSTICA technologies, identification of competitive and or complementary technologies. In parallel, the nutrient value and other potential functional values in the agri-residues from the fruit and vegetable sector were assessed. Trends in European legislation and admission rules were identified, and in societal acceptance, in farming systems, production systems and human food patterns. The trend analysis will lead to:

- Strategic preferences for RBBFs containing limited, partly, or exclusively mineral nutrients
- Strategic preference for application methods of RBBFs
- The strategic importance of multifunctional or integral RBBF
- The strategic importance of crop specificity of the RBBF versus specificity of method of its application.

From here we are able to formulate long term market needs and to identify the key players in the bio-based fertiliser market. Interviewing international and/or regional key players will reveal the ambition of existing players to participate in the development of RUSTICA products. Conclusively we will arrive on product and partner preferences and prioritisation in time line of development.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

De voordelen en risico's van de RUSTICA-technologie-integratie voor het maken en toepassen van RUSTICA biogebaseerde meststoffen (RBBF's) zullen worden geëvalueerd tegen de achtergrond van de omstandigheden in de 5 RUSTICA-regio's: Vlaanderen, Pays de la Loire, Almeria, Friuli-Venezia Giulia en Valle del Cauca. Deze analyse geeft inzicht in de stand van zaken op het gebied van bijproductbeschikbaarheid en kunstmestgebruik. De regionale factsheets omvatten o.a. afvalstromen, huidige behandelingen van deze afvalstromen, belangrijke landbouwpraktijken, potentieel voor de RUSTICA-technologieën, identificatie van concurrerende en/of complementaire technologieën. Parallel hieraan zijn de voedingswaarde en andere potentiële functionele waarden in de agro-reststromen uit de AGF-sector beoordeeld. Trends in Europese wetgeving en toelatingsregels werden geïdentificeerd, en in maatschappelijke acceptatie, in landbouwsystemen, productiesystemen en menselijke voedingspatronen. De trendanalyse leidt tot:

- Strategische voorkeuren voor RBBF's met beperkte, gedeeltelijk of uitsluitend minerale nutriënten
- Strategische voorkeur voor toepassingswijzen van RBBF's
- Het strategisch belang van multifunctionele of integrale RBBF
- Het strategische belang van gewasspecificiteit van de RBBF versus specificiteit van de toepassingsmethode.

Van hieruit zijn we in staat om marktbehoeften op de lange termijn te formuleren en de belangrijkste spelers op de markt voor biokunstmest te identificeren. Het interviewen van internationale en/of regionale sleutelspelers zal de ambitie van bestaande spelers blootleggen om mee te werken aan de ontwikkeling van RUSTICA producten. Uiteindelijk zullen we komen tot product- en partnervoorkeuren en prioritering in de tijdlijn van ontwikkeling.

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

RUSTICA

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PRACTICE ABSTRACT

MARKET ANALYSIS REPORT

Market analysis report

CONTEXT

The business question: which blend one is going to make and for what region, is mainly determined by the customer demand from the region. There, the RBBF concept should ultimately be implemented from a regional consortium. A consortium that is then responsible for the entire life cycle: a volume wise and qualitatively correct collection of fruit and vegetable waste flows, conversion and processing of the waste flows into the required building blocks, blending & mixing, and sales, distribution and product advice, and this all set in an economically sound exploitation.

PROBLEM

What are the general drivers for RBBF's market entry and how do we make it regionally specific?.

APPROACH

A market analysis has been made with a look ahead to 2030 regarding the European market for mineral and organic fertilisers including the underlying drivers. Trends in European legislation and admission rules were identified, as well as trends in societal acceptance in farming systems, production systems and human food patterns. From the trend analysis we extract:

- Strategic preferences for bio-based fertilisers containing limited, partly or exclusively mineral nutrients
- Strategic preference for application methods
- The strategic importance of multifunctional bio-based fertiliser
- The strategic importance of crop specificity of the bio-based fertiliser versus specificity of method of application

OUTCOME

1. The European organic fertiliser market possesses a substantial scope for growth in the future, owing to an increased awareness towards the benefits of organic farming over conventional farming
2. Start strategy KPIs
   - Low volumes-high margins
   - Be good not Big
   - Multifunctionality of RBBF
   - Collector of waste flows should benefit, securing quality commitment
3. Ecological/organic horticulture is the most receptive market segment
4. In agriculture, the somewhat younger and middle-skilled entrepreneurs with medium-sized companies are generally the most receptive.

PRACTICAL RECOMMENDATIONS

- 100% circular; We should not jeopardise this uniqueness by mixing in materials other than RUSTICA building blocks plus compost produced under the auspices of RUSTICA partners
- Modular & Multifunctional; Serving niche markets is a unique selling point, enabled by the modular structure of RBBFs. The fact that RBBFs claim to support a build-up of the desired soil quality requires modularity and flexibility and a programming in application for a couple of years

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PRACTICE ABSTRACT

MARKET ANALYSIS REPORT

Market analysis report

CHARACTERISATION OF THE DRIVERS FOR THE FIVE RUSTICA REGIONS

Region	Almeria	Pays de la Loire	Flanders	Friuli-Venezia Giulia	Valle del Cauca
Regional RBBF business drivers					
Awareness of ecology in agriculture	X	X	X	X	X
Environmental awareness	X	X	X	X	
The advance of the ecological/organic cultivation	X	X	X		
The need for more soil/substrate resilience	X			X	X
The need for an increased water use efficiency	X				X
Urgency for recirculation of minerals/nutrients	X	X	X		
Reduction of soil organic matter contents			X	X	
Reduction high GHG emissions & soil CO_2 capture		X	X		X
NO_3^- leaching from agriculture; water quality		X	X		X
Promotion of circular agriculture		X	X		
Reduction of erosion sensitivity				X	X
Lower CO_2 footprint					X
Sum	6	7	8	5	7

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PRACTICE ABSTRACT

MARKET ANALYSIS REPORT

Market analysis report

CHARACTERISATION OF THE FIVE RUSTICA REGIONS

Region	Almeria	Pays de la Loire	Flanders	Friuli-Venezia Giulia	Valle del Cauca
Critical factors					
Presence RUSTICA partners	3	1	5	1	1
Availability vegetable and fruit waste	+	+	+	+/-	+
Development target market Organic cultivation	+	+	+	+/-	+/-
Implementation RUSTICA technologies	+	+/-	++	+/-	+
Start-up markets					
Ecological/organic farming	X	X	X		
Conventional horticulture protected	X	X	X		
Short food chains			X		
Annual open-field horticulture/viticulture	X		X	X	
Breeding companies		X			
Fair trade farmers					X
Small farmholders using fertlisers					X
Organised group of certified sugarcane growers					X
Regional RBBF business drivers					
Awareness of ecology in agriculture		X	X	X	X
Environmental awareness	X	X	X	X	
The advance of the ecological/organic cultivation	X	X	X		
The need for more soil/substrate resilience	X			X	X
The need for an increased water use efficiency.	X				X
Urgency for recirculation of minerals/nutrients;	X	X	X		
Reduction of soil organic matter contents			X	X	
Reduction high GHG emissions & soil CO_2 capture		X	X		X
NO_3^- leaching from agriculture; water quality		X	X		X
Promotion of circular agriculture		X	X		
Reduction of erosion sensitivity				X	X
Lower CO_2 footprint					X

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

RUSTICA

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#21

PRACTICE ABSTRACT

ALMERIA - LEGAL POINTS

RUSTICA test case: A view on legal points in Almeria

SHORT SUMMARY FOR PRACTITIONERS

EN version

RUSTICA aims at sustainable provisions by means of converting redundant residues from the agri-food chain into valuable fertilising products. The project specifically focuses on circular models benefitting regional approaches. In this respect, legal and political frameworks are pivotal, and enormous progress has been achieved in terms of using organic materials for fertilisers by enacting the new Fertilising Products Regulation (EU) 2019/1009 in the EU. Furthermore, Spanish legislation enables a wide range of bio-based solutions for fertilisers while some restrictions apply if waste and animal by-products are considered.

The project develops and evaluates a broad spectrum of bio-based fertilisers starting from a variety of feedstocks, using new processing routes and leading to six main building blocks microbial biomass, NPK-concentrate, insect biomass, frass, biochar and compost for tailor-made fertlisers. At present, European and national Spanish rules already reveal that certain value chains can be built based on leftovers from fruit and vegetable production. In particular, routes involving compost are prominent examples for such options while other value chains would need a more specific consideration of relevant criteria, such as type of input, technology and characteristics of the final product.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

RUSTICA quiere fomentar la producción sostenible de fertilizantes de base biológica mediante la conversión de residuos agrícolas en valiosos productos fertilizantes. El proyecto se centra específicamente en modelos circulares con un enfoque regional. En este sentido, los marcos legales y políticos son fundamentales, y se ha logrado un enorme progreso en términos del uso de materiales orgánicos para la producción de fertilizantes, al promulgar el nuevo Reglamento de Productos Fertilizantes (UE) 2019/1009 en la UE. Además, la legislación española permite una amplia gama de soluciones de base biológica para la producción de fertilizantes, aunque son aplicables algunas restricciones si se tienen en cuenta los residuos y subproductos animales.

El proyecto desarrolla y evalúa un amplio espectro de biofertilizantes a partir de una variedad de materias primas, utilizando nuevas rutas de procesamiento y dando lugar a seis bloques principales de producción de materias primas: biomasa microbiana, concentrado NPK, biomasa y excrementos de insectos, biochar y compost, para la producción a medida de fertilizantes. En la actualidad, la normativa europea y nacional española ya revela que se pueden poner en marcha determinadas cadenas de valor a partir de los restos de la producción hortofrutícola. En particular, las rutas que involucran al compost son ejemplos destacados de tales opciones, mientras que otras cadenas de valor necesitarían una consideración más específica de los criterios más relevantes, como el tipo de insumo, la tecnología a utilizar y las características del producto final.

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

RUSTICA

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#21

PRACTICE ABSTRACT

ALMERIA - LEGAL POINTS

RUSTICA test case: A view on legal points in Almeria

CONTEXT

At the moment, precious resources from residues and side streams of fruit and vegetable producition, food manufacture and retail often remain unused. Fertilisers are frequently produced by traditional methods and nutrient recovery by regional concepts are not at the forefront. Therefore, innovative solutions are needed to close the gap on sufficient avalability of circular fertilising materiials.

PROBLEM

Albeit the new EU legislation on fertilising products and the national legislation in Spain provide opportunities on waste and animal by-products, there are some bottlenecks for such input if it will be considered for plant nutrition. These legal rules affect also complex valorisation routes of novel bio-based fertiliser developments.

SOLUTION

Legal aspects are broadly addressed in the RUSTICA project and the scope of analysis comprises not only international agreements and EU legislation but also national and regional stipulations in Spain and Andalusia. The results achieved in the course of the study are published and available for policy makers and authorities. The investigations include inter alia the six main technologies of RUSTICA and EU rules on fertiliser application including their national and regional transposition in Spain and Andalusia. Attention is paid to conventional and organic farming.

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 has been prepared.
2. A dedicated summary on major criteria of national and regional legislation in Spain and Almeria relevant for stakeholders and marketing of the new technologies is elaborated.
3. An integration of the subject into workshops enabling a broad discussion on legal situations, positions and future needs in the Almeria test region has been made.

PRACTICAL RECOMMENDATIONS

- An evaluation of the feedstocks and precursors of fertiliing products identifying their legal options for the individual value chains;
- A verification of the processing methods and comparison with legal requirements to recognize 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., water (nitrate) and fertiliser application;

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

RUS TI CA

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#22

PRACTICE ABSTRACT

FRIULI-VENZIA GIULIA – LEGAL POINTS

RUSTICA test case: A view on legal points in Friuli-Venezia Giulia

SHORT SUMMARY FOR PRACTITIONERS

EN version

RUSTICA explores, demonstrates and evaluates bio-based fertilisers and soil improvers based on redundant materials or waste from agriculture and food management. As being a test region of the project and its envisaged circular models, the legal situation of Friuli Venezia Giulia is of particluar interest. While legal provisions of the EU Fertilising Products Regulation apply, at the same time, national/regional legislative pathways can be considered if a novel product shall be marketed for plant supply or soil enhancement purposes.

Valorisation routes for leftovers and waste are already defined at the EU level as well as at the national/regional level if specific treatments, such as composting and biochar are addressed in Italy. However, taking into account that some rules may deviate between the harmonised law for CE-marked fertilising products and the marketing specifically for the national and regional level, it needs to be stressed that placing on the market of bio-based innovations requires a profound examination on what avenues are fully or partly open.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

RUSTICA studia, dimostra e valuta i fertilizzanti a base biologica e gli ammendanti basati su materiali in esubero e rifiuti del settore agroalimentare. Poiché rappresenta una delle regioni di studio dei modelli circolari previsti nell'ambito del progetto, la situazione legale del Friuli Venezia Giulia per quanto riguarda i fertilizzanti è di particolare interesse. Sebbene si applichino le disposizioni giuridiche del regolamento sui fertilizzanti dell'UE, allo stesso tempo, possono essere presi in considerazione percorsi legislativi nazionali/regionali nei casi in cui un nuovo prodotto debba essere commercializzato per fornire elementi nutritivi alle piante e/o per migliorare la fertilità del suolo.

Percorsi di valorizzazione dei residui e dei rifiuti sono già definiti a livello di UE e a livello nazionale/regionale per quanto riguarda trattamenti specifici, come il compostaggio e la pirolisi, in Italia. Tuttavia, tenendo conto del fatto che alcune norme possono discostarsi tra la normativa armonizzata per i fertilizzanti con marchio CE e la commercializzazione a livello nazionale e regionale, è necessario sottolineare che l'immissione sul mercato di prodotti innovativi a base biologica richiede un esame approfondito di quali siano i percorsi di commercializzazione completamente o parzialmente aperti.

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

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#22

PRACTICE ABSTRACT

FRIULI-VENZIA GIULIA – LEGAL POINTS

RUSTICA test case: A view on legal points in Friuli-Venezia Giulia

CONTEXT

Until now, huge amounts of residues from agriculture, horticulture and viticulture including their follow-up manufacture and dispatch are not subject to purposeful deployment. In parallel, production of fertilising materials occurs under traditional patterns by neglecting the nutrient content of such disposable matter. Consequently, new approaches and methods are required to reach optimal fertilising products by regional circular approaches.

PROBLEM

Even though organic inputs are broadly addressed if fertilising materials shall be marketed under either the harmonised or non-harmonised legislation, there are still limits and restrictions especially if specific feedstocks waste or by-products are incorporated into value chains. In addition, the optons enabled by legislation are often different if conditions at the EU and national/regional level are compared in Italy and Friuli Venezia Giulia.

SOLUTION

In the RUSTICA project, an array of investigations covering not only international agreements and EU legislation but also national and regional stipulations in Italy and Friuli Venezia Giulia takes place. Results accomplished by the research are published and available for policy makers and authorities. In addition, the work of RUSTICA contains EU rules on fertiliser application and how they are transposed in Italy and Friuli Venezia Giulia. In addition, legal aspects of organic farming are highlighted.

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 has been prepared.
2. A dedicated summary on major criteria in national and regional legislation in Italy and Friuli Venezia Giulia relevant for stakeholders and marketing of the new technologies is elaborated.
3. An integration of the subject into workshops enabling a broad discussion on legal situations, positions and future needs in the Friuli Venezia Giulia test region has been made.

PRACTICAL RECOMMENDATIONS

- An evaluation of the feedstocks and precursors of fertiliing products identifying their legal options for the individual value chains;
- A verification of the processing methods and comparison with legal requirements to recognize 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., water (nitrate) and fertiliser application;

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#23

PRACTICE ABSTRACT

FLANDERS - LEGAL POINTS

RUSTICA test case: A view on legal points in Flanders

SHORT SUMMARY FOR PRACTITIONERS

EN version

RUSTICA validates, demonstrates and implements bio-based fertilisers and soil improvers while focusing on closed loops at the regional level. According to the test region Flanders, two main routes are discussed for commercialisation. Depending on the raw material, processing and final product marketing of such bio-based solutions via the harmonised rules of the new EU Fertilising Products Regulation (EU) 2019/1009 or under the national/regional regime can be verified.

Both CE-marked fertilisers rules and national legislation in Flanders include options on the use of organic materials for plant nutrition, and defined treatments, such as composting and anaerobic digestion are comprehensively addressed. However, differences between the new EU Regulation and the national/regional framework in terms of requirements of such treatments or products need to be thoroughly studied. If an innovation is intended to be marketed under the latter, it needs to be evaluated in detail if the new product is already included in existing legislation or a derogation is needed. Derogations are published in Flanders e.g., for biochar.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

RUSTICA valideert, demonstreert en implementeert biogebaseerde meststoffen en bodemverbeteraars en richt zich op gesloten kringlopen op regionaal niveau. In de testregio Vlaanderen worden twee hoofdroutes voor commercialisering besproken. Afhankelijk van de grondstof kan van dergelijke biogebaseerde oplossingen de verwerking en het eindproduct op de markt worden gebracht via de geharmoniseerde regels van de nieuwe EU-meststoffenverordening (EU) 2019/1009 of onder de nationale/regionale regelgeving.

Zowel de regels voor meststoffen met CE-markering als de nationale wetgeving in Vlaanderen omvatten opties voor het gebruik van organische materialen voor plantenvoeding. Gedefinieerde behandelingen zoals compostering en anaerobe vergisting komen er uitgebreid in aan bod. De verschillen tussen de nieuwe EU-verordening en het nationale/regionale kader wat betreft vereisten voor dergelijke behandelingen of producten moeten echter grondig worden bestudeerd. Als het de bedoeling is dat een dergelijke innovatie op de markt wordt gebracht, moet in detail worden beoordeeld of het nieuwe product al is opgenomen in de bestaande wetgeving of dat er een uitzondering nodig is. In Vlaanderen worden uitzonderingen gepubliceerd, bijvoorbeeld voor biochar.

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

RUSTICA

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#23

PRACTICE ABSTRACT

FLANDERS - LEGAL POINTS

RUSTICA test case: A view on legal points in Flanders

CONTEXT

At present, the potential of organic matter by means of residues and side streams in fruit and vegetable production is not fully exhausted along the agri-food chain. Valuable secondary resources are still not completely exploited for bio-based fertilisers while fossil-based materials play an important role. Subsequently, novel developments need to be validated in order to meet this challenge.

PROBLEM

Valorisation routes for organic material are broadly addressed not only in the new EU Regulation on fertilising products but also in the national and regional legislation one has to abide by in Flanders. However, comparing the rules of the new EU Regulation with national/regional frameworks in Flanders, certain differences can be identified. Furthermore, if marketing of an innovation is planned under the national regime, the necessity of a derogation needs to be examined in this region.

SOLUTION

In the course of its systemic feasiblity studies, the RUSTICA project conducts not only investigations on international agreements and EU legislation but also on national and regional legislative frameworks in Flanders and Belgium. Results are published and available to political institutions and authorities. The analyses include inter alia the six main technologies of RUSTICA and EU rules on fertiliser application including their national and regional transposition in Belgium and Flanders. In addition, specific aspects of organic farming are subject to the studies.

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 has been prepared.
2. A dedicated summary on major criteria in national and regional legislation in Belgium and Flanders relevant for stakeholders and marketing of the new technologies is elaborated.
3. An integration of the subject into workshops enabling a broad discussion on legal situations, positions and future needs in the Flanders test region has been made.

PRACTICAL RECOMMENDATIONS

- An evaluation of the feedstocks and precursors of fertiliing products identifying their legal options for the individual value chains;
- A verification of the processing methods and comparison with legal requirements to recognize 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., water (nitrate) and fertiliser application;

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RUSTICA

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#24

PRACTICE ABSTRACT

PAYS DE LA LOIRE - LEGAL POINTS

RUSTICA test case: A view on legal points in Pays de la Loire

SHORT SUMMARY FOR PRACTITIONERS

EN version

The goal of RUSTICA is to foster circular bio-based nutrient valorisation chains starting from residues and side streams of the fruit and vegetable agro-food system. Validation takes place at the regional level and a test case is established in Pays de la Loire. To launch fertilisers and soil improvers onto the market, the legal environment is paramount. Apart from getting market access via the harmonised legal prescriptions of the new EU Fertilising Products Regulation, routes can be selected by taking advantage of the Rural Code, market authorisation and/or a wide range of standards which apply to various plant nutrition concepts in France.

However, the novel value chains and products need to be individually evaluated on their possibilities to match the requirements of a legal framework either opening the gate to EU market or solely to the national territory. In particular, a thorough verfication is recommended if waste is intended to serve as a feedstock for certain fertilising products.

SHORT SUMMARY FOR PRACTITIONERS

NATIVE version

L'objectif de RUSTICA est de favoriser l'émergence d'une filière en économie circulaire d'engrais biosourcés à partir des déchets de fruits et légumes. La validation se fait au niveau régional et un site pilote pour les tests fertilisation est établi en Pays de la Loire. Pour rendre disponible ces nouveaux engrais sur le marché, l'environnement légal est primordial. Outre l'accès au marché via les prescriptions juridiques du nouveau règlement européen sur les fertilisants, des pistes peuvent être dégagées en tirant parti du code rural, de l'autorisation de mise sur le marché et/ou d'un large éventail de normes en France.

Cependant, les nouvelles chaînes de valeur et les nouveaux produits doivent être évalués individuellement quant à leur aptitude à répondre aux exigences d'un cadre juridique pour intégrer le marché national et européen. De là, une vérification approfondie est recommandée afin de déterminer si les déchets peuvent être destinés à servir de matière première dans la fabrication de produits type engrais et fertilisants.

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

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#24

PRACTICE ABSTRACT

PAYS DE LA LOIRE - LEGAL POINTS

RUSTICA test case: A view on legal points in Pays de la Loire

CONTEXT

To date, vast quantities of waste along the way from agricultural production to market are considered dispensable and are disposed. Simultaneously, linear production chains dominate production and supply of fertilisers rather than models focusing on valuable nutrient substances from waste. Hence, new solutions are needed by incorporating the benefits of regional circular concepts.

PROBLEM

Despite manifold possibilities on the use of fruit and vegetable residues for fertiliser production already established in EU and national legal frameworks, placing on the market in France needs a precise examination if compliance with legal requirements can be achieved. Speciifc rules need to be abide by if waste is set as the feedstock or starting point for the manufacture of fertiisers.

SOLUTION

RUSTICA comprehensively tackles the issues of legislative and political environment related to circular bio-based fertilisers, thereby analysing legislative situations from the international and EU perspective to natonal and regional stipulations in Pays de la Loire. Furthermore, the RUSTICA project involves investigations on rules concerning application of fertilisers in the EU and their transpoisition in France and Pays de la Loire. Moreover, legal aspects of organic farming are embraced by the studies. 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 has been prepared.
2. A dedicated summary on major criteria in national and regional legislation in France and Pays de la Loire relevant for stakeholders and marketing of the new technologies is elaborated.
3. An integration of the subject into workshops enabling a broad discussion on legal situations, positions and future needs in the Pays de la Loire test region has been made.

PRACTICAL RECOMMENDATIONS

- An evaluation of the feedstocks and precursors of fertiliing products identifying their legal options for the individual value chains;
- A verification of the processing methods and comparison with legal requirements to recognize 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., water (nitrate) and fertiliser application;

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