FERTIMANURE

Deliverable

Project Acronym: FERTIMANURE

Project full name: Innovative nutrient recovery from secondary sources – Production of high-added value FERTIlisers from animal MANURE

Grant Agreement No. 862849

D7.8. EIP Practice Abstracts

Project start date	January 1st, 2020
Duration in months	54
Deliverable due date	June 30st, 2024
Actual submission date	June 30st, 2024
Work package concerned	7
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This project has received funding from
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under grant agreement No. 862849

Preface

The FERTIMANURE project's main objective is to develop, integrate, test, and validate innovative nutrient management strategies to efficiently recover mineral nutrients and other relevant products with agronomic value from animal manure, to finally obtain reliable and safe fertilisers that can compete in the European fertilisers market.

The aim of the EIP practice abstracts is to ensure uptake by farmers by outlining the benefits and practical recommendations for the use of the produced BBFs and TMFs.

The resulting innovative knowledge and easily accessible end-user material from this project will feed into the EIP AGRI (The agricultural European Innovation Partnership) website for broad dissemination. The end-user material to be produced contains a substantial number of summaries for practitioners in the EIP common format ("practice abstracts"), including the characteristics of the project (e.g., contact details of partners, etc.). This is the third and last set of practice abstracts produced by FERTIMANURE, containing the last outcomes/recommendations which are ready for practice.

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Document History

Date	Author	Action	Status
30th April, 2024	Gabriele Sacchettini	1st draft revision	Draft
24th May, 2024	Gabriele Sacchettini	2nd draft revision	Draft
14th June, 2024	Isabelle Grommet	3rd draft revision	Draft
26th June, 2024	Laia Llenas	Approved by UVIC	Approved by PC
3rd October, 2024	Stéphanie Roosa	4th draft revision after reviewer comments	Reviewed version

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Summary

This document contains under WP7 “Dissemination and Communication” the last part of Task 7.4 *EIP Practice abstracts*. This deliverable completes the previous D7.8 delivered at M18 and M36 by providing the final set of six abstracts, which are due to be submitted in Month 54. The topics include:

- Practice Abstract 10 - FERTIMANURE Regulatory Tool
- Practice Abstract 11 - FERTIMANURE Business plans and business models for sustainable manure management
- Practice Abstract 12 - FERTIMANURE BBFs in the context of organic farming
- Practice Abstract 13 - Development and features of the FERTIMANURE Decision Support System
- Practice Abstract 14 - FERTIMANURE Tailor-Made Fertiliser (TMF) Soil-Crop Nutrition Tool
- Practice Abstract 15 - FERTIMANURE Manure valorisation - Dutch pilot at Arjan Prinsen Farm

The aim of the EIP practice abstracts is to ensure uptake by farmers by outlining the benefits and practical recommendations for the use of the produced BBF and TMF.

The resulting innovative knowledge and easily accessible end-user material from this project will feed into the EIP AGRI (The agricultural European Innovation Partnership) website for broad dissemination. The end-user material produced contains a substantial number of summaries for practitioners in the EIP common format ("practice abstracts"), including the characteristics of the project (e.g., contact details of partners, etc.). A total of 15 practice abstracts have been produced by FERTIMANURE, containing all the outcomes/recommendations which are ready for practice and delivered in 3 different sets in: M18, M36 and M54. The EIP practice abstracts produced in the previous D7.8 (delivered at M18 and M36) are listed here under:

- Practice Abstract 1 - H2020 FERTIMANURE project objectives
- Practice Abstract 2 - Changes to the EU fertiliser regulation will allow for harmonization of criteria for organic materials for fertilising purposes (including BBFs) across the Member States
- Practice Abstract 3 - Innovative on-farm pilots to recover nutrients from manure Short summary
- Practice Abstract 4 - Existing nutrient imbalances in European regions
- Practice Abstract 5 - Manure valorisation at the on-farm Belgian pilot plant
- Practice Abstract 6 - Manure valorisation at the on-farm Dutch pilot plant
- Practice Abstract 7 - SWOT analysis of BBFs produced in the project framework
- Practice Abstract 8 - Agronomic performance of BBFs
- Practice Abstract 9 - The results of on-farm TMFs production

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FERTIMANURE

Content

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List of Abbreviations

BBFs	Bio-based fertiliser
TMFs	Tailor-made fertiliser
EU	European Union
N	Nitrogen
K	Potassium
C	Carbon
LF	Liquid Fraction
SF	Solid Fraction
AD	Anaerobic Digester
NPK	Nitrogen-Phosphorus-Potassium

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1. Introduction

The FERTIMANURE project's main objective is to develop, integrate, test, and validate innovative nutrient management strategies to efficiently recover mineral nutrients and other relevant products with agronomic value from animal manure, to finally obtain reliable and safe fertilisers that can compete in the European fertilisers market.

In order to ensure the uptake by farmers, FERTIMANURE delivered EIP practice abstracts which outlined the benefits and practical recommendations for the use of the produced BBF and TMF. The deliverable 7.8. was submitted at M18, M36 and M54, with the aim of describing the content of these abstracts. Over the first 36 months, nine practice abstracts were produced and mentioned in D7.8 of M18 and M36:

- 1 - H2020 FERTIMANURE project objectives
- 2 - Changes to the EU fertiliser regulation will allow for harmonization of criteria for organic materials for fertilising purposes (including BBFs) across the Member States
- 3 - Innovative on-farm pilots to recover nutrients from manure Short summary
- 4 - Existing nutrient imbalances in European regions
- 5 - Manure valorisation at the on-farm Belgian pilot plant
- 6 - Manure valorisation at the on-farm Dutch pilot plant
- 7 - SWOT analysis of BBFs produced in the project framework
- 8 - Agronomic performance of BBFs
- 9 - The results of on-farm TMFs production

This document contains the last set of Practice Abstracts that have been produced to be able to disseminate relevant project outcomes to farmers and practitioners (M54). These 6 new abstracts include the following topics:

- FERTIMANURE Regulatory Tool
- FERTIMANURE Business plans and business models for sustainable manure management
- FERTIMANURE BBFs in the context of organic farming
- Development and features of the FERTIMANURE Decision Support System
- FERTIMANURE Tailor-Made Fertiliser (TMF) Soil-Crop Nutrition Tool
- FERTIMANURE Manure valorisation - Dutch pilot at Arjan Prinsen Farm

This is the first version of the third set of the Practice Abstracts, which means that we have produced them in English because they still need to be approved by the European Commission. As soon as the Practice Abstracts are approved by the EU, they will be sent to the EIP-AGRI, as stated in the Excel file, and also, they will be translated to all consortium languages (FR – ES – IT – HR and NL). It is important to mention that the information of the common format for interactive innovation projects, in excel format, is presented in this deliverable by taking into account the mandatory and recommended fields.

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2. EIP-AGRI Common format

Project Identification

Please indicate whether the information refers to a multi-actor project or a thematic network	Multi-actor project

Project Information

Project identifier (see INSTRUCTIONS)	2020H2020_862849_FERTIMANURE
Title of the project in native language (*can be the language of the coordinator / one of the partners - otherwise repeat the title in English*)	Innovative nutrient recovery from secondary sources – Production of high-added value FERTIlisers from animal MANURE
Title of the project in English (*provide the project ACRONYM + short title within the characters limit*)	FERTIMANURE - Innovative nutrient recovery from secondary sources – Production of high-added value FERTIlisers from animal MANURE
Geographical location	
Country (*of the coordinator*)	ES
Main geographical location (NUTS3) (of coordinator - *for geolocalisation on map*)	ES511 – Barcelona
Editor of the text: person/organisation responsible for delivering the text	Wageningen University and Research IPS Konzalting UVIC RITTMO

Project coordinator (lead-partner) according to the cooperation/consortium agreement:

Name	Fundacio Universitaria Balmes (UVic-UCC)
Address	Carrer Perot Rocaguinarda 17, VIC Barcelona 08500
E-mail	laia.llenas@uvic.cat
Telephone	0034 93 881 61 68

Project period:

start year (YYYY)	2020
end year (YYYY)	2024

Project status: ongoing (after selection of the project) or completed (after final payment)	Ongoing

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Main **funding source** (Rural development programme, H2020, or other EU, national/regional or private funds)	H2020
Total budget of the project (total costs - in euros)	8.394.170,75
Objective of the project in English: what problems/opportunities does the project address that are relevant for the practitioner/end-user, and how will they be solved? - (300-600 characters, word count – no spaces)	Develop, integrate, test and validate innovative Nutrient Management Strategies to efficiently recover mineral nutrients and other relevant products with agronomic value (organic amendments and biostimulants) from animal manure, to finally obtain reliable and safe fertilisers that can compete in the European fertilizers market.
Description of project activities in English: (max 600 characters, word count – no spaces): short summary highlighting main project activities.	The main project activities include setting up 5 on-farm experimental pilots, which have been designed to offer replicable, viable and sustainable solutions for valorising the main types of livestock wastes. These pilots will produce bio-based fertilisers which will further be used to create tailor-made fertilisers to compete with current synthetic fertilisers on the market.

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Project Partners

	Name	Address	E-mail	Telephone	Type of partner
project coordinator (lead partner) *from PROJECT INFORMATION*	Fundacio Universitaria Balmes (UVic-UCC)	Carrer Perot Rocaguinarda 17, VIC Barcelona 08500	laia.llenas@uvic.cat	+3493881 6168	research institute
project partner	Universiteit Gent (UGent)	SINT PIETERSNIEUWSTRAAT 25, GENT9000, Belgium	erik.meers@ugent.be aurore.assaker@ugent.be	+3292645 950	research institute
project partner	STICHTING WAGENINGEN RESEARCH (WENR)	DROEVENDAALSESTEEG 4, WAGENINGEN 6708 PB, Netherlands	oscar.schoumans@wur.nl	+3131748 6446	research institute
project partner	UNIVERSITA DEGLI STUDI DI MILANO (UMIL)	Via Festa Del Perdono 7,MILANO 20122	fabrizio.adani@unimi.it	+3902503 16545	research institute
project partner	ACONDICIONAMIENTO TARRASENSE ASSOCIACION (LEITAT)	CARRER DE LA INNOVACIO 2, TERRASSA 08225, Spain	mjorba@leitat.org	+3493788 2300	research institute
project partner	POLE GREENWIN (GWin)	RUE AUGUSTE PICCARD 20, GOSSELIES 6041 ,Belgium	rodrigo.arandi@greenwin.be	+3247094 5425	SME
project partner	European Landowners Organization (ELO)	RUE DE TREVES 67,BRUXELLES 1040, Belgium	projects@elo.org	+3222343 000	NGO
project partner	IPS KONZALTING DOO ZA POSLOVNE USLUGE (IPS)	DR. ANTESTARCEVICA 66, SISAK GRAD SISAK 44000, Croatia	ams@ips-konzalting.hr	+3859899 53630	SME
project partner	FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTENFORSCHUNG E.V. (Fraunhofer)	HANSASTRASSE 27C, MUNCHEN 80686,Germany	sophie.schoenfeld@umsicht.fraunhofer.de	+4996618 155620	research institute

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	Name	Address	E-mail	Telephone	Type of partner
project partner	DORSET GREEN MACHINES BV (DORSET)	WEVERIJ 26, AALTEN 7122MS, Netherlands	e.haaring@dorset.nu	+31543475355	SME
project partner	MAATSCHAP J.G EN J.A. PRINSEN (APF)	BORCULOSEWEG 42, HAARLO7273 SJ, Netherlands	arjan@groot-zevert.nl	+31651249107	SME
project partner	ASSEMBLEE PERMANENTE DES CHAMBRES D'AGRICULTURE (APCA)	AVENUE GEORGE V 9, PARIS 8 75008, France	ka-ho.yim@apca.chambagri.fr	+33153571118	other
project partner	AGRARIA PLANA DE VIC I SECCIO DE CREDIT SCCL (CPV)	CARRETERA BARCELONA-PUIGCERDA KM 70.4, GURB BARCELONA 08503, Spain	gmuns@planadevic.cat	+34938855503	other
project partner	FERTINAGRO BIOTECH SL (FERT)	CALLE BERLIN POLIGONO LA PAZ185, TERUEL 44195, Spain	bego.arrufat@tervalis.com	+34978623077	other
project partner	RECH INNOV TRANSFERT TECHN MAT FERT ORG (RITTMO)	37 RUEDE HERRLISHEIM, COLMAR 68000, France	laure.metzger@rittmo.com	+33389804700	research institute
project partner	AGRIFUTUR SRL (AGRI)	VIA CAMPAGNOLE 8, ALFIANELLO 25020,Italy	roberto.kron-morelli@agrifutur.it	+390309934776	SME
project partner	DEPARTAMENT D'AGRICULTURA, RAMADERIA, PESCA I ALIMENTACIO (DARP)	GRAN VIA DE LES CORTS CATALANES 612-614, BARCELONA 08007, Spain	carlos.ortiz@gencat.cat	+34973220868	other
project partner	FERTILIZERS EUROPE (FertilizersEU)	AVENUE DES NERVIENS 9-31,BRUXELLES 1040, Belgium	cecilia.dardes@fertilizerseurope.com	+32472801475	other
project partner	INSTITUTO NACIONAL DE TECNOLOGIA AGROPECUARIA (INTA)	Rivadavia 1439, BUENOS AIRES 1033, Argentina	beily.maria@inta.gob.ar	+54116533382	research institute

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Audiovisual material

Title/description (in English)	URL	Additional comments
FERTIMANURE project website	https://www.fertimanure.eu/en/	Main communication and dissemination channel of the project
FERTIMANURE explanatory video	https://www.fertimanure.eu/en/publication/consult/12	General video explaining the most important aspects of the FERTIMANURE project
FERTIMANURE leaflet	https://www.fertimanure.eu/en/publication/consult/6	Communication material that explains the what, mission and objectives, circular economy strategy, on-farm pilots, aims of the project, parnters involved, contacts, EU funding phrases
FERTIMANURE leaflet	Consulter une news - Fertimanure	Communication material that explains the results of the project.
FERTIMANURE region cards	https://www.fertimanure.eu/en/publication/consult/17	Compilation of data related to all the manure generation and management costs in Barcelona (Spain), Achterhoek (The Netherlands), Oberpfalz (Germany), Flanders (Belgium), Grand Est and Brittany (France) and Italy.
FERTIMANURE explanatory videos with subtitles in all of the consortium languages	https://www.youtube.com/watch?v=LSkuObmCk_Q&t=21s https://www.youtube.com/watch?v=VZIp8-I5WYI&t=98s https://www.youtube.com/watch?v=R-YTiDBY1M4 https://www.youtube.com/watch?v=4CXKsXsufKI&t=44s https://www.youtube.com/watch?v=Dy6VFe97USU&t=20s https://www.youtube.com/watch?v=x4Dv3w5DliE&t=136s	These videos were published in the Youtube channel during the month of May, June and July 2021. These have subtitles in Catalan, Croatian, Dutch, French, German, and Italian.
Dutch on-farm pilot explanatory video - English subtitles	https://www.youtube.com/watch?v=8ph5ZDezXtw&t=12s	This video was published in the FERTIMANURE's YouTube channel on February 2022
Dutch on-farm pilot explanatory video - no subtitles	https://www.youtube.com/watch?v=gIsj0HRgVbA	This video was published in the FERTIMANURE's YouTube channel on February 2022
Spanish on-farm pilot explanatory video - no subtitles	https://www.youtube.com/watch?v=Om8ajUdzz5s&t=108s	This video was published in the FERTIMANURE's YouTube channel on October 2022
German on-farm pilot explanatory video - English subtitles	https://www.youtube.com/watch?v=G3njMsZ2LcU&t=4s	This video was published in the FERTIMANURE's YouTube channel on November 2022
Belgian on-farm pilot explanatory video - English subtitles	https://youtu.be/zhHmOtXkSOo?si=n5bXXAFsovd1u_Sc	This video was published in the FERTIMANURE's YouTube channel on November 2022

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Keywords

Keyword - category 1	Fertilisation and nutrients management
Keyword - category 2	Waste, by-products and residues management
Keyword - category 3	Agricultural production system

Websites

Title/description	**URL**	**Additional comments**
FERTIMANURE official project website	http://fertimanure.eu	-

Links to other website(s) hosting information on the project (results) that are available after the project has ended, by preference using the existing local/regional/national communication channels that practitioners most often use.

Title/description	**URL**	**Additional comments**
Repositori Institucional de la UVIC	http://repositori.uvic.cat/handle/10854/6620	-

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3. EIP Practice abstract 10

Short title:

FERTIMANURE - Fertilising Products Regulation (FPR) Tool

Short summary for practitioners (in English):

The Fertilising Products Regulation (FPR) tool is a regulatory tool created to facilitate comparison of fertilising products with European Regulation 2019/1009 requirements to validate their possible placing on the European market. To be authorised, a product must be 1) made of authorised components, and 2) meet the regulatory requirements defined according to the functionality of the product. Thus, the tool aims to analyse these two aspects of the regulation, to help fertiliser-concerned people (notified bodies, producers, sellers, end users) to assess the compliance of a given Bio-Based Fertiliser (BBF).

The tool is designed as a product simulator and the user is guided throughout the whole process. Firstly, the raw material (one BBF or in mixture) is created based on physico-chemical information (input data) to constitute the final product. Then, the tool checks the compliance of the raw materials with the Component Material Category (CMC) requirements described in the EU regulation. Finally, based on valid CMC(s), the tool models and automatically checks the compliance of the final product with the Product Function Categories (PFCs) requirements.

In case of non-compliance with any categories, the tool informs users by highlighting invalid parameters that can be further checked and possibly corrected by modifying raw materials, production process or looking for other applications.

The tool is dedicated to verifying compliance with the European Regulation. However, it does not constitute an official validation for marketing authorisation, which is only delivered by notified bodies certified by the European Union. The FPR tool runs with Excel (v.2016 and above) and is available for free download on the FERTIMANURE website.

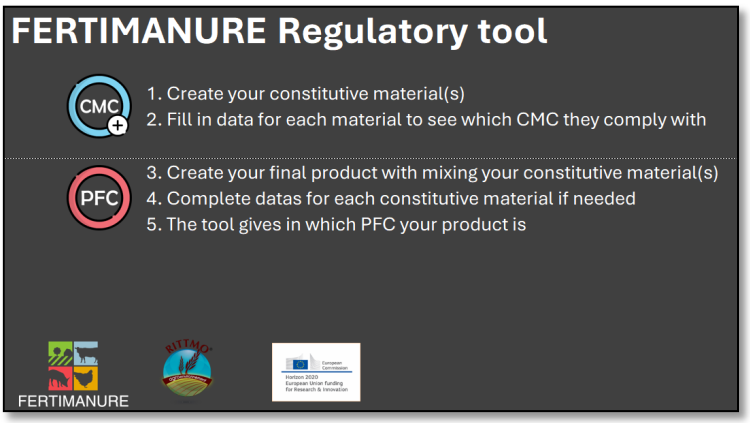

Figure 1: FPR tool homepage

PROJECT WEBSITE:

https://www.fertimanure.eu

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4. EIP Practice abstract 11

Short title

FERTIMANURE - Business plans and business models for sustainable manure management

Short summary for practitioners (in English):

The production of novel bio-based fertilisers (BBFs) poses considerable challenges, particularly concerning economic viability and environmental sustainability. Achieving successful production of high-quality BBFs that can compete with mineral ones, necessitates the establishment of a well-equipped production facility, complete with comprehensive pre- and post-treatment capabilities.

The FERTIMANURE project has generated business plans for 7 end-products (3 mineral fertilisers, 3 organic amendments and 1 biostimulant) of 18 produced BBFs during the project. One Business Model Canvas (BMC) for the fertiliser industry and 8 BMCs (covering consortium countries) for farmers were also developed. These serve to illustrate the fundamental components of each business, providing a structured framework for conceptualising BBF production.

The business plans for the specified products have been devised utilising two methodologies: the cost-based approach and the substitute nutrient method. Primary conclusions reveal negative basic profitability and return on investment, therefore lacking economic justification for establishing BBFs production. Given the significant costs associated with production facilities and equipment, production is only profitable and economically viable when large quantities are produced, which implies substantial inputs of manure.

Acknowledging that the market might not fully grasp the pricing dynamics of BBFs, it is essential to include governments to tackle this challenge through financial mechanisms, potentially in the form of subsidies, which are vital in facilitating the market's transition to sustainable practices, making BBFs more economically viable and accessible.

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5. EIP Practice abstract 12

Short title:

FERTIMANURE - BBFs in the context of organic farming

Short summary for practitioners (in English):

The organic farming sector has emerged as a response to concerns regarding environmental and health impacts associated with conventional agricultural practices, emphasising sustainability and long-term food security. Organic farming principles prioritise environmental protections, biodiversity, minimising external inputs, focusing on closed nutrient cycles and reliance on natural resources (EU Reg. 2018/848), and restricts the use of certain products and substances (Implementing Regulation (EU) 2021/1165).

The FERTIMANURE project aligns with the goals of organic farming by implementing circular economy strategies to produce high-quality bio-based fertilisers (BBFs) from animal manure. These BBFs enhance nutrient management, improve soil fertility, and contribute to sustainable agriculture. Through innovative biorefinery processes, FERTIMANURE develops various bio-based fertilisers, including organic soil conditioners, recovered phosphorus products, and plant biostimulants, with some identified as potentially authorisable for use in the organic sector. Still, a significant challenge lies in the origin of the raw manure, sourced from conventional farms (otherwise recognised as "factory-farming origin"). Relevant gaps on animal welfare and potential presence of pollutants in conventional farms are argued among other reasons. Within the European Commission, discussions are underway to reconsider this restriction, potentially allowing certain recycled nutrients from conventional farming into organic systems. This shift could promote sustainable nutrient cycles and reduce dependency upon non-renewable sources but requires broader stakeholder dialogue for consensus.

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6. EIP Practice abstract 13

Short title:

Development and features of the FERTIMANURE Decision Support System

Short summary for practitioners (in English):

The sustainability of agricultural practices in Europe faces a critical challenge due to the overreliance on fossil-based mineral fertilisers. In response, the FERTIMANURE project was initiated, aiming to transition towards sustainable agricultural practices by valorising waste streams to produce bio-based fertilisers (BBFs).

The FERTIMANURE Decision Support System (DSS) was developed to facilitate decision-making relating to nutrient management in sustainable agriculture. The tool, based on quantitative modelling, consists of three main sections: User Inputs, Model Outputs, and Model Details.

The User Inputs section allows users to define farm-specific data, including feedstock composition, land application parameters, and biorefinery selection. The integrated Costs module enables users to define cost parameters (BBFs price, Pilots CAPEX and pilots OPEX) that influence profitability, while the Revenue and Financial Indicator module estimates potential revenues and financial indicators such as Net Present Value (NPV).

In the Model Outputs section, the DSS provides the user with five main results based on the user input and default parameters. These include the total amount of BBFs produced, associated costs, potential revenues, financial indicators, and environmental impacts.

The development of the FERTIMANURE DSS represents a significant achievement in promoting sustainable agricultural practices. The tool enables farmers and stakeholders to assess various scenarios and make informed decisions to improve manure management and achieve sustainability goals. The DSS tool is available for free download at https://www.fertimanure.eu/en/achievements.

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7.EIP Practice abstract 14

Short title

FERTIMANURE - Tailor-Made Fertiliser (TMF) Soil-Crop Nutrition Tool

Short summary for practitioners (in English):

The EU has adopted a Circular Economy Action Plan, which aims to extend product and material lifespans while reducing greenhouse gas emissions. Within agriculture, recycling of excess manure into fertilisers is crucial. Europe lacks phosphate rock mines to produce phosphorus fertilisers, while high amounts of natural gas are used to produce nitrogen fertilisers using industrial Haber-Bosch technology. Manure processing techniques have advanced in recent years, focusing on recovering nutrients to produce bio-based fertilisers (BBFs). The FERTIMANURE project proposes using tailor-made fertilisers (TMFs) designed for specific crop-soil combinations, utilising bio-based fertilisers in combination with synthetic mineral fertilisers and/or manure.

A TMF Crop-Soil Nutrition tool has been developed which helps users to determine optimal combinations of BBFs, synthetic mineral fertilisers and/or manure. The tool facilitates transparent TMF creation, relying on data from FERTIMANURE pilot installations to inform BBF compositions. The tool enables optimisation based on crop requirements, legal restrictions, soil status, and the composition and pricing of BBF, mineral fertiliser and manure. Pricing concepts consider nutrient value and CAPEX/OPEX of the BBFs. If nutrient value pricing is used in the optimising procedure, the lowest costs are calculated; it was concluded that mineral fertilisers can be economically substituted with BBFs. The tool assists in defining optimal fertiliser combinations, adaptable to user-defined conditions, while ensuring nutrient and legal compliance. This systematic and transparent approach offers potential for broader application and continuous improvement beyond project completion.

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8.EIP Practice abstract 15

Short title

FERTIMANURE Manure Valorisation - Dutch Pilot at Arjan Prinsen Farm

Short summary for practitioners (in English):

The EU project FERTIMANURE has developed innovative technologies for processing animal manure in five on-farm pilots, with the aim to use nutrients more efficiently, reduce environmental impacts and create a positive business case. One pilot is being undertaken at Arjan Prinsen Farm, a dairy farm in the Achterhoek region in the Netherlands. Here, cattle slurry is anaerobically digested on-farm for biogas production, followed by the production of biobased and tailor made fertilisers rich in nitrogen (N), phosphorus (P), potassium (K) and/or organic matter (C). The nutrient recovery is done using solid-liquid separation with a screw press, followed by N stripping with a stripper-scrubber installation. Following a series of processes, a concentrated ammonium sulphate solution, rich in N (6-7% N, pH 4.5 - 5.5), and a liquid fertiliser rich in K are produced. These biobased fertilisers can be used on the farm's own agricultural land or by other farmers. Out of dairy slurry, about 10% soil improver, 1% P sludge, 2% ammonium sulphate solution and 87% of K fertiliser are produced. Field and pot experiments have shown similar agronomic yields for grass for the ammonium sulphate solution compared to mineral fertiliser (CAN). Depending on nutrient management in fields, the products will have a small impact on air emissions (ammonia, nitrous oxide) and nitrate losses to groundwater, compared to untreated manure and digestate. The business case of the nutrient recovery part of the installation is positive. Besides the income of biogas production and energy use on farm, soil conditioners provide further income. Furthermore, by N stripping, less surplus manure has to be exported from the farm against high costs.

Pilot video: https://youtu.be/8ph5ZDezXtw

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Conclusions

The deliverable includes the third set of 6 EIP Practice abstracts under Task 7.4 of the FERTIMANURE project. They outline the benefits and practical recommendations for the use of bio-based and tailor-made fertilisers to ensure the uptake by farmers.

In total 15 practical abstracts have been developed under the Fertimanure project :

- Practice Abstract 1 - H2020 FERTIMANURE project objectives
- Practice Abstract 2 - Changes to the EU fertiliser regulation will allow for harmonization of criteria for organic materials for fertilising purposes (including BBFs) across the Member States
- Practice Abstract 3 - Innovative on-farm pilots to recover nutrients from manure Short summary
- Practice Abstract 4 - Existing nutrient imbalances in European regions
- Practice Abstract 5 - Manure valorisation at the on-farm Belgian pilot plant
- Practice Abstract 6 - Manure valorisation at the on-farm Dutch pilot plant
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This project has received funding from
the EU Horizon 2020 Research and Innovation Programme
under grant agreement No. 862849

FERTIMANURE

FERTIMANURE

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

PROJECT COORDINATOR

Fundació Universitària Balmes (Spain)

CONSORTIUM

Ghent University (Belgium)
Wageningen Environmental Research (The Netherlands)
University of Milan (Italy)
Leitat (Spain)
GreenWin (Belgium)
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IPS Konzalting (Croatia)
Fraunhofer (Germany)
Dorset Green Machines (The Netherlands)
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French Chamber of Agriculture (France)
Cooperativa Plana de Vic (Spain)
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PROJECT WEBSITE:

https://www.fertimanure.eu

This project has received funding from
the EU Horizon 2020 Research and Innovation Programme
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Brief project summary

The mission of the FERTIMANURE project is to provide innovative solutions (technology, end-products, and business models) that solve real issues, ie the manure challenge, and help farmers with the challenges that they are currently facing. FERTIMANURE will develop, integrate, test and validate innovative nutrient management strategies so as to efficiently recover and reuse nutrients and other products with agronomic value from manure, to ultimately obtain reliable and safe fertilisers that can compete in the EU fertiliser market.

The FERTIMANURE project will cover both technological and nutrient management approaches. The technological side will be addressed with the implementation of 5 innovative & integrated on-farm experimental pilots for nutrient recovery in the most relevant European countries in terms of livestock production (Spain, France, Germany, Belgium, The Netherlands), whereas nutrient management will be addressed through 3 different strategies adapted to mixed and specialised farming systems:

Strategy #1 with on-farm production and use of bio-based fertilisers (BBF)(1) , **Strategy #2** with on-farm BBF production and centralised tailor-made fertilisers (TMF)(2) production, and **Strategy #3** with on-farm TMF production and use.

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

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

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

LIST OF BBFs Produced in FERTIMANURE

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

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16	BE-AW	Ammonium water
17	FR-BC	Biochar
18	FR-AS	Ammonium sulphate
19	FR-LK	Liquid K-fertiliser

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

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

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

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

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