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

D7.7. EIP Practice Abstracts (second version)

Project start date	January 1st, 2020
Duration in months	48
Deliverable due date	December 31st, 2022
Actual submission date	December 27th, 2022
Work package concerned	7
Author(s) and Co-author(s)	Authors: Kimo van Dijk, Oscar Schoumans, Arjan Prinsen, Ruben Vingerhoets, Ivona Sigurnjak, Erik Meers, Ana-Marija Spicnagel, Natalija Vugrin, Herminia de la Vega
Contributor(s)	Wageningen University & Research, Ghent University, IPS Konzalting, Fertinagro Biotech

Disclaimer: This deliverable a. Reflects only the author's view; and b. Exempts the Commission from any use that may be made of the information it contains.

This project has received funding from
the EU Horizon 2020 Research and Innovation Programme
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 the agronomic value from animal manure to obtain reliable and safe fertilisers that can compete in the European fertilisers market.

The EIP practice abstracts aim to ensure uptake by farmers by outlining the benefits and practical recommendations for using 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.). A full package of practice abstracts will be produced by FERTIMANURE, containing all the outcomes/recommendations ready for practice. A total target number of 12 practice abstracts is foreseen for the project, which is expected to be delivered in 3 different sets during M18, M36 and M48.

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

Document History

Date	Author	Action	Status
December 5th, 2022	Rodrigo Arandi - Klee (GWIN)	1st draft revision	Draft
December 9th, 2022	Micaela Cosgrove (ELO)	2nd Draft	Draft
December 20th, 2022	Nagore Guerra and Laura Díaz (UVIC)	Reviewed by UVIC	Draft
December 27th, 2022	Laia Llenas	Approved by UVIC	Approved by PC

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

Summary

This document contains, under WP7 “Dissemination and Communication”, the second part of Task 7.4 *EIP Practice abstracts*. This second set includes 5 new practice abstracts covering the following topics: the on-farm Belgian pilot plant, the on-farm Dutch pilot plant, the SWOT analysis of BBFs produced in the project framework, the agronomic performance of BBFs, and the results of on-farm TMFs production.

The EIP practice abstract aims 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 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.). A full package of practice abstracts will be produced by FERTIMANURE, containing all the outcomes/recommendations ready for practice. A total target number of 12 practice abstracts is foreseen for the project, which is expected to be delivered in 3 different sets of 4 practice abstracts each: M18, M36 and M48.

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

FERTIMANURE

Content

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

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

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

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 the agronomic value from animal manure to finally obtain reliable and safe fertilisers that can compete in the European fertilisers market.

This document contains under WP7 "Dissemination and Communication" the second part of Task 7.4 *EIP Practice abstracts*. The second set of 5 abstracts are included, which are due to be submitted in Month 36. The topics include the on-farm Belgian pilot plant, the on-farm Dutch pilot plant, the SWOT analysis of BBFs produced in the project framework, the agronomic performance of BBFs, and the results of on-farm TMFs production.

This is the first version of the second 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 EU approves the Practice Abstracts, they will be sent to the EIP-AGRI, as stated in the Excel file, and also, they will be translated to all consortium languages. It is essential 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.

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

FERTIMANURE

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 Ghent University IPS Konzalting Fertinagro Biotech

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)	2023

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

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

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 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 five on-farm experimental pilots 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.

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

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	+34938816168	research institute
project partner	Universiteit Gent (UGent)	SINT PIETERSNIEUWSTRAAT 25, GENT9000, Belgium	erik.meers@ugent.be aurore.assaker@ugent.be	+32926450	research institute
project partner	STICHTING WAGENINGEN RESEARCH (WENR)	DROEVENDAALSESTEEG 4, WAGENINGEN 6708 PB, Netherlands	oscar.schoumans@wur.nl	+31317486446	research institute
project partner	UNIVERSITA DEGLI STUDI DI MILANO (UMIL)	Via Festa Del Perdono 7,MILANO 20122	fabrizio.adani@unimi.it	+390250316545	research institute
project partner	ACONDICIONAMIENTO TARRASENSE ASSOCIACION (LEITAT)	CARRER DE LA INNOVACIO 2, TERRASSA 08225, Spain	mjorba@leitat.org	+34937882300	research institute
project partner	POLE GREENWIN (GWin)	RUE AUGUSTE PICCARD 20, GOSSELIES 6041 ,Belgium	rodrigo.arandi@greenwin.be	+32470945425	SME
project partner	European Landowners Organization (ELO)	RUE DE TREVES 67,BRUXELLES 1040, Belgium	projects@elo.org	+32223430000	NGO
project partner	IPS KONZALTING DOO ZA POSLOVNE USLUGE (IPS)	DR. ANTESTARCEVICA 66, SISAK GRAD SISAK 44000, Croatia	ams@ips-konzalting.hr	+385989953630	SME

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

	Name	Address	E-mail	Telephone	Type of partner
project partner	FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTENFORSCHUNG E.V. (Fraunhofer)	HANSASTRASSE 27C, MUNCHEN 80686,Germany	sophie.schoenfeld@umsicht.fraunhofer.de	+4996618155620	research institute
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	ALGAENERGY SA (ALGE)	AVENIDA DE EUROPA 19, ALCOBENDAS MADRID 28108, Spain	jmg@algaenergy.es	+34914902020	SME
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

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

	Name	Address	E-mail	Telephone	Type of partner
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	+541165333382	research institute

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

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 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-l5WYI&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

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

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	-

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

3. EIP Practice abstract 5

Short title:

Manure valorisation for the production of BBFs at the Belgian on-farm pilot

Short summary for practitioners (in English):

The Belgian pilot is an ammonia (NH_3) stripping-scrubbing plant which has been implemented in the manure treatment plant of the Bio Sterco pig farm. First, animal manure (95% of pig slurry and 5% of cattle slurry) is separated into a liquid (LF) and solid (SF) fraction by a centrifuge. The SF of manure is subsequently composted, whereas LF of manure is treated in the stripping-scrubbing unit to recover NH_3 as ammonium nitrate (AN) or ammonium sulphate (AS). The stripped LF of manure is biologically treated via nitrification/denitrification (NDN) system, and finally, the effluent of the NDN system is polished in a constructed wetland.

By increasing the pH (from 7.5 to 9.0) and the temperature (from 40 to 55 °C) of the LF of manure, NH_3 volatilisation (30-60% of NH_3) is induced in the NH_3 stripping unit. The volatilised NH_3 embedded in the ventilation flow (1,000–1,800 m3 h-1) is sent to a scrubber column where HNO_3 or H_2SO_4 are added as a sorbent, resulting in AN or AS, respectively. Throughout the monitoring campaign, on average, 5.9 kg total N was embedded in 1 tonne of influent, including 3.4 kg NH_4-N and 2.5 kg organic N. During the stripping process, on average, 57 % of the NH_4-N (32% of total N) embedded in the LF of manure was recovered in the form of 7.5% N AS or 15% N AN (depending on the counter acid used) while consuming 13.8 kWh of energy. Both ammonium nitrate and ammonium sulphate fulfil all quality criteria needed to be recognised as RENURE products as they comply with the maximal TOC:TN, mineral N:TN ratio and maximal Cu and Zn content.

The Belgian pilot offers replicable and sustainable solutions for valorising liquid slurries (cattle and pig) to produce ammonium nitrate and ammonium sulphate. It can simultaneously remove N from the LF of manure to reduce the energy demand in further processing steps. At the same time, bio-based N solutions can be recovered to replace synthetic N fertilisers, which makes it an economically attractive technology for farmers.

PROJECT WEBSITE:

https://www.fertimanure.eu

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

4. EIP Practice abstract 6

Short title

Manure valorisation for the production of BBFs and TMFs at the Dutch on-farm pilot

Short summary for practitioners (in English):

At the Dutch pilot located at the Arjan Prinsen farm, cattle slurry is produced in the stable and it is collected in a continuously mixed cellar with a storage capacity of 400 m^3. The anaerobic digester (AD) is fed from this cellar by pumps every 140 minutes. The added co-substrates are solid farmyard manure and feed residues (hay, maize, remaining feed) which are mixed in a separate biological acidification tank together with a part of the digestate and part of the separated liquid fraction. The acidified mixture (after fermentation) is pumped to the AD in order to increase the biogas production due to easily decomposable material.

The produced digestate flows into a buffer tank with a storage capacity of 0.2 m^3. From there, it is fed batch-wise to a screw press with a 500 µm pore size filter to separate the digestate into a solid and liquid fraction. The solid fraction is rich in fibres and is therefore used as a soil conditioner, mainly sold to customers (hobby gardeners). The liquid fraction of digestate (still with large amounts of fine particles) is pumped to a settling tank, with an effective volume of 17 m^3, to remove part of the remaining particles before it is treated in the stripper.

This tank operates in batches, and alkaline material can be added to raise the pH to facilitate the precipitation and settling of phosphorus (P) to be collected as a P-rich sludge at the bottom. The remaining liquid fraction flows to the stripper that operates in batches of six hours, where ammonia is stripped to the gas phase and subsequently absorbed in the attached scrubber. Thereby concentrated ammonium sulphate and a liquid K fertiliser are produced.

The Dutch pilot offers replicable and sustainable solutions for valorising cattle manure to produce BBFs. The produced BBFs and TMFs can be used on their land or by other farmers.

PROJECT WEBSITE:

https://www.fertimanure.eu

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

5. EIP Practice abstract 7

Short title:

Agronomic performance of the BBFs and TMFs produced in the FERTIMANURE project

Short summary for practitioners (in English):

Currently, it is estimated that around 7.8 % of all livestock manure in Europe is processed. FERTIMANURE project aims to stimulate further processing of animal manure and to assess the agronomic and environmental performance of recovered BBFs, compared to their conventional counterparts.

The assessment of 15 BBFs produced in the FERTIMANURE is currently on-going, both at laboratory and field level. Combination of fully controlled lab trials and the field full scale trials provides a full range of data that allows full comprehension and comparison of novel fertilising products against mineral fertilising products. To this end, the FERTIMANURE consortium conducted 13 field trials and 6 pot trials across Spain, France, Belgium and the Netherlands to assess fertiliser potential of manure-derived ammonium sulphate, ammonium nitrate, ammonium water, biochar, liquid K solution (i.e. mechanically separated liquid fraction of digestate or manure after ammonia stripping) and several TMFs (i.e. blend of the BBF(s) and synthetic mineral fertilisers) in the cultivation of wheat, spinach, potatoes, maize, rye-grass, sauerkraut cabbage, sugar beet and grass.

Preliminary results show that, in terms of crop yield, nitrate residue, fertiliser efficiency, and greenhouse gas emissions, ammonium salts have the potential to be used as N fertilisers, being able to compete with the current N fertilisers available in the market. In addition, biochar has the potential to be used as a C source, whereas liquid K solution can be used to replace synthetic K fertilisers. The validation of results through the second year of field trials is ongoing.

PROJECT WEBSITE:

https://www.fertimanure.eu

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

6. EIP Practice abstract 8

Short title:

SWOT analysis of the BBFs produced in the framework of the project

Short summary for practitioners (in English):

With the aim of assessing the risks and for a better understanding of the placement of BBFs on the market, a SWOT analysis was carried out. This analysis is a simple but powerful tool for assessing internal (strengths and weaknesses) and external (opportunities and threats) factors that newly produced fertilisers may encounter on the market. A carefully designed SWOT was used to evaluate important statements between different stakeholders in the EU, and different values between end-users were observed. SWOT analysis was completed by 84 respondents.

As the greatest strength of BBFs, the respondents pointed out the fact that there is no leaching of nutrients from the root area, whereby plant growth is stimulated for a longer period of time. The least important strength was the ability to improve the profitability of plant production. The ability of BBFs to reduce the harmful impact on the environment and their contribution to sustainability were of great importance to respondents from Germany. Furthermore, they believe that EU standards and regulations make it challenging to sell BBFs in different countries, and they believe that this is one of the most significant weaknesses of BBFs. Other respondents do not share the same opinion. As the most significant weakness, respondents from Spain highlight the wrong assumption that BBFs have a slow effect of releasing nutrients, are more expensive and have problems with storage and smell. Respondents from Germany and Argentina pointed out that the sustainable use of manure for producing new fertilisers is an excellent opportunity for BBFs. For other respondents, this advantage is not of great importance. All countries, except Spain, do not consider the presence of harmful organic substances that could be transferred into the food chain to be a major threat to the production of BBFs. Furthermore, Croatia, Italy and Argentina believe that the biggest threat to BBFs is the difference in the certification process across the EU.

The SWOT analysis and stakeholder opinion represent an essential segment for further distribution and placement of BBFs on the market.

PROJECT WEBSITE:

https://www.fertimanure.eu

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

7. EIP Practice abstract 9

Short title

On-farm production of TMFs and field trials

Short summary for practitioners (in English):

Pig slurries are a by-product of intensive pig-breeding that have been used historically as a fertiliser. Nowadays, the increased concentration of livestock farms in certain areas, has led to the production of quantities of slurry that are above the reception capacity of local crops. For this reason, farmers have been forced to transport the slurry further away to find a cropland where it may be applied. This generates an additional cost to famers due to the low nutritional (fertiliser) value of the slurry, making it increasingly difficult to manage.

The solution to this problem can be the improvement of slurry by incorporating different components to make it suitable and profitable for application in croplands, where its potential use is limited or with prohibitive cost. Potato was selected as the target crop for the development of a slurry based TMF. The main reasons for selecting this crop were (1) its promotion by regional government in Aragon as a cash crop; and (2) the closeness of the trial field to the pig farm and production facilities of Fertinagro. For the obtention of the TMF, fresh pig slurry, NPK nutrients, humic acids and amino acids were mixed. Field trials were carried out in 2021 and 2022.

After the field trials completion, it could be observed that slurry can be improved on-farm and used for potato production as the expected yield can be achieved, compared to traditional synthetic fertilization. It is also possible to replace mineral fertilisers with organic fertilisers and give additional value to pig slurry since it can be applied to new cash crops, contributing to soil fertilisation (not only for disposal reasons).

PROJECT WEBSITE:

https://www.fertimanure.eu

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

8. Conclusions

The deliverable includes the second set of five EIP Practice abstracts under Task 7.4 of the FERTIMANURE project. Each abstract gives light to the manure valorisation at the Belgian on-farm pilot plant, manure valorisation at the Dutch on-farm pilot, SWOT analysis of BBFs produced in the project framework, agronomic performance of BBFs, and the results of on-farm TMFs production. At the same time, they outline the benefits and practical recommendations for the use of BBFs and TMFs to ensure the uptake by farmers. A minimum of three additional practice abstracts will be produced for being submitted at M48.

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

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)
European Landowners Organisation (Belgium)
IPS Konzalting (Croatia)
Fraunhofer (Germany)
Dorset Green Machines (The Netherlands)
Prinsen Dairy Company (The Netherlands)
French Chamber of Agriculture (France)
Cooperativa Plana de Vic (Spain)
AlgaEnergy S.A. (Spain)
Fertinagro Biotech (Spain)
RITTMO Agroenvironnement (France)
Agrifutur (Italy)
Departament d'Agricultura, Ramaderia, Pesca I Alimentació (Spain)
Fertilizers Europe (Belgium)
Instituto Nacional de Tecnología Agropecuaria (Argentina)

PROJECT WEBSITE:

https://www.fertimanure.eu

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

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)

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

14	BE-AN	Ammonium nitrate
15	BE-AS	Ammonium sulphate
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 the 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 have to be taken into account as a nutrient supplier. Consequently, the composition of the TMF (combination of BBF and MF) that the farmer will use can differ from the one produced in a centralised way.

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