

FERTILISATION



OPERATIONAL GROUPS AND INNOVATIVE PROJECTS



Unión Europea
Fondo Europeo Agrícola
de Desarrollo Rural
Europa invierte en las zonas rurales



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RURAL
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OPERATIONAL GROUPS AND INNOVATIVE PROJECTS

Fertilisation

EsRuralEsVital

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Introduction

This publication is a collection from Operational Groups and Innovation Projects about fertilisation in Spain. The National Rural Network (NRN) supports and spreads the innovative initiatives in the rural environment and facilitates exchange and transfer of knowledge amongst the principal actors in the research field and its practical application.

Presently, innovation plays an important role in European, state and local public policy.

The main instrument to promote innovation in rural areas is the European Innovation Partnership for agricultural productivity and sustainability (EIP-AGRI). The EIP-AGRI aims to speed up innovation in the agri-food and forestry sector, and therefore in rural areas, as well as to disseminate successful examples of experience in the territory through specific innovative projects. In addition, it seeks to match the range of science available to the demand from different sectors and help solve specific problems or make the most of opportunities to help increase competitiveness and improve living conditions in rural areas.

The Operational Groups (OGs) are groups of stakeholders from different sectors: agriculture, livestock, forestry, agri-food and forest-based industries, from public or private R&D&I training and consultancy centres, technology centres, non-profit institutions and more. These parties get together to solve a problem or make the most of an opportunity using an innovative, multisectoral and collaborative approach via an Innovative Project. Their work is subsidised by EAFRD through national and regional rural development programmes to set up the group and prepare its Innovation Project, as well as to implement it.

Furthermore, in the European context, there are other policies with synergies appearing within their commitment to innovation in rural areas. The Horizon 2020 research framework programme covers matters related to the agri-food and forestry sectors. Under this umbrella, there are thematic networks and research projects.

This dossier presents the outcomes from the exchange of experiences between Operational Groups and Innovative Projects on fertilisation organised by the NRN. It includes information units describing the Operational Groups and Innovative Projects, fostered by Measure 16 of the rural development programme in Spain in this matter, in addition to Horizon 2020 projects, whether or not they participated in the conference, with the aim of helping to disseminate them and enabling the different stakeholders to consult them

Conference to exchange experiences between Operational Groups and Innovation Projects on Fertilisation

On 8 July 2020, the National Rural Network (NRN) organised an exchange of experiences between Operational Groups, Innovative Projects and others from Horizon 2020 working on the matter of fertilisation. The exchange took place via a virtual meeting attended by more than 60 people representing private companies, public government administration, professional organisations, rural development groups and research centres.

Objectives:

The meeting was held with the following aims:

- To help create networks among the various parties involved or with an interest in fertilisation.
- To contribute to the exchange of information and results obtained among the different Operational Groups and the projects of EAFRD and the H2020 European research programme related to these topics.
- To highlight the innovative work developed by the Operational Groups and Innovative Projects.

The Conference:

- An analysis was made of the work being carried out by the NRN as regards disseminating the work by the Operational Groups and the Innovative Projects. Furthermore, the innovative measures in rural development programmes encouraged by EIP-Agri were also examined. Finally, the work of the Ministry of Agriculture, Fisheries and Food with respect to fertilisation was explained.
- In order to bring about an exchange of innovative solutions in the sphere of fertilisation, the attendees saw presentations by nine Operational Groups, Innovation Projects and H2020 Programme, given in three parallel sessions, after which the key points discussed in each room were shared.

Key ideas

- It was shown there are advances in the development of new techniques to achieve more sustainable fertilisers that allow for the use of biological waste and an emphasis on models that facilitate a circular economy. These advances are happening via the Operational Groups and the and Innovation Projects they are developing, as well as H2020 projects.
- It became clear that there was a need for effective transmission of the results obtained through the projects by way of conferences and workshops tasked with disseminating the information. In addition, it must be taken into account that entities located in the territory can play an important role in this process.

For more information about the conference, click [here](#)



EsRuralEsVital

FERVAP: Introduction of fertilisation in wheat, barley and sunflower plots at variable rates based on harvest output



RURAL DEVELOPMENT PROGRAMME
NRDP

YEAR CREATED
2017

PROJECT COORDINATOR
García Puertas Agraria, S.C.

PARTNERS

Fertiberia
Farming Agrícola
Sociedad Cooperativa Agropal
Bayer Cropscience
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Description

FERVAP studies the profitability of different fertilisation strategies with the aim of designing a 3-year fertilisation plan with varying rates and using yield monitors installed in combine harvesters.

From the geo-referenced data provided by the monitors, productivity maps will be drawn up to detect the potential yield differences in each area. Depending on the richness of the soil in each area, the minimum and maximum fertilisation rate to be used in the plan will be determined and tested.

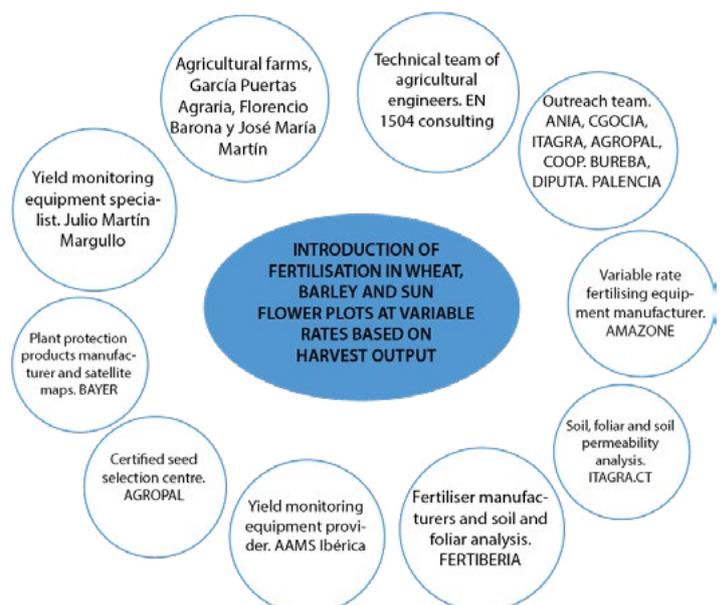
Objectives

- Studying the viability of applying these techniques to the agriculture in each zone.
- Easing the transfer of information to the sector, providing real results from the precision farming techniques used.
- Designing a fertilisation plan of varying rates using yield monitors.
- Reducing the consumption of fertilisers and the environmental impact of these operations.
- Spreading the word about best practices for hunting and the management of natural spaces via a network of specialists.

Expected results

- ▶ Improving economic results and competitiveness in agricultural operations.
- ▶ Reducing the environmental impact of these operations.

“As a result of the development of this project, another idea has emerged for future projects: to take advantage of the data from the trial plots from GO FERVAP, one could broaden innovation to variable seeding in cereals, to determine the best rate for R1 and R2 certified seeds and the profit potential”.



Efficient use of different sources of organic matter in Mediterranean agriculture

2

RURAL DEVELOPMENT PROGRAMME

NRDP

YEAR CREATED

2016

PROJECT COORDINATOR NATIONAL

SAT Primaflor

PARTNERS

Coexphal | Agrícola Perichán | Biosabor |
Fundación Cajamar | Fundación Cajamar
Comunidad Valenciana | Centros de
investigación: UAL, IVIA | Miembros
colaboradores: SEAE



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Description

Horticulture in Spain is of great importance. It is an export-oriented sector, considered to be a world leader. Intensive horticulture is characteristic for a very high demand of inputs and fossil fuel energy.

One of the principal disadvantages of organic matter as fertiliser is its high degree of variability due to its different origins, composition, nutrient content, particle size distribution, microbial load, etc.

This project aims to confront the difficulties of using organic matter in Mediterranean agriculture by way of new technologies to design “on-demand” fertilisation programmes. It seeks to establish models that allow for efficient availability of nutrients according to the different organic sources used in intensive horticulture.

Objectives

- Gathering existing information about the composition, characteristics and experience in the management of organic products in agriculture.
- Analysing the principal factors and existing algorithms in the literature about the dynamics of mineralisation of organic products and their use as nutrient input for crops.
- Developing a simulation model of mineralisation of organic matter adapted to conditions in the soil, weather and intensive cultivation systems in Spain.

- Evaluating the results of the model developed based on information from previous field experiences and bibliographic references.
- Designing an online support system based on the simulation model to give recommendations about rate, type of products, ways of application, fractioning and other ways of handling inputs, and making it available to the horticulture sector.
- Spreading the use of this management tool in the sector throughout Spain.

Expected results

- ▶ Efficient use of nutrients in Mediterranean agriculture.
- ▶ Minimisation of the environmental impact generated by inputs used in intensive agriculture.

“The formation of this Operational Group will allow for adequate fine-tuning of the use of fertilisers in Mediterranean agriculture, making high-quality crop production compatible with minimum environmental impact”.

FERTIOR: Application of circular economy principles to optimise the management of organic waste by the development of innovative processes that allow for an efficient conversion of organic waste materials into quality fertilisers and substrates

RURAL DEVELOPMENT PROGRAMME
NRDP

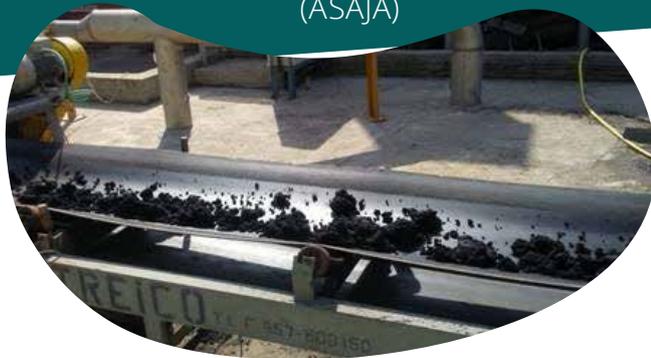
YEAR CREATED
2018

PROJECT COORDINATOR
Asociación Agraria Jóvenes Agricultores (ASAJA)

PARTNERS

Ferrovial Servicios

Universidad Politécnica de Madrid y la Facultad de agrónomos



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Description

The management of organic waste and its subsequent use as high-quality organic fertiliser is of great strategic importance, and has wide room for improvement in terms of the competitiveness and profitability of agricultural farms.

FERTIOR addresses the issue of organic waste in Spain from differing origins based on a circular economy approach and the development of innovative processes for its use as a fertiliser. The use of organic waste materials on different crops will be studied, as will possible techno-economic variations, seeking an increase in agricultural productivity in a sustainable manner.

- Analysing the impact on the economic and environmental costs of carrying out this project in its area of influence.
- Developing a method applicable to any geographical area.

Expected results

- ▶ Introduction of circular economy principles in the management of organic waste from differing origins.
- ▶ Obtaining quality fertilisers/substrates for agricultural use.

“The management of organic waste and its later use as high-quality organic fertiliser is of great strategic importance, and has wide room for improvement in terms of the competitiveness and profitability of agricultural farms”.

Objectives

- Producing high-quality organic fertilisers/substrates, by way of innovative processes that consider the entire value chain, increasing agricultural productivity.
- Developing protocols to apply and use organic fertilisers/substrates to serve as a practical guide to maximise the benefits of these products.



DIAGRINT: Improvement of arable crop yield in Spain by using new fertilisers and smart diagnostic tools

4

RURAL DEVELOPMENT PROGRAMME
NRDP

YEAR CREATED
2018

PROJECT COORDINATOR
SOAGA-Sociedad Agrícola Gallega S.L.

PARTNERS

Blue Agro Chemicals S.L.
Universidad de Santiago (USC)
Fundación Empresa-Universidad Gallega (FEUGA)



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Description

The production of arable crops requires a paradigm shift brought about by the legislative demands related to the protection of the environment, the halting of the loss of organic matter from the soil, Common Agricultural Policy funding and the requirements of the agricultural sector and consumers, seeking a decrease in fertiliser inputs, precision and convenience of use, and reasoned advice.

The DIAGRINT project seeks to improve the yield of arable crops via fertilisation, bringing together scientific advances with empirical knowledge from farmers in different regions of Spain.

New formulations will be tested to improve nutrition and increase crop yield, without damaging the environment, in addition to new methods and smart diagnostic tools for providing advice to the sector.

Objectives

- Optimising crop nutrition and maximising plant yield by using more efficient fertilisers.
- Increasing the bioavailability of nutrients present in the soil, reducing application rates and minimising the pollution risks and production costs.

- Providing advice as regards the rate and timing of fertiliser application using soil, weather and crop needs and yield databases, and smart tools that enable a faster, more reliable diagnosis.

Expected results

- ▶ Improved yields by applying new fertiliser formulations coated with nitrification inhibitors and incorporating different organic biomolecules.
- ▶ Honing of analysis and DRIS (Diagnosis and Recommendation Integrated System) standards for cereals and potatoes.
- ▶ Rapid sap analyses to optimise nitrogen management.
- ▶ Fertilisation adjustments using image diagnosis.
- ▶ Reduction of costs and pollution levels.

“The project promotes advice using smart tools that allow for a more rapid and reliable diagnosis, reduction of costs and environmental damage”.

Automatic management of irrigation and fertigation in horticultural crops

5

RURAL DEVELOPMENT PROGRAMME

NRDP

YEAR CREATED

2017

PROJECT COORDINATOR

COEXPHAL

PARTNERS

Fundación Cajamar | Haciendas Bio S.A. | LabFerrer | Aigües del Segarra Garrigues S.A. | Grupo Desarrolla | Progrés S.A | Institut de Recerca I Tecnologia Agroalimentaries (IRTA) | University of Almería | Centro de Investigaciones Científicas y Tecnológicas de Extremadura (CICYTEX)



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Description

Irrigation is one of the principal elements of agriculture in arid and semi-arid zones. This project aims to create a computing tool that advises irrigators and companies on managing irrigation and fertilisers in horticultural crops.

The tool will allow for the integration and application of all techno-scientific knowledge generated concerning irrigation and crop fertilisation. It will be underpinned by available agronomic data, climate data, and the possibilities of using sensors and information and communication technologies (ICTs).

Expected results

- ▶ The automation of the results achieved will free the sector from the task of irrigation programming.
- ▶ Educating irrigators to program watering may no longer be a barrier for advances and irrigation management support technologies to reach commercial operations.

“We want to create a computing tool that will advise irrigators and companies on irrigation and fertiliser management”.

Objectives

- Developing seasonal irrigation and fertigation plans for the main irrigated crops.
- Considering the spatial variability aspect in management and fertilisation strategies in commercial plots.
- Developing a commercially available interface for automatic irrigation programming.
- Provide the platform with the functionalities to dose the fertigation daily.



MOSOEX: Increase in organic matter, sustainable management of extensive systems in Spain: promote an innovative model of soil management for extensive production systems of in dry areas, directed towards the improvement of organic matter and the reduction of greenhouse gas emissions, in line with the 4 per 1000 strategy

6

RURAL DEVELOPMENT PROGRAMME
NRDP

YEAR CREATED
2018

PROJECT COORDINATOR
Unión de Pequeños Agricultores y Ganaderos (UPA)

PARTNERS

Asociación Española Agricultura de Conservación Suelos Vivos (AEAC.SV) | Solid Forest | Universidad Politécnica de Madrid | Instituto de Tecnología e Infraestructuras Agroalimentarias de Navarra (INTIA) | Agencia Estatal Consejo Superior de Investigaciones Científicas (CSIC) / Estación Experimental de Aula Dei (EEAD-CSIC)



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Description

Projections for population increase in the coming years are a challenge for sustainable food production. Agricultural soils are the basis for food production in a world with an ever-growing population. Accordingly, soil management is present on the political agenda of all international agreements.

The MOSOEX project aims to foster an innovative model of soil management for rainfed arable crops. It will be based on a catalogue of measures to improve organic matter in soils and reduce greenhouse gas emissions, in line with Spanish and European soil conservation policies, as well as the 4 per 1 000 Initiative: organic carbon in the soil as a tool to mitigate and adapt to climate change.

Objectives

- Formulating a philosophical change in soil management in rainfed extensive systems in Spain to improve soil structure and organic matter content.
- Carrying out a proposal for indicators to identify best practices related to soil management.

- Obtaining practical, reliable information aimed at different public administrations that is useful for future policies and lines of action.

Expected results

- ▶ Supporting the agricultural sector in increasing the carbon content in the soil through innovative management practices.
- ▶ Reducing greenhouse gas emissions.
- ▶ Fighting against erosion, improving soil structure, and thus the productivity of the land.

“We have come to see the enormous potential of the research accumulated in the last few decades and the need to bolster the transfer of this knowledge to the productive sector. We have reinforced outreach activities about the objectives and the conclusions from our Operational Group to our target audience”.

Comprehensive platform for the cultivation of tomatoes for processing

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RURAL DEVELOPMENT PROGRAMME

NRDP

YEAR CREATED

2018

PROJECT COORDINATOR

Soltel It Solutions S.L.U.

PARTNERS

Asociación Empresarial Centro Tecnológico Agroalimentario "Extremadura" (CTAEX) | Instituto Tecnológico de Galicia (ITG) | Cartogalicia S.L. | Ambling Ingeniería y Servicios S.L. | Agrupación de Cooperativas Agrarias de Extremadura "ACOPAEX" | Cooperativas Agroalimentarias Extremadura



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Description

Tomato production has increased markedly in recent years. Nevertheless, to maintain its position as the leading irrigated crop in the country, it must improve its yield, always keeping in mind environmental sustainability. In addition, it is necessary for the processing industry to become more efficient and seek out new opportunities to use by-products.

This project aims to improve management of tomatoes grown for industry in terms of sustainable management in key processes such as fertilisation, health and irrigation. It seeks to create a platform to integrate different technologies and support decisions in key processes, aiming to improve productivity and more sustainable farming.

Objectives

- Optimising the use of agrochemicals and other inputs in crops of tomato for processing.
- Improving product quality and facilitating comprehensive management of the crop cycle via a platform based on ICTs, hyperspectral technology, drones and the development of new prediction algorithms for the industrial tomato sector.
- Supporting the sector in key process decision-making, attaining an increase in productive and more sustainable crops.

Expected results

- ▶ Making a key tool available to the industrial tomato growing sector.
- ▶ Optimisation of inputs.

"The Operational Group provides optimal solutions to achieve productive and sustainable agriculture from a multidisciplinary perspective".



SmarTom

Plataforma de gestión integral para el cultivo de tomate

G.O. SUPRAUTONÓMICO

GO-FerPrAS: Operational Group for sustainable agricultural fertilisation and production

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RURAL DEVELOPMENT PROGRAMME

RDP - Aragón

YEAR CREATED

2017

PROJECT COORDINATOR

AGROPAL S.L.

PARTNERS

BESPEN VINOS, S.L.

FEDERACIÓN ARAGONESA DE COOPERATIVAS AGRARIAS (FACA)

AGRACON, Asociación Aragonesa de Agricultura de Conservación

PCTAD

Fundación Parque Científico Tecnológico Aula Dei

Escuela Politécnica Superior (EPS)



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Description

Approximately 20% of Aragón's lands have seen soil losses from erosion of more than 25 t/ha, while 16.1% of the territory is at risk of desertification. This erosion is worsened by poor soil management and fertilisation practices.

The Operational Group seeks alternatives to agricultural soil quality loss in Aragón and the problems of overfertilisation and diffuse pollution from the excessive use of livestock slurries and fertilisers.

The FerPrAS project seeks to establish a new model for fertilisation that allows for sustainable, environmentally friendly production without a reduction in productivity, by stimulating biological activity in agricultural soils.



Objectives

- Favouring the implementation of a new model of fertilisation for sustainable agricultural production.
- Stimulating the recuperation of biological activity in agricultural soils.
- Educating about the need to shift production to a more sustainable model as a tool in the fight against overfertilisation and diffuse pollution in the soil.

Expected results

- ▶ Demonstrating to the cereal and wine-growing sector that it is possible to achieve savings on inputs of up to 40%, matching the results from production with conventional management.

"The situation in which we find ourselves justifies the need for a conceptual change in the sector with respect to recovering the soil's biological activity and its ongoing maintenance via sustainable fertilisation".

APGEFERT: Development of techniques to improve the introduction of precision agriculture in the management of fertigation in fruit-growing farms

RURAL DEVELOPMENT PROGRAMME

RDP-Extremadura

YEAR CREATED

2017

PROJECT COORDINATOR

CICYTEX

PARTNERS

TEPRO EXTREMADURA, S.L.

JARILLA Y BARRANTES--CERVANTES, S.L

SET, i.c.i., S.L.

CELLNEX (RETEVISIÓN)

SINAPSE, S.L.

GREENFIELD



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Description

Agriculture should be understood as a competitive sector with increasingly pressing needs, more appropriate pricing and demand for higher quality foods. There is a need to apply new technologies such as those proposed by precision agriculture.

APGEFERT aims to reduce existing barriers in applying precision agriculture technologies to new efficient sustainable models of fruit tree production.

In accordance with farmers' technological capability, access to information regarding the different tools will be facilitated through training and demonstrations in pilot plots. The transfer of knowledge will improve the management of fertigation on their own farms.

Objectives

- Identifying culture and technology barriers that hinder adaptation to technology to manage irrigation and soil and crop nutrients.

- Identifying existing technology and developing a roadmap to adapt it to each user based on their level of technological specialisation and their production and improvement goals.
- Developing methods to improve the transfer of knowledge and resources.

Expected results

- ▶ Fostering an industry differentiated by its technological and innovative foundations.
- ▶ Achieving market volume consistent with the sector's already existing technological know-how.
- ▶ Coordinating companies that are working throughout the entire value chain in the sector.
- ▶ Working jointly with the users and complementary sectors.
- ▶ Optimising the social benefits and use of environmental resources.

"We have proposed to act upon the standardisation of precision agriculture in an effort to identify the main barriers to its application in operations in Extremadura".



FERTIGATION: Collaboration in defining a comprehensive and detailed business model for intensive cultivation of cork-producing trees with fertigation

10

RURAL DEVELOPMENT PROGRAMME

RDP - Extremadura

YEAR CREATED

2019

PROJECT COORDINATOR

JOGOSA

PARTNERS

AGROGESTIÓN EXTREMEÑA

ASOCIACIÓN DE PROPIETARIOS DEL MONTE
ALCORNOCAL DE EXTREMADURA
(APMAE)



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Description

Extremadura has 250,000 hectares of cork oak, making up 34.5% of the cork forested area in Spain, meaning a quarter of the world's cork production.

Several studies undertaken by the cork industry point to a gradual decrease in production, both in quality and in quantity, threatening the sector with medium-term supply shortages.

The Fertirriego project aims to develop new intensive production systems based on fertigation and the use of select genetic material to produce high-quality cork.

Objectives

- Creation of an integrated and detailed business model for the intensive cultivation of cork oak.
- Developing proposals for sustainable productive systems of cork oak with the support of fertigation practices.

Expected results

- ▶ Fostering regenerative forest management.
- ▶ Opening up new innovative paths for tree regeneration.
- ▶ Learning from the knowledge and experience generated from growing other woody crops such as olives and pistachios.

“The factors that most influence the fall in production are the decrease in density of wooded areas, decay due to root rot, pests such as *Coraeus undatus*, the ageing of cork oak trees and neglect of management practices”.



FERVIÑA: Integrated fertilisation system in the wine-growing sector

11

RURAL DEVELOPMENT PROGRAMME

RDP - Galicia

YEAR CREATED

2018

PROJECT COORDINATOR

Viña Costeira SCG

PARTNERS

FEUGA

Estación de Viticultura y Enología de Galicia

Agencia Gallega de Calidad Alimentaria

University of Santiago de Compostela

Cooperativa Vitivinícola Arousana



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Description

Obtaining quality harvests is largely determined by the balance between vegetation and fruit on the plants. This is influenced by several factors, one of the most important being the plant's nutritional state. In a production system such as vineyards, adequate fertilisation is necessary given that deficiency in certain nutrients can lead to a reduction in a vine's vigour, a decrease in photosynthesis, fruit deterioration, poorer quality of the harvest and even the death of the vine.

The FERVIÑA project seeks to develop an integrated fertilisation system in the Galician wine-growing sector via strategies laying down examples for nutritional diagnosis of crops.

This is challenging due to the lack of experience in the sustainable application of fertilisers in wine-growing, but it involves an opportunity to improve productivity and reduce the sector's environmental impact.

Objectives

- Developing a comprehensive system of monitoring in the management of fertilisers in agricultural vineyard soils.

- Avoiding the inefficient use of nutrients in terms of the environment, production and quality of the harvest.
- Establishing protocols for ad hoc fertilisation based on gathering and inter-relating soil-weather-plant criteria.
- Promoting the results at a regional level and fostering their adaptation in other agricultural sectors.
- Delivering an ICT tool.
- Transferring the knowledge generated, informing and training winegrowers and other professionals in the sustainable use of fertilisation, with the goal of decreasing the negative impact of wine-growing activity.

Expected results

- ▶ Greater environmental and economic sustainability in these operations, decreasing the use of fertilisers.
- ▶ Reduction in greenhouse gas emissions.

"The tool will allow for the optimisation of the use of natural resources and inputs, and reduce soil contamination and greenhouse gas emissions".



Optimisation of apricot and early flat peach irrigation under agro-textile mesh in the Ricote Valley

12

RURAL DEVELOPMENT PROGRAMME

RDP - Murcia

YEAR CREATED

2018

PROJECT COORDINATOR

Basilio Jesús Gambín López (FUERM - ENAE BUSINESS SCHOOL)

PARTNERS

Fundación Universidad Empresa de la Región de Murcia.

Widhoc Smart Solutions.

Basol Fruit S.L.

Gesagra S.A.



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Description

The Ricote Valley is suffering from notable depopulation despite potential employment opportunities in off-season stone fruit production. The underutilisation of the scenario offered by its micro-climate comes mainly from the lack of innovation in farms.

This project aims to incentivise innovation and help to maintain the population in place by spreading strategies for controlled deficit irrigation (CDI). By measuring the state of the water in the soil and the crop, and the use of plastic mulching, the aim is to increase the efficient use of irrigation water for the apricot and early peach crops in the Ricote Valley.

Objectives

- Evaluating the effect of CDI in the water status of soil and crops, and the response in terms of production and quality of the harvest for apricots (var. Lilly Cot, Maya cot and Magic cot) and flat peaches (var. Carioca).
- Evaluating the effect of agro-textile coverings in the main meteorological variables in Lilly Cot apricot crops.

- Evaluating the effects of agro-textile covering and plastic mulching in the water status of soil and crops and in the production and quality parameters of the Maya cot apricot, the Carioca flat peach and the Magic cot apricot grown under agro-textile cover.
- Spreading the applied methods and the results obtained in different forums accessible to farmers.

Expected results

- ▶ Reduction in the use of water for irrigation.
- ▶ Optimisation of the use of water resources complemented by the use of agro-textile materials to preserve moisture, reduce the drying impact of the wind and evapotranspiration.
- ▶ Cost savings in producing stone fruits.

“We hope to reduce the use of water used for irrigation by 25% or more each year, which would mean savings of more than 1,600m³ per hectare and year, without reducing the quality or quantity of the harvest, and improving the efficiency of water usage by more than 40%”.

ERA-NET PROGRAMME

RDP - Murcia

YEAR CREATED

2018

PROJECT COORDINATOR

PROEXPORT (Asociación de Productores-Exportadores de Frutas y Hortalizas de la Región de Murcia)

TRIALS

UPCT (Universidad Politécnica de Cartagena)

PARTNERS

Agromediterránea Hortofrutícola

Bonduelle

Grupo CFM

Gs España

Intercrop

Murciana de Vegetales



www.nutricionvegetalsostenible.es

ahernandez@proexport.es

Expected results

- ▶ Improving orientation towards the market for products obtained with low environmental impact.
- ▶ Reduction of nitrogen losses, decreasing pollution of underground water and limiting greenhouse gas emissions to the atmosphere.

Description

Through fertigation, we can dose and deliver nutritional inputs for the plant by simultaneously applying water and fertilisers, while at the same time using nitrification inhibitors to improve the absorption of nitrogen by the plants and reduce losses.

The NUVES project aims to develop nutrition protocols that improve the positioning in the market of products obtained with low environmental impact and which reduce nitrogen losses, whether from deep percolation, surface runoff or emission to the atmosphere.

Objectives

- Increasing the efficient use of nitrogen fertilisers in fertigation systems via the use of nitrification inhibitors.

“NUVES proposes the development of more sustainable fertilisation that allows for a better environmental integration of horticultural production in the Region of Murcia, and which contributes to the balance of agrarian ecosystems such as the Mar Menor”.



nuves
GRUPO OPERATIVO DE
NUTRICIÓN VEGETAL
SOSTENIBLE

proexport
Hortalizas y Frutas de Murcia, España

MICRO-N: Reduction of nitrogen fertilisation in the Murcia Region by adding native nitrogen-fixing microorganisms

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RURAL DEVELOPMENT PROGRAMME

RDP - Murcia

YEAR CREATED

2018

PROJECT COORDINATOR

PARTNERS

Altech

Agrocolin S.L.

Gruventa - Grupo de ventas hortofrutícolas S.L.



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Description

Fertilisers are one of the main inputs in agricultural production, so efficient use is a vital source of cost savings and reduction in environmental impacts. As such, it is necessary to progress in applying new techniques that enable these crop inputs to be minimised.

The MICRO-N project seeks to generate a more sustainable fruit-and-vegetable-growing sector in the Region of Murcia, avoiding the losses in production that could arise from a 30% reduction in nitrogen fertiliser. This proportion of fertilisation will be compensated using native microorganisms whose main function is nitrogen-fixing harnessed by the plant naturally.

In addition, the project also intends to get ready for the adaptation of the Murcia Region's agri-food sector to the new European public health requirements to replace inputs of a chemical origin, as provided for in the Region of Murcia Law 1/2018.

Objectives

- Reducing synthetic nitrogen fertiliser inputs by 30%.
- Determining the effectiveness of rhizobacteria, promoters of plant growth in agricultural soils in the Region of Murcia, as nitrogen input for crops, substituting the need for synthetic products.
- Extrapolating the results obtained to the most important groups of crops in the Region of Murcia.

Expected results

- ▶ Avoiding production losses.

"It is necessary to progress in applying new techniques that enable a reduction in nitrogen fertiliser used in crops".



Eco-innovation association in the Murcia Region: Development of a sustainable alternative to reduce nitrates in the fertigation of peppers in the Mar Menor area

15

RURAL DEVELOPMENT PROGRAMME

RDP - Murcia

YEAR CREATED

2018

PROJECT COORDINATOR

Explotaciones Ríos De Aguas S.L.

PARTNERS

EXPLOTACIONES RÍOS DE AGUAS SL

LOS ZENEQUES SL

SULFATO CÁLCICO DEL MEDITERRÁNEO SL

UPCT PROGES I&D SL



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Description

The area surrounding the Mar Menor is classified as vulnerable, and yet it is home to 30 000 hectares of fruit and vegetable farming. As such, the intensive irrigation agricultural model has caused environmental collapse in the lagoon.

Calcium sulphate is used as a fertiliser to improve the texture of agricultural soils, in addition to its use in reducing the salinity of soils due to the ongoing use of water with a high salt content. It is considered an ecological, natural and viable alternative, in comparison to the $\text{Ca}(\text{NO}_3)_2$ used in conventional systems.

This project aims to introduce the use of calcium sulphate, to generate and incorporate more advanced technology adapted to climate change in the production process of fresh, minimally processed horticultural products. This will help reduce NO_3 pollution in the soils and water in the Campo de Cartagena area, supplying the Ca necessary in fertigation in its CaSO_4 form.

Objectives

- Characterising the cultivation techniques used in the area and identifying those that can cause environmental problems.
- Comparing methods of irrigation and fertilisation scheduling in the field by installing sensors.
- Sharing the knowledge gained with the sector.
- Creating a manual containing successful strategies for reducing water drainage and nitrate leaching.

Expected results

- ▶ Developing a sustainable non-polluting alternative adapted to agribusiness and increasing eco-innovative technological capacities.

“It is both pressing and necessary to intensify protective measures, ensuring the greatest possible environmental sustainability of the activities carried out in the area of Mar Menor, the reason for Decree Law no. 2/2019, 26 December, guaranteeing the sustainability of the area”.

GENHIDRO: Systems integration by way of a single platform for water and fertiliser management in vegetable crops in the Murcia Region 16

RURAL DEVELOPMENT PROGRAMME

RDP - Murcia

YEAR CREATED

2018

PROJECT COORDINATOR

Manuel Soler Méndez

PARTNERS

Futurplant semillas S.L.

Oficar-Agro S.L.

Pedro Martínez García



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Description

The current need to produce a greater quantity and quality of food for a continually growing population is forcing the agri-food sector to become more efficient at the same time as more sustainable. For this reason, agriculture in future must guarantee greater productivity and profitability with a smaller use of resources, especially scarcer resources, such as water.

GENHIDRO seeks to achieve a more sustainable and productive agriculture in the Murcia Region by promoting the efficient use of water resources and nitrogen fertilisers, improving the protection of the environment, tightening ties between the value chain and new technologies, and moving forward with innovative solutions to increase the sector's competitiveness.

Objectives

- Developing a fertilisation management system (ferti-control) based on weight lysimeter techniques.
- Controlling electrohydraulic circuits that manage fertilisation control equipment by way of electronic programming systems and communications protocols.

- Developing an online platform that allows for integration of the system for optimal management of irrigation and fertilisers.
- Validating the system developed to manage irrigation and fertilisers in diverse vegetable crops.

Expected results

- ▶ Optimising the management of water, energy and nutritional resources necessary for the development of the crop.
- ▶ Reducing environmental pollution.

“The online platform integrates all types of equipment, sensors and actuators. In addition, it is capable of keeping track in real time of what is happening both in the field and in the monitoring equipment”.



Run4Life: Recovery and utilisation of nutrients for low impact fertilisers

17

HORIZON 2020 PROGRAMME

YEAR CREATED
2019

PROJECT COORDINATOR
FCC Aqualia (España)



PARTNERS

DESAH (Países Bajos). | SLU, Sveriges Lantbruksuniversitet (Suecia). | LEAF (Países Bajos). | LEITAT (España). | NSVA, Nordvastra Skanes Vatten Och Avlopp (Suecia). | USC, Universidad de Santiago de Compostela (España). | WE&B, Water Environment & Business Development (España). | Wageningen University (Países Bajos). | ZFV, Consorcio de la Zona Franca de Vigo (España). | JETS, ECOMOTIVE (Noruega). | Isle Utilities (Reino Unido). | CEIP, Clean Energy Innovative Projects (Bélgica). | Forfarmers Corporate Services (Países Bajos). | ASB Grünland Helmut Aurenz (Alemania).



www.run4life-project.eu



innovacion@aqualia.es

Description

Domestic wastewater is an important carrier of resources, particularly water and nutrients, that are scarcely recovered in today's centralised wastewater management systems.

Run4Life proposes an alternative strategy for efficient nutrient recovery from wastewater to be used as agricultural fertilisers, using a circular economy approach.

Objectives

- Establishing a decentralised recovery of up to 100% of NPK nutrients and >90% of black water, grey water and organic kitchen waste collected separately.
- Promoting market acceptance by minimising the risks with proactive mitigation, implementation of new business models, fostering social and organisational innovation and including an end-user perspective (fertiliser companies and farmers) to achieve actual usage of the products obtained.
- Decentralising on-site recovery via separation of concentrated flows: black water, grey water and organic kitchen waste.

- Integrating innovative technologies for nutrient recovery with complementary concepts as regards fertilisers and with the objective of reducing environmental and health risks.

Expected results

- ▶ Recovery of up to 100% of NPK nutrients and more than 90% of water re-used.
- ▶ Characterising the resulting products and exploring the possibilities for their use in agriculture and other fields.
- ▶ Participation in a consortium of possible end users and development of a new model of business based on a cooperative financing scheme.

“Run4life opens up a new paradigm in society. Active measures such as activities for passing on knowledge, will be carried out as a strategy of commitment for institutional, legal and social acceptance of technologies for the recovery of nutrients”.

NUTRI2CYCLE: Transition towards a more carbon and nutrient efficient agriculture in Europe

18

HORIZON 2020 PROGRAMME

YEAR CREATED

2018

PROJECT COORDINATOR

Universiteit Gent

PARTNERS

Universita Degu Studi Di Milano | Politechnika Czestochowska | United Experts | Fundación CARTIF | Johann Heinrich Von Thuenen Institut, Bundesforschungsinstitut fuer laendliche Raeume, wald und Fischerei | Soltub Trade and Service providing Limited Liability | Stichting Wageningen Research | Instituto Superior de Agronomía | Kobenhavns Universitet | Terra Humana Tiszta Technologiakatfejeszto tervezo es kivitelezo KFT | Chambre d'Agriculture de la Charente-Maritime | Zuidelijke Landen Tuinbouworganisatie Vereniging | Institut de Recerca I Tecnologia Agroalimentaries | TEAGASC - Agriculture and Food Development Authority | European Biogas Association | IPS Konzalting d.o.o. za poslovne usluge | INAGRO, Provinciaal Extern Verzelfstandigd Agentschap in | Privaatrechtelijke Vorm VZW | Consorzio Italtotec



www.nutri2cycle.eu



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Description

European agriculture is characteristic for its high overall contribution to global greenhouse gas emissions and inefficient recovery of carbon. Addressing existing gaps in the flow of nutrients in Europe will help bring down greenhouse gas emissions, reduce soil degradation and improve the EU's energy and nutrient independence.

NUTRI2CYCLE addresses existing gaps in the cycles of nitrogen (N), phosphorous (P) and carbon (C) in the different European agricultural systems and the related environmental problems by implementing optimised management systems, at the same time as it achieves a positive commitment to productivity, quality and environmental impact.

Objectives

- Mapping out flows and gaps in C, N, and P cycles in European operations and analysing the related environmental problems.
- Implementation of tools to measure the sustainability of various types investigated.
- Evaluation of 60 farming systems and large-scale demonstration of 12-16 of them.

- Development of at least 1 or 2 prototypes per farm type.
- Calculating the impact of these systems at regional and EU level.
- Evaluation of how agro-products obtained could affect consumer behaviour.

Expected results

- ▶ Agricultural ecosystems efficient in C, N and P.
- ▶ Improved overall sustainability and innovation capacity of the farming systems.
- ▶ Reduction of environmental impact.
- ▶ Integrated scientific support for relevant EU policies (Common Agricultural Policy, Water Framework Directive, sustainable use of pesticides, etc).
- ▶ Strengthened research for long-lasting application of results.

“The results are encouraging and will help to create and develop new legislation regarding the sale and use of fertilisers, favouring market placement”.

PRIMA iGUESS-MED. Innovative greenhouse support system in the Mediterranean region: efficient fertigation and pest management through IoT-based climate control

PRIMA PROGRAMME

YEAR CREATED

2020

PROJECT COORDINATOR

Council for Agriculture Research and Economics (CREA, Italy)

PARTNERS

Fundación Cajamar (Spain) | Universidad de Almería (UAL, Spain) | Università di Pisa (UNIPi, Italy) | EVJA (company, Italy) | BIOPLANET (company, Italy) | Grupo La Caña (company, Spain) | University of Akdeniz (Turkey) | Regional Research Centre on Horticulture and Organic Agriculture (CRRHAB, Tunisia)



 www.iguessmed.com
 mdoloresfernandez@fundacioncajamar.com

Description

The increasing demand for food in terms of both quantity and quality has raised the need to develop technological innovations in the agro-ecological sector in particular, promising tools such as the Internet of Things (IoT) and Artificial Intelligence (AI), which are increasingly important, in order to offer solutions to modernise greenhouse horticulture.

The objective of iGUESS-MED is to develop a Decision Support System (DSS) capable of effective fertigation management and prevention of diseases and pests in soil and soilless tomato crops in commercial greenhouses in the Mediterranean region.

Objectives

- Developing a DSS to manage fertigation and irrigation, control pests and diseases, and the smart improvement of climate conditions in the tomato growing greenhouses in the Mediterranean region. Using climate data, IoT and AI to convert high technology solutions into simple tools easily available for work on the farm.

- Developing specific protocols to predict the emergence of plant pathogens and arthropod pests.
- Introducing innovative management to help take up efficient fertigation strategies, particularly in conditions of low-quality water, so to guarantee limited or zero leaching of nitrates and phosphates.
- Creating a space for mutual learning and fostering technological exchange between the EU and non-EU Mediterranean countries.
- Spreading the project's results to users.

Expected results

- ▶ Improving management of fertigation in areas with low-quality water supplies (saline).
- ▶ Reducing the use of chemical products via sustainable and integrated control of pests and diseases.
- ▶ Increasing climatic efficiency in existing greenhouses through low-cost solutions.

“DSS will provide feedback and alerts about crops' needs and recommendations for farmers in real time, allowing data to be seen via portable tools such as computers, tablets or mobile phones”.

B-FERST: Bio-based fertilising products as the best practice for agricultural management sustainability

20

HORIZON 2020 PROGRAMME

YEAR CREATED
2020

PROJECT COORDINATOR
FERTIBERIA S.A.

PARTNERS

FCC Medio Ambiente | FCC Aqualia, S.A. | Universidad de León | Novamont Spa | Drage & Mate International SI | Fkur Kunststoff GmbH | Agrisat Iberia S.L. | Vlaamse Instelling Voor Technologisch | Ag Futura Technologies | Arcadia International | Reg&Env Center Central& Eastern Europe | Instytut Uprawy Nawozenia Gleboznawstwa



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Description

Currently, the challenge for the agricultural sector is to increase productivity in a sustainable manner. However, in the past few decades, agri-food specialisation has compromised the nutritional content of soils. To shift this trend, the fertiliser industry must seek out solutions and provide renewable nutrients. This will only be possible by improving relations between the agricultural sector and bio-based industries.

B-FERST seeks to valorise bio-waste in agriculture by creating new circular economy value chains. These bio-wastes coming from municipal solid waste and the agricultural industrial sector will be used to produce mineral and organo-mineral fertilisers. This project integrates the most advanced technologies to develop products and manage fertilisation. The resulting products will be assessed and validated in four different agroclimatic zones, by way of field trials carried out in Spain, Italy, France, Poland and Ukraine.

Objectives

- Valorising underexploited bio-waste for sustainable agricultural management.

- Developing eight new green fertiliser consumer products based on nutrient recovery to be sold at competitive prices.
- Reducing dependence on raw materials by replacing 15-40% with bio-waste.
- Improving the sustainability of fertilisers and their management in agriculture.
- Reducing water and energy consumption, as well as the carbon footprint by 10%.
- Defining guidelines for certification and quality standards at the EU level.
- Improving farm's economies by developing tailor-made nutrients.

Expected results

- ▶ Changing the market uptake of fertilisers in intensive agriculture by demonstrating and introducing three new integrated and sustainable value chains.
- ▶ Replacing 15-30% of mineral raw material with bio-waste. All bio-based products will include between 10 and 43% of bio-based materials.

“Know-how and best practices will be disseminated and replicated locally and in other areas. Direct participation from end users in the whole value chain of the product will be fostered and encouraged to help create the right environment to use them”.

Nutrient Management and Nutrient Recovery Thematic Network

21

THEMATIC NETWORK

YEAR CREATED

2018

PROJECT COORDINATOR

3R-BioPhosphate Ltd



PARTNERS

TERRA HUMANA Ltd. | Stichting EFFoST | ZLTO Southern Agriculture and Horticulture Organisation | Assemblée Permanente des Chambres d'Agriculture (APCA) | Chamber of Agriculture of Charente-Maritime (CA17) | Chamber of Agriculture of Brittany (CRAB) | University of Ghent | INAGRO | Institute for Agricultural and Fisheries Research (ILVO) | Ornamental Plant Research | Assembly of European Regions Producing Fruits, Vegetables and Ornamental Plants (AREFLH) | Vlaco Vzw | Fundación CARTIF | Università degli Studi di Torino | AGROINNOVA | Institut für Baustoff-Forschung e.V. (FEhS) | The Institute of Soil Science and Plant Cultivation | Depuración de Aguas del Mediterráneo, S.L. (DAM) | Hungarian Chamber of Agriculture (NAK)



<https://nutriman.net/>



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Description

Agriculture and agri-food industry are highly dependent on natural resources in their production processes. Hence, there is an urgent need to optimise the use of resources and smooth the transition to agriculture driven by knowledge and environmental sustainability.

The political initiative to revise the EU regulations on fertilisers aims to incentivise large-scale production of fertilisers in the region from raw organic domestic or secondary materials, in line with the principles of the circular economy.

Objectives

- Making an inventory of innovative research results in technologies, methods and products for nutrient recovery that will soon be on the market, but that are not sufficiently known in the agricultural sector.
- Evaluating innovative nutrient recovery technologies, new products and fertilisation practices.
- Spreading the knowledge gathered within the agricultural sector.

Expected results

- ▶ Identification of 100 practical solutions that cover the most urgent needs in the agricultural production sector, such as an innovative supply of fertilisers.
- ▶ Increasing the flow of information in the sector at European level with respect to the management and recovery of nutrients.
- ▶ Contributing to a more competitive and sustainable agricultural sector, minimising the use of non-renewable raw materials and replacing them with secondary raw materials such as recycled nitrogen or phosphorous.

“NUTRIMAN’s web platform is a database for summarising, sharing and presenting N and P recovery technologies and products that are well-matured and ready-to-use, concentrating on farmers’ most urgent needs, but which are not sufficiently known or used by the end users”.

FERTINNOWA: Transfer of INNOvative techniques for sustainable WAter use in FERTigated crops

22

THEMATIC NETWORK

YEAR CREATED

2016

PROJECT COORDINATOR

Proefstation Voor De Groenteteelt (PSKW)



PARTNERS

Association Provençale De Recherche et d'Experimentation Legumiere (APREL). | Centro de Investigaciones Científicas y Tecnológicas de Extremadura (CICYTEX). | Centro di Sperimentazione ed Assistenza Agricola (CERSAA). | Centrum Doradztwa Rolniczego W Brwinowie (CDR). | Fraunhofer Gesellschaft zur Forderung der Angewandten Forschung Ev (Fraunhofer). | Fundación Cajamar (FC). | Instituto de Investigación y Formación Agraria y Pesquera (IFAPA). | Instituto Navarro de Tecnologías e Infraestructuras Agroalimentarias S.A. (INTIA). | Instituto Valenciano de Investigaciones Agrarias (IVIA). | Kmetijsko Gozdarska Zbornika Slovenije Kmetijsko Gozdarski Zavod Maribor (CAFS). | Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek (TNO). | NIAB EMR. | Optima Agrik PTY LTD (OA). | PRIVA BV. | Proefcentrum Hoogstraten (PCH). | Proefcentrum Voor Sierteelt (PCS). | Provinciaal Proefcentrum voor de Groenteteelt (PCG). | Research Institute of Horticulture (IO). | Station Expérimentale Du Caté (CATE). | Stichting Proeftuin Zwaagdijk (ZW). | The Agriculture and Horticulture Development Board (AHDB). | Universidad de Almería (UAL)

Description

In European countries, irrigated crops and intense cultivation generate significant risks for water quality. Innovative technologies and know-how exist, but they are not implemented in farms.

FERTINNOWA aims to create a database of innovative technologies and practices for fertigation of horticultural crops. In addition, it has created a knowledge exchange platform to assess new technologies for fertigated crops.

Objectives

- Facilitating decision-making for more efficient management of water, sharing the best technologies and fertigation management practices with the agricultural sector.
- Supporting reuse of water, providing information about the technologies available for water treatment and the regulation of its use.
- Promoting sustainable management and optimisation of natural water and soil resources in horticultural production.

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- Demonstrating and exchanging the best technologies and practices in fertigation management highlighted by the different members of the consortium, and putting them into practice in real local conditions.

Expected results

- ▶ A compendium of more than 125 fertigation techniques for the horticultural sector can be found in The Fertigation Bible.

“The cost of fertigation technology is currently the main obstacle in getting the sector interested in modernising its equipment”.



Focus Group: Fertiliser efficiency - Focus on horticulture in open field

23

FOCUS GROUP

YEAR CREATED
2016



PARTNERS

Javier Brañas | Stefano Canali | Corina Carranca | Franky Coopman | Janjo de Haan | Stefaan De Neve | Hildegard Garming | Zoltán Hajdu | Eligio Malusa | Carolina Clara Martínez Gaitán | Barry Mulholland | Silvana Nicola | Mark Plunkett | Clive Rahn | Nidal Shaban | Ingvar Svensson | Rodney Thompson | Fernando | Andrés Toresano-Sánchez | Micheline Verhaeghe | Wim Voogt



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Description

The Focus Group “Fertiliser efficiency - Focus on horticulture in open field” was launched as one of the activities carried out by the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI). It brought together 20 experts from throughout Europe.

They were commissioned to create a list of innovative fertilisation approaches, to gather the ideas from Operational Groups, needs and recommendations for farmers and exemplary management strategies. All of this was included in the final report published in 2016.

Objectives

- Identifying how crop quality and yield are influenced by legal requirements (from the Nitrates Directive and the Water Framework Directive).
- Identifying and comparing innovative systems that can help to solve the conflict between crop quality and quantity demands and legislative requirements.
- Describing failure factors that limit the use of the techniques or systems identified by farmers and summarising how to address these factors.

Expected results

- ▶ Cost and lack of research and training are impediments to taking up new measures.
- ▶ In more than 40% of the farms assessed, new fertilisation measures were applied.

“Efficiency in the use of fertilisers can be improved by the regions gathering and exchanging available data on nitrogen and phosphorous removal and the crops’ water requirements”.



EIP-AGRI Focus Group
Fertiliser efficiency – Horticulture in open field

The NRN is the hub connecting all of the people and entities related to the rural environment with the aim of raising awareness of Rural Development Programmes and providing access to them. At the same time, its purpose is to make the population aware of the importance of the rural environment for our present and our future.

The unit responsible for the NRN is the Subdirectorate General for Rural Revitalization within the Directorate General of Rural Development, Innovation and Agrifood Training of the Ministry of Agriculture, Fisheries and Food.

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Es Vital*

FERTILISATION



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Europa invierte en las zonas rurales



RRN RED
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