

**PLANT
HEALTH**

OPERATIONAL GROUPS AND INNOVATIVE PROJECTS



Unión Europea

Fondo Europeo Agrícola
de Desarrollo Rural

Europa invierte en las zonas rurales



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DE ESPAÑA

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DE AGRICULTURA, PESCA
Y ALIMENTACIÓN



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OPERATIONAL GROUPS AND INNOVATIVE PROJECTS

Plant Health

EsRuralEsVital

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Introduction

This publication is a compilation of Operational Groups and Innovative Projects for plant health in Spain. The National Rural Network, NRN has been entrusted with creating this publication to meet its purpose of **disseminating and raising awareness about innovative initiatives and fostering knowledge exchange and transfer** from the sphere of research to practical applications.

Innovation is a fundamental instrument in all areas, but especially in rural areas since this is a disperse environment with difficult access to knowledge, the results from research, training, market developments and new technologies.

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 in order 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 centres, training and consultancy centres, technology centres, non-profit institutions, and more. These parties get together to solve a problem 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 Plant Health, organised by the NRN, and information units describing the Operational Groups and Innovative Projects, fostered by Measure 16 of the rural development programme in Spain in this matter, as well as Horizon 2020 projects, whether or not they participated in the conference, in order to help disseminate them and enable the various stakeholders to consult them.

Conference to exchange experiences between Operational Groups and Innovative Projects in the matter of plant health

On 3 June 2020, the National Rural Network (NRN) organised an exchange of experiences between Operational Groups, innovative projects and others from Horizon 2020 that are working on the matter of plant health. More than 60 people attended this virtual meeting to exchange experiences, representing research centres, agricultural organisations, cooperatives, companies and different Spanish Autonomous Community regions.

Objectives

The meeting was held with the following objectives:

- To help create networks among the various parties involved or with an interest in agricultural plant health.
- To help disseminate the results obtained by the Operational Groups and Innovative Projects from Measure 16 of the Rural Development Programmes and the National Programme for Rural Development.
- To foster an exchange of information on innovations obtained by the different EAFRD Operational Groups and projects within the framework of the H2020 European research programme, as well as the results from the European Focus Groups on the matter.



The Conference

- An analysis was made of the work being carried out as regards development of **national phytosanitary legislation and the transposition of European legislation**. Furthermore, emphasis was placed on the work being done in terms of knowledge transfer and in preparing Integrated Pest Management Guides, which advise farmers on crop management.
- In order to bring about an exchange of innovative solutions in the sphere of plant health, the attendees saw presentations by nine Operational Groups and Innovative Projects as well as projects from the H2020 programme, given in three parallel sessions, after which the key points discussed in each room were shared.

Key ideas:

- The involvement of innovation partners in accompanying companies in carrying out projects was seen to be important, providing support in administrative and bureaucratic tasks, as well as conveying the results to the agricultural sector.
- The projects emphasised identification and prevention of the appearance of pests and diseases, and the importance of developing sustainable farming work through agricultural practices such as integrated pest management through biological control, care for soil health, crop rotation and agroecological approaches.
- The Focus Groups had a noteworthy role in drawing up inventories of the pests and diseases attacking certain crops such as olive trees and vines.
- In the context of climate change, research into the appearance and evolution of pests and diseases in crops has become a fundamental area where it is necessary to study and analyse different mitigation and adaptation strategies.

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



EsRuralEsVital

GOPHYTOVID: Optimisation of the use of plant protection products in wine growing based on vegetation density maps

RURAL DEVELOPMENT PROGRAMME

NRDP

YEAR CREATED

2018

PROJECT COORDINATOR

Familia Torres

PARTNERS

Raventós Codorniu

Martín Códax

Bodega Las Copas

Viñas del Vero

FMC Corporation

Universitat Politècnica de Catalunya

Universidad de Lleida



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Description

GOPHYTOVID is a project aimed at benefiting the entire Spanish viticulture sector, reducing the use of plant protection products by adapting the doses applied depending on each vineyard's characteristics. Its aim is to develop and apply an efficient, manageable and simple tool to treat fungal diseases and pests in vineyards, enabling a decision-making support system to be available for each vineyard based on its production strategy.

This system can help improve management of diseases and pests, reducing the costs arising from treating the vineyard and from the use of plant protection products, by applying the strictly necessary dose at the right time, with the resulting economic and environmental benefits and greater food safety for the final product.

Based on existing technologies, the aim is to develop and validate a compatible universal system for variable application of plant protection products in vineyards, using maps of different levels of plant vigour.

Objectives

- Minimising the use of chemical-based plant protection products in viticulture.

- Assessing the use of bioprotective alternatives in practice in Spanish vineyards by applying existing technology to analyse vegetation and/or vigour maps, as well as highly efficient equipment to optimise chemical treatment and minimise the environmental impact and risk for people, all while reducing economic costs.

Expected results

- ▶ Social effect: job creation, improvement of public health, business creation, social inclusion, incorporating young people and women into rural areas, etc.
- ▶ Environmental effect: the project helps mitigate or adapt to climate change, improve the management of natural resources, an efficient use of inputs and use of renewable energies.
- ▶ Economic effect: economic savings for the company/entity.

"We are making a clear commitment to next generation agriculture, which has to be more sustainable and efficient, while also compatible with other sectors and the environment".



GOPHYTOVID

FITOSCEREZO: Availability of plant protection products and integrated management strategies for cherry trees 2

RURAL DEVELOPMENT PROGRAMME

NRDP

YEAR CREATED

2019

PROJECT COORDINATOR NATIONAL

CENTRO TECNOLÓGICO NACIONAL
AGROALIMENTARIO

PARTNERS

Fepex (Federación Española de Asociaciones de Productores y Exportadores de Frutas y Hortalizas)

ACVJ (Asociación de cooperativas del valle del jerte)

AEAMDE (Asociación de Empresarios Agrícolas de la Margen Derecha del Ebro)

AEPLA

INIA

DEVREG



Description

FITOSCEREZO emerged as an innovative proposal of national interest that requires joint work to be carried out by independent stakeholders from several autonomous community regions in Spain. The intention was to draw up an integrated pest and disease control programme to make rational use of plant protection products for it to be environmentally sustainable and increase its availability in cherry farming, specifically in Extremadura and Aragon.

The project's general aim is to design and implement a new programme for integrated control over pests and diseases in cherry trees, in order to adapt it to Directive 2009/128/EC, which sets out the framework for action in the EU to achieve sustainable use of pesticides.

Objectives

- Drafting a new integrated management programme for pests and diseases in cherry farming in Extremadura and Aragon.
- Fostering the availability and registration of new plant protection products.
- Carrying out a demonstration of the new integrated management programme for pests and diseases in cherry farming in Extremadura and Aragon.

- Making an economic, biological and environmental assessment of the new programme for integrated management of pests and diseases in cherry trees
- Analysing the results and drawing conclusions to provide knowledge to help develop the integrated management programmes set out in the national action plan.

Expected results

- ▶ Different methods for estimating the risk of pests and diseases, support systems for decision-making and determination of thresholds and times to intervene, in order to manage pests and diseases in cherry farming in Extremadura and Aragon.
- ▶ New preventive and/or curative management systems for pests and diseases.
- ▶ New plant protection products available and registered for cherry tree farming in Spain.
- ▶ New systems to determine plant protection products' residues.

"We have learned perseverance, coordination and cooperation".

GOSSGE: *Gonipterus* in eucalyptus

3

RURAL DEVELOPMENT PROGRAMME

NRDP

YEAR CREATED

2018

PROJECT COORDINATOR

Asociación Española de Fabricantes de Pasta, Papel y Cartón (ASPAPEL)

PARTNERS

ASPAPEL | ASEFOGA | CETEMAS | COSE | ENCE |
INGENIERIA ADRA | GALCA



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Description

It is estimated that today that the weevil causes a drop of 30-40% in production for many eucalyptus plantations on the Cantabrian coast. It also weakens the tree masses that are more susceptible to other pests entering such as boring insects.

The GOSSGE Group project aims to improve the state of health of eucalyptus-producing forests on the Cantabrian coast affected by the defoliator *Gonipterus platensis* pest in order to cut down the associated losses in production; and to improve the profitability for local forest owners and industries through innovative mechanisms of biological and technical control following the principles of integrated pest management and spreading knowledge generated through the forestry and industry chain.

Objectives

- Ensuring the sustainability of eucalyptus plantations.
- Objectively detecting the level of affectation and carry out inspections economically.
- Drawing up a single protocol for inspection.
- Innovation in biological control techniques aimed at managing the rate of parasitisation, as well as keeping the seasonal egg-laying stable.

- Improved integrated treatment using natural, more environmentally friendly products and innovative techniques to apply them (e.g. UAVs, drones).
- Innovating in control techniques with substances that are natural or compatible with integrated management.
- Knowledge transfer.

Expected results

- ▶ Standardisation of damage assessment protocols with inventory methods in the field.
- ▶ Optimisation of bioproduction of the pest's natural parasitoids, improving their releases according to the characteristics of the forest mass treated and the degree of damage, as well as optimising the use and doses of new natural plant protection products compatible with the integrated management.
- ▶ Experimental validation in operational environments using application systems with UAVs, and comparison with classic ground-based application methods.
- ▶ Transfer of the knowledge generated and training for forest owners will help boost the production capacity.

"The project has no negative environmental impact. In the long term, it means greater efficiency with resources, since it will help reduce losses due to pests, thus reducing waste in resources".

VITICAST: Innovative solutions to predict fungal disease on vines

4

RURAL DEVELOPMENT PROGRAMME

NRDP

YEAR CREATED

2019

PROJECT COORDINATOR

Monet Tecnología e Innovación S.L.

PARTNERS

Monet Tecnología e Innovación SL | Fundación Empresa Universidad Gallega (FEUGA) | Viña Costeira S.C.G. | Bodega Hacienda Monasterio SL | Bodega Matarromera S.L. | Estación Fitopatológica Areeiro (Diputación de Pontevedra) | Universidad de Vigo (grupo de Planta, suelo y aprovechamiento de subproductos)



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Description

In order to implement an appropriate strategy to sustainably develop grapevine farming, it is necessary to take into account the thermal requirements to determine the phenological state of each grape variety and evaluate the incidence of diseases caused by some fungi such as *Botrytis cinerea*, *Plasmopara viticola* and *Uncinula necator*.

The development of monitoring systems such as biological sensors to measure fungal spores in the atmosphere, combined with epidemiological models designed to include meteorological and phenological factors, enables pathogen attacks on the vine to be detected early.

The VITICAST operational group aims to provide innovative solutions to predict fungal diseases in vineyards, helping to optimise production and sustainable development for the crop in the most important bioclimatic provinces in the north-west of the peninsula via innovation in managing the most prevalent fungal diseases. The tool for warning of possible infections will combine meteorological data measured on the plot itself, prediction of the vine's phenological phases, and the concentration of spores and inoculum necessary for the infection to occur.

Objectives

- Determining when the different phenological phases begin in the areas studied according to the variety of grape through field observation and phenoclimatic models.
- Creation of prediction models for the number of spores in the vineyard's atmosphere necessary for infection to occur, determining the risk thresholds and studying the symptoms.
- Optimising the number of plant protection treatments in viticulture.

Expected results

- ▶ Improvements in disease prediction systems to optimise the number of plant protection treatments and determine the right time to apply them.
- ▶ Quantification of the improvement in wine quality by comparing multi-residue analyses in microvinifications.
- ▶ A model for calculating the annual cost savings per hectare arising from the optimisation of plant protection treatments and crop management.

"The project's success is notable for the importance placed on cooperation between the parties involved, and the commitment, teamwork and scientific potential of the researchers".

INVAREGA: Assessment of treatments to manage invasive species in irrigation facilities

5

RURAL DEVELOPMENT PROGRAMME

RDP Andalucía

YEAR CREATED

2018

PROJECT COORDINATOR

Asociación FERAGUA de Comunidades de Regantes de Andalucía

PARTNERS

Fundación Pública Centro de las Nuevas Tecnologías del Agua (CENTA)

Campus de Excelencia Internacional Agroalimentario (ceiA3)

Fundación Caja Rural del Sur

Asociación FERAGUA de Comunidades de Regantes de Andalucía



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Description

Invasive alien species are a real threat to biodiversity and the economy. Irrigation infrastructures provide the ideal habitat for such species to take hold, colonising irrigation reservoirs and distribution pipes, and leading to additional costs due to maintenance and greater water and energy consumption.

INVAREGA aims to improve the irrigation systems being used by applying more effective and efficient physical and chemical treatment to prevent and control the three main invasive species found in Andalusian irrigation: the Asian clam, zebra mussel and bryozoans.

It seeks to evaluate feasible physical and chemical treatments to mitigate the effects of invasive species in irrigation facilities.

Objectives

- Testing new treatment methods, first in the laboratory and then in the field, using chemical ones (sulphurous acid, chlorination and other oxidants and biocides) and physical ones (antifouling paints, ultrasound and desiccation).
- Evaluating the effectiveness and economic viability of the different treatment techniques.

- Fostering action protocols to better manage the fight against invasive species and make better use of water.
- Estimating the costs of applying them in the current water system in each of the irrigation communities participating in the Operational Group, based on the dosage of each product applied, volumes of water in regulation ponds, flows, pressures, speeds, etc. in order to verify their economic viability.

Expected results

- ▶ Prevention and control of the damage caused by invasive species in Andalusian irrigation, particularly Asian clams, zebra mussels and bryozoans.
Fewer working hours devoted to cleaning filters such as stone catchers or repairs.
- ▶ Fostering and bolstering green jobs.
- ▶ A decrease in pressure losses in pipes, leading to lower energy costs.
- ▶ A reduction in rust and deterioration of water facilities.

"Invasive alien species are a real and potential threat to biodiversity and the economy. Identifying effective, efficient treatment against invasive species is essential for the Andalusian irrigation sector. Such treatment must be technically, economically and environmentally viable".

Innovative strategies for early detection and control of the *Sclerotium rolfii* fungus in potatoes

6

RURAL DEVELOPMENT PROGRAMME

RDP Andalucía

YEAR CREATED

2016

PROJECT COORDINATOR

Asociación Agraria - Jóvenes Agricultores (ASAJA-Sevilla)

PARTNERS

Universidad de Córdoba

Crespo Camino, Explotaciones Agrícolas, S.A. (Crescasa)

Andalucía Patatas del Sol SL (Anpasol) | ASAJA-Andalusia



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Description

The early Andalusian potato is a very important crop economically, especially in the provinces of Seville, Cádiz and Málaga. However, in recent years an exponential increase in the fungus *Sclerotium rolfii* has been seen in different production areas.

This project was set up to create strategies to control *Sclerotium rolfii* by combining chemical and/or biological treatments with certain farming practices. The implementation of an integral disease management strategy must use minimal inputs, within the context of sustainable agriculture that respects the environment and ensures healthy consumption.

Objectives

- An evaluation of the resistance of varieties of potatoes under controlled conditions.
- Evaluation of chemical and biological products against *S. rolfii* in artificially inoculated potatoes under controlled conditions.
- Evaluation of products and methods to control pathogens in trials carried out under field conditions.

Expected results

- ▶ A method for early detection of the pathogenic agent *S. rolfii* in soil, enabling prior evaluation of the risk of planting in plots that have grown potatoes or other susceptible species in the past.
- ▶ Evaluation of the resistance of potato varieties against infection, detecting differences in susceptibility among them.
- ▶ Evaluation of the effectiveness of various active ingredients, whether chemical or biological.
- ▶ Identification of some active ingredients capable of inhibiting infection under controlled conditions and in the field.

“In our opinion, it is essential to disseminate the project well, with a permanent communication channel between all interested parties and with society in general to explain the current situation and the project’s achievements”.



Dosaolivar: dosifying plant protection products for olive

7

RURAL DEVELOPMENT PROGRAMME

RDP Andalucía

YEAR CREATED

2018

PROJECT COORDINATOR

Dcoop

PARTNERS

CEIA- Universidad de Córdoba (Grupo de Investigación 126 Mecanización y Tecnología Rural)

DTA

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Description

Plant protection products should be applied in olive groves with care as regards the environment, but this recommendation clashes with the real situation in the field. The problem can be solved with a system that can calculate the optimum doses based on the trees' characteristics.

DOSAOLIVAR seeks to develop a tool to support agricultural and technical workers to achieve the right doses of plant protection products applied to the crown of olive trees within their different farming systems, so as to reduce dosages and improve environmental and economic sustainability.

A system has been developed based on a mobile app, DOSAOLIVAR-App, which determines the optimum volume of solution and hence the amount of active ingredient to be sprayed, based on the olive grove's morphology (essentially, the volume of crown and density of leaves), and an electronic device, DOSAOLIVAR-kit, which is built into conventional sprayers and automatically regulates the equipment based on the prescriptions from the mobile app, with the possibility of communicating with it remotely. In addition, the work is monitored using the equipment's GPS position shown graphically, and the data about the different plant protection treatments is stored.

Objectives

- Development of a system to plan plant protection treatments and their optimal application depending on the crop's situation and characteristics.
- An increase in technical, environmental and energy efficiency, mitigating emissions that affect climate change in the olive sector.
- Creation of a dynamic, updatable, science- and technology-based tool that can be used by the sector to make better decisions and is easy for olive growers to use.
- Transferal of the project's results to producers, bodies, institutions and public and private entities, whether regional or national, that may be interested in it.

Expected results

- ▶ Having systems available to dosify plant protection products so as to help farmers know how much product to apply based on their trees' characteristics.
- ▶ Prevention of product wastage and minimisation of environmental damage.

"We have acquired a greater knowledge of the morphology of Andalusian olive orchards, especially the traditional kind, as well as learning how to develop smartphone apps for agricultural machinery".

Launch of pilot demonstration farms for integrated pest management

8

RURAL DEVELOPMENT PROGRAMME

RRDP - Aragón

YEAR CREATED

2017

PROJECT COORDINATOR

APROGIP (Asociación para la Promoción de la Gestión Integrada de Plagas)

PARTNERS

Agropecuaria del Cinca | ATRIA de Fruticultores de Épila | Asociación para la Promoción de la Gestión Integrada de Plagas (APROGIP) | Fundación Parque Científico Tecnológico Aula Dei (PCTAD) | Centro de Investigación y Tecnologías Agroalimentarias de Aragón (CITA) | Universidad de Zaragoza | Cooperativas Agroalimentarias de Aragón (CAA) | Unión de Agricultores y Ganaderos de Aragón (UAGA) | Unión de Pequeños Agricultores y ganaderos de Aragón (UPA) | Colegio de Ingenieros Agrónomos de Aragón, Navarra y País Vasco | Colegio Oficial de Ing. Técnicos Agrícolas y Peritos Agrícolas de Aragón (COITA)



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Description

The current legislative framework (Law 43/2002 on Plant Health, Regulation (EC) 1107/2009 and Royal Decree 1311/2012) on pest management encourages a reduction in consumption of plant protection products, prioritising the use of non-chemical methods to control pests and diseases, which entail less risk to human health and to the environment.

This project aims to become a real example of the applicability and viability of techniques following the principles of IPM (integrated pest management), which are available and are the ones most suited to pest and disease control in a given agricultural ecosystem.

Objectives

- Fostering the application of IPM in practice on pilot demonstration plots with pome and stone fruit crops, managed by technicians and farmers who can also take part in disseminating these practices.
- Demonstrated applicability of these techniques from a technical point of view by making comparisons of costs and profits that show their viability and economic profitability.

Expected results

- ▶ Fostering knowledge and the use of innovative IPM techniques and alternative methods of crop protection through outreach initiatives and dissemination of the activities carried out within the project.
- ▶ Information given to society in general about the benefits that IPM can bring in terms of food quality and safety, and in terms of sustainability.

“Greater awareness and support are necessary to implement this type of work, which we consider essential to truly implement Integrated Pest Management”.

Creation of new biological control strategies against four pistachio pests

9

RURAL DEVELOPMENT PROGRAMME

RDP - Castilla-La Mancha

YEAR CREATED

2018

PROJECT COORDINATOR

IRIAF (Instituto Regional de Investigación y Desarrollo Agroalimentario y Forestal de Castilla la Mancha)

PARTNERS

IRIAF

Ecovalia

SAT El Campo

SAT Ecopistacho

SAT Pistamancha



IRIAF

Instituto Regional de Investigación y Desarrollo
Agroalimentario y Forestal
Castilla-La Mancha



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Description

Despite the pistachio's good adaptation to the continental climate, to drought and to the stony limestone soils of the region, pistachio farming in Castilla-La Mancha is facing some difficulties arising from its late entry into production, from underdeveloped nursery work, a lack of Spanish consumption and the scarcity of studies and proven technical information.

To solve these difficulties, this project will study new techniques and strategies for biological control against the four main pests in Castilla-La Mancha (and to a large extent in the rest of the Iberian Peninsula): Pistachio psyllids (*Agonoscyta spp.*), fruit bugs (*Hemiptera* order), leaf beetles (*Labidostomis lusitanica*) and Indianmeal moths (*Plodia interpunctella*). Innovative plant protection products will be tested in the field to combat these pests in organic pistachio farming.

Objectives

- Studying and developing new strategies and techniques to control these four pests following the standards of organic production, by exhaustively compiling a bibliography of previous studies.

- Preparation of the new techniques developed in the field and in storage by collaborating with pistachio farmers and storage workers who follow the standards of organic production.
- Experimental trials carried out in the field to study the effectiveness of different new plant protection products to combat these pests in pistachio trees, as well as the authorised plant protection products that are currently used in organic farming to combat these and other pistachio pests, which will serve as "control" to compare their effectiveness.
- Dissemination of the results and conclusions from experimental field trials among the project's partners and collaborators, in terms of new plant protection strategies and organic plant protection products.

Expected results

- ▶ Creation of new plant protection strategies.
- ▶ Knowledge of current products and other more innovative ones.
- ▶ A boost for organic pistachio farming in Castilla-La Mancha.

"Consumption of pistachios produced in local areas helps reduce the carbon footprint and improve the rural population's quality of life".

Adaptation of a prediction model to control and manage the grapevine moth in the La Mancha Denomination of Origin (DO) area, based on the correlation between climatic factors and the development of different generations

10

RURAL DEVELOPMENT PROGRAMME

RDP - Castilla-La Mancha

YEAR CREATED

2018

PROJECT COORDINATOR

IRIAF (Instituto Regional de Investigación y Desarrollo Agroalimentario y Forestal de Castilla la Mancha)

PARTNERS

IRIAF

UCLM (Universidad de Castilla la Mancha)

Consejo Regulador de la D.O. La Mancha

Vinícola de Tomelloso, S.C.L.

Private farmers



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Description

The grapevine moth (*Lobesia botrana*) is the main pest in vineyard farming in Castilla-La Mancha. The growth of this pest is closely related to climatic factors, so it is very useful to develop prediction models to estimate the pest's biological cycle. Indeed, this has been done in different areas for decades.

This project aims to adapt a new model to predict the development of the different phases of the grapevine moth adapted to the climatic conditions of the area under study (DO La Mancha), which will serve as a tool to predict the appearance of the grapevine moth and rationalise the way to deal with it. The model to be developed in the study area is based on the previous prediction models, but it is necessary to look into the development and validation of the model, adapting it to the geographical area in which it is to be implemented. No model developed to date has been created taking into account the climatic characteristics of Castilla-La Mancha.

Objectives

- Study and comparison of the different existing prediction models in the area under study with the real data obtained in the project.
- Minimum and maximum thresholds established for *Lobesia botrana*'s day-to-day development
- Analysis of the behaviour of *L. botrana* in the vineyards of Castilla-La Mancha.
- Learning the relationship between climatic factors and grapevine moth population levels.

Expected results

- ▶ Application of the results obtained in practice, enabling pest monitoring.
- ▶ Creation of a simple tool adapted to the conditions of our study area, which helps the sector improve its integrated management of this pest.

"The prediction models are based on thermal integrals that make it possible to predict when each generation begins to fly or when the maximum number of each of them are in flight, thereby creating a more accurate alert".

Biological pest control in commercial apple orchards

11

RURAL DEVELOPMENT PROGRAMME

RDP - Catalunya

YEAR CREATED

2016

PROJECT COORDINATOR

GIROPOMA COSTA BRAVA SL

PARTNERS

GIROPOMA COSTA BRAVA SL. Empresa frutícola

PARETA RUBAU SL. Empresa agraria

CAN RESTA. Empresa agraria

FUNDACIÓ MAS BADIA. Centro tecnológico



Description

Apple production requires the use of plant protection products, which clashes with the ever-increasing consumer demand for products that are minimally treated and free of residues. In technological terms, a lot of progress has been made in optimising treatments based on the biology of each pest, while also developing sexual confusion and mass capture systems. Even so, it is essential to use plant protection products to ensure farms' productivity.

This project is based on biological control, fully protecting apple plantations from pests with polyethylene nets. It seeks to minimise insecticide treatment by using a global pest defence strategy in commercial apple orchards completely closed off with anti-insect netting in addition to biological control.

The activities carried out were mainly aimed at biological control of aphids, particularly the rosy apple aphid (*Disaphys plantaginea*), the green apple aphid (*Aphis pomi*) and the woolly apple aphid (*Eriosoma lanigerum*). Passive protection of the orchards with a polyethylene net was considered, as well as treatment in autumn to make it difficult for adult rosy apple aphids to return to the orchard to lay eggs, while also installing refuges for auxiliary insects and releasing predators from biofactories.

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Objectives

- Fostering the use of other methods as alternatives to plant protection products.
- Preserving, restoring and enhancing biodiversity.
- A reduction in the number of plant protection treatments and residues on the fruit.

Expected results

- ▶ In orchards protected with polyethylene nets, exclusively releasing auxiliary fauna does not achieve biological control of the aphid. By integrating agronomic practices, however, the results have improved and biological control over the aphids has been achieved in one of the plantations, while control over other pests (apple moth (*Cydia pomonella*), fruit fly (*Ceratitis capitata*)) has also been satisfactory. Biological products to control *Pseudococcus viburni* were not effective.
- ▶ It has been demonstrated that in protected orchards the number of insecticides can be significantly reduced. The strategy of adding biological control to the total closure of an orchard has enabled the different species of aphids to be controlled with minimal use of insecticides.

"It is necessary to integrate agronomic methods with biological control methods to achieve biological control of the most potentially damaging species of aphids in apple trees".

EVID: Innovative practices to combat grapevine wood diseases

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H2020 RESEARCH AND INNOVATION PROGRAMME

RDP - Galicia

YEAR CREATED

2017

PROJECT COORDINATOR

FUNDACION EMPRESA UNIVERSIDAD GALLEGA (FEUGA)

PARTNERS

Fundación Empresa-Universidad Gallega (FEUGA) | Bodegas Godeval S.L. | Estación de Viticultura y Enología de Galicia (EVEGA)-Agencia Gallega de Calidad Alimentaria (AGACAL) | Universidad de Santiago de Compostela (USC, grupo de investigación Modelos de optimización, decisión, estadística y aplicaciones-Modesty)



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Description

The term vine wood diseases covers a group of fungal pathologies that cause an alteration in the woody parts of the plant. The infection often ultimately results in the premature death of the plant. The main problem in controlling vine wood diseases is the lack of effective authorised plant protection treatments.

Based on the work carried out within the framework of the European project WINETWORK (H2020-ISIB-2014-1), which aims to establish a European network to exchange knowledge on dealing with vine pathologies, some innovative control practices have been identified.

This is how EVID came about, with the intention of defining, assessing and validating new practices that have been identified as promising to treat vine wood diseases. Specifically, there is the treatment with antagonistic fungal species of the genus *Trichoderma* acting as a biological agent, with its innovative application by inserting previously inoculated plugs. Similarly, other techniques will be monitored, such as spray treatment for pruning wounds and the use of mastic, including last generation fungicides and using commercial brands to carry out a comparative study and demonstrate the effectiveness of the procedures put forward.

Objectives

- Monitoring reports on selected innovative practices to combat vine wood diseases.

- Action protocols set out for these practices.
- An assessment of the technical and economic feasibility of the practices identified.
- An evaluation of the effectiveness of using fungi from the *Trichoderma* genus inoculated in wooden plugs as a biological control agent in Galician vineyards.
- Statistical analyses of data processing to enable robust conclusions to be drawn.

Expected results

- ▶ Economic: stabilisation and job creation thanks to improved productivity.
- ▶ Social: foreseeably, the population in the rural area around vineyards will become increasingly stabilised.
- ▶ Technological: due to the many stakeholders who want to get involved in the project through outreach tasks, which will foreseeably enable technical guidelines to be adopted on a large scale.
- ▶ Putting Galicia at the forefront in developing innovative treatment techniques to combat such a widespread problem.

"We have learned new application techniques for Trichoderma, comparing them with conventional treatments, as well as statistical analysis methods for decision-making in the field".

ERA-NET PROGRAMME

RDP - Madrid

YEAR CREATED

2018

PROJECT COORDINATOR

UPA Madrid

PARTNERS

UPA Madrid

Andrés Morate

Francisco González

José Antonio Núñez

Luis Saavedra

IMIDRA



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Description

According to the statistics from 2018 published by the MAPA, in Spain there are 200,129 ha of organic vineyards, 466 ha of which are in the Madrid Community region. Fungicides and bactericides make up the group of active substances most sold, with 37.999 MT, accounting for 52.7% of the total.

Ecoviña is based on protecting vineyards against diseases with a covering of dust generated by materials from the soil. This practice was carried out in the past and the intention is to recover it thanks to the knowledge from farmers who do it. Trial and study of this technique enables us to know the benefits it brings to the crop and its effectiveness in controlling vine diseases.

Several experimental plots with different types of soil have been set up within the Madrid Community region, in each of which the tests will be carried out to evaluate the effectiveness of dust clouds in disease control. If the doses of plant protection products are reduced, this would reduce their environmental impact.

Objectives

- Evaluation of the efficiency of the dust cloud technique in controlling powdery mildew.
- Evaluation of the influence of the dust cloud technique on grape production.
- Evaluation of the environmental impacts associated with the dust cloud technique.
- Improvement on the design of the artisanal machine currently in use.

Expected results

- ▶ A higher quality grape compared to the current one, which should also be a cheaper option for consumption.
- ▶ Conservation and improvement of environmental aspects.
- ▶ Control over powdery mildew in the plots treated with the dust cloud technique.
- ▶ A reduction in the use of plant protection products.

"We are re-learning the tradition of beating the earth with shovels, turning it into a mechanised technique by adapting existing machines that are simple to use and low-cost, which will enable the tradition to be modernised while keeping all of its environmental advantages".

OZOCAM: Ozone and plant pathogenicity in the Madrid Community region

14

RURAL DEVELOPMENT PROGRAMME

RDP - Madrid

YEAR CREATED

2018

PROJECT COORDINATOR

CIEMAT- Departamento de Medio Ambiente

PARTNERS

Laboratorio de Sanidad Vegetal-IMIDRA | Grupo de Mejora Genética Vegetal-UPM | Heliconia S. Coop. Mad. | Hortifuenla -Comunidad de Regantes Parque Agrario de Fuenlabrada | Unidad de Modelización y Ecotoxicología de la Contaminación Atmosférica-CIEMAT



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Description

Analysing the increase in tropospheric ozone in the development of plant pathogens is a very new, unknown topic. The increase in this atmospheric pollutant is a key factor linked to climate change that is affecting the quality and production of our crops. In addition to its direct toxicity, ozone weakens plants' ability to cope with other stresses such as plant pathogens. Selection of tolerant varieties and management of fertilisation and irrigation can be considered to be an agricultural management practice to adapt to the global change.

OZOCAM is an operational group with two facets: research and transfer or dissemination of results and of the ozone problem in the sector. It seeks to analyse the effect of the increase in tropospheric ozone levels on the development of plant pathogens in agricultural crops in the Autonomous Community region of Madrid (CAM) and to study the possibilities of mitigating the effects by selecting varieties and agricultural practices (fertilisation and irrigation).

Objectives

- Experimental analysis of the effect of the increase in tropospheric ozone on the development of plant pathogens in typical crops in the CAM (chard and wheat).

- Definition of the morphological, physiological and genetic traits that determine the ozone tolerance of a crop or variety, and the possibility of selecting it as an option to mitigate climate change and atmospheric pollution.
- An analysis of the options for mitigating the effects of ozone via agricultural management (irrigation, fertilisation and selection of varieties)
- An analysis of the ozone risk in the CAM region's crops following the method of the United Nations Convention on Air (CLRTAP, UNECE) and taken up in the European Air Quality Directives.

MAPPING CRITICAL LEVELS FOR VEGETATION

Expected results

- ▶ Increased scientific knowledge on the influence of high levels of tropospheric ozone on the development of wheat and chard pathogens.
- ▶ Definition of genetic traits for tolerance to ozone aimed at varietal selection programmes to adapt to climate change and atmospheric pollution.
- ▶ Optimisation of "Ozone Bioindicator Plots" in Mediterranean conditions for use as an educational tool regarding the problem of ozone.
- ▶ Dissemination of the matter of the ozone problem in the agricultural sector of the Madrid Autonomous Community region.

"Experimental and field trials have been affected by the COVID-19 lockdown".

CITRI-HERB: Development of a weedkilling tool for citrus crops in greenhouses

15

RURAL DEVELOPMENT PROGRAMME

RDP - Murcia

YEAR CREATED

2017

PROJECT COORDINATOR

GO Asociación Tecnológica de Innovación Agrícola de la Región de Murcia (ATIARM)

PARTNERS

Gaysa- maquinaria agrícola y fitosanitaria

AGRYTEL

ID-DAVID

Global Invernaderos



Description

GO ATIARM was launched for the purpose of fostering growth in the agricultural sector through innovation. With most crops, weed removal in orchard alleys is done by machinery using mechanical and chemical means. However, this machinery is not effective in combating weeds that grow between trees in the same row. In the case of greenhouses, the main problem is to avoid the obstacles posed by trees and posts. This area between the trees is currently dealt with manually, either by chemical or physical means.

The CITRI-HERB project aims to build a device capable of combating weeds within the rows of trees and subsequently analyse its behaviour in citrus crops under netting.

Objectives

- Creation of a new machine to combat weeds for citrus trees in greenhouses, combining chemical and mechanical methods.
- Planning a weed management strategy that balances both methods in an attempt to reduce herbicide use.



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Expected results

- ▶ Solutions found to tackle spontaneous flora.
- ▶ A reduction in the resistance to herbicides and in the difficulty of attacking weeds within rows of trees.
- ▶ Direct application in building a machine prototype that can carry out mechanical and chemical weeding for lemon farming in a greenhouse.

"The innovation partner puts companies that have an innovative idea in touch to carry out a project: we take up the idea, carry out a study and see how to shape that idea".

atiarm | Asociación Tecnológica de Innovación Agrícola de la Región de Murcia

Champihealth: New farming methods to reduce mushroom diseases

16

RURAL DEVELOPMENT PROGRAMME

RDP - La Rioja

YEAR CREATED

2018

PROJECT COORDINATOR

Eurochamp

PARTNERS

EUROCHAMP

CTIC-CITA

CTICH



<http://ctic-cita.es/>



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Description

In order to obtain a higher yield in mushroom farming, there is a need to reduce the current economic losses caused by the diseases produced by the 'wet bubble' (*Mycogone perniciosa*) and 'cobweb' (*Cladobotryum dendroides syn.*) fungi.

Champihealth aims to develop new methods to control and cultivate mushrooms so as to reduce diseases caused by these fungi and thus bring down losses in mushroom farming in La Rioja. In addition, these new farming systems will concentrate on optimising the quality of the product, whether fresh or for subsequent processing.

With this new system, it is estimated that the benefit just in terms of the savings by avoiding losses and thus gaining higher yields, could exceed 8 million euros a year in La Rioja, and 20 million nationally.

Objectives

- Creation of an effective method to combat diseases for which there are no effective solutions today.

- Management of such diseases with a method below their pathogens' tolerance threshold.

Expected results

- ▶ Innovative methods in mushroom farming to reduce diseases and improve yield.
- ▶ AFostering an improvement in the sector's competitiveness as well as in cooperative projects so that companies from La Rioja can tackle new challenges with ease, guaranteeing results.

"We have been able to verify the true effectiveness of some plant protection methods, the entry points of diseases and the physiological response from the mushrooms".



Biological pest control in mushroom crops

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RURAL DEVELOPMENT PROGRAMME

RDP - La Rioja

YEAR CREATED

2017

PROJECT COORDINATOR

Asociación Profesional de Productores de Sustratos y Hongos de La Rioja, Navarra y Aragón

PARTNERS

HERCHAMP 2017, SL.

CHAMPI-RIOJA SAT nº 2653



Description

Mushroom farming is the second biggest agricultural producer in the La Rioja Community region. However, the mushrooms (*Agaricus bisporus*) are affected by two families of mosquitoes: Sciaridae and Phoridae. There are different species within these families, which makes it very difficult to find a valid solution for all of them.

These pests are also transmission vectors for other crop diseases. Furthermore, they cause yield losses due to the damage their larvae do to the mycelium on which they feed and to the sporophores.

This project intends to provide mushroom farmers with an alternative mechanism to effectively and biologically control pests, which should also be commercially viable, by using attraction traps, repellents and/or natural enemies, in order to adapt to new trends in reducing the use of plant protection products.

Objectives

- Identification and selection of at least 10 biological control mechanisms based on the existing bibliography and/or products already available from commercial firms, and their use on other types of crops.



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- Evaluation of the effectiveness of the selected mechanisms in the laboratory for the different stages of the two species of Diptera being studied.
- Compounds selected from species of cultivated fungi that are attractive to mosquitoes (sciarids and phorids) with a view to using them to control these pests.
- Field trials carried out to evaluate the effectiveness of directly applying the chosen mechanisms in rooms with controlled infestations.
- Optimisation and validation of the mechanisms in crops and the plants themselves.

Expected results

- ▶ A mechanism found for effective biological control over mushroom crop pests (Sciaridae and Phoridae) that is commercially viable and can be certified under the regulations of the Other Means of Plant Protection (OMDF in Spanish) according to Royal Decree 951/2014 of 14 November.

“The main difficulty with this type of study lies in the characteristics of the crop itself. The pests are very specific in mushroom farming, which makes it difficult to obtain commercial products to treat them”.



Best4soil: Boosting 4 best practices for soil health in Europe

18

HORIZON 2020 PROJECT

YEAR CREATED

2018

PROJECT COORDINATOR

DELPHY (Netherlands)

THEMATIC NETWORK COORDINATOR

WP Leader

PARTNERS

IFAPA (Spain) | Wageningen University and Research (Netherlands) | PHPetersen (Germany) | SEGES (Denmark) | TEAGASC (Denmark) | Agroscope (Switzerland) | BFH (Switzerland) | FiBL (Austria) | VermiGrand (Austria) | 7Reasons (Austria) | University of Wroclaw (Poland)



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Description

Best4Soil is an international thematic network that has been launched with the ultimate goal of maintaining, improving and restoring the health of agricultural soil in Europe.

In this vein, the thematic network attempts to foster existing knowledge that is ready to be applied about crop rotation and the four practices that have been considered the best for managing agricultural soils. These practices are divided into the preventive kind (adding organic matter and using green manure and/or cover crop) and the proactive or control kind (anaerobic soil disinfection and biosolarisation). In order to transfer knowledge about these best practices, tools have been created that include easy-to-understand video tutorials addressing the soil management practices encouraged through the project, technical factsheets with additional information on the practices encouraged, and a database on soil pathogens and their interaction with plants. This tool is an instrument to support decision-making, helping those working in agriculture and their consultants to plan crop rotations, as well as in the use of green manures and/or the most suitable and beneficial cover crops for the soil's health, according to the different cases.

Objectives

- Sharing of scientifically and technically-backed knowledge on soil health with anyone who may be interested.
- Interconnecting a significant amount of European producers, technicians and educators.

Expected results

- ▶ Implementation and take-up by producers and other parties interested in the soil management practices promoted by the project.
- ▶ To maintain, improve, and/or restore the health of agricultural soil in Europe.

"Healthy soils are very important for the future of horticultural and arable crop production in Europe. Soil health is a reflection of the health of human beings".



BEST4
SOIL

XF-ACTORS. European Research on *Xylella fastidiosa*

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HORIZON 2020 PROGRAMME

YEAR CREATED

2016

PROJECT COORDINATOR

Consiglio Nazionale delle Ricerche (CNR, IT)

PARTNERS

Consortium of 29 partners, including 4 non-European research centres

Spanish Partners: Agencia Estatal Consejo Superior De Investigaciones Científicas (CSIC, ES); Instituto Valenciano de Investigaciones Agrarias (IVIA, ES); Instituto Andaluz de Investigación y Formación Agraria Pesquera Alimentaria Y de la Producción Ecológica (IFAPA); AINIA – Bioassays; Universidad de Girona



Xylella fastidiosa Active Containment Through a multidisciplinary-Oriented Research Strategy



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Description

Xylella fastidiosa (Xf) is a bacterium that causes diseases of great economic significance in crops such as vines, citrus, olive, peach and almond trees, and other woody and shrubby species, including ornamental and forest species of great ecological value.

XF-ACTORS is developing an integrated management strategy for Xf-associated diseases to prevent them from entering, becoming established and expanding, and to control their economic, environmental and social impact in the event of new outbreaks in EU territory.

Objectives

- Strengthening preventive measures by consolidating knowledge.
- Developing techniques for early detection of Xf symptoms from the level of the leaf up to the scale of the landscape.
- Filling gaps in knowledge about Xf's biology, population genetics, host interaction mechanisms, and xylem sap feeding bioecology in order to identify the processes involved in Xf vectorisation and transmission.

- Developing new and innovative management strategies and setting up an integrated framework of sustainable approaches aimed at minimising the economic, environmental and social impact of Xf infections in European Union territory.
- Using the results from research to develop pest risk assessment tools on a regional scale.
- Setting up a platform to communicate, disseminate and transfer the appropriate results among the various stakeholders.

Expected results

- ▶ Specific computer tools developed to be able to quickly analyse the large set of raw sequence data and extract useful genetic and epidemiological information.
- ▶ Preliminary results about the pathogenicity of the strain that causes the infection in olive trees and in susceptible host species.
- ▶ Advances in characterising the behaviour of a set of xylem-sucking insects, which are vectors of Xf.

*“Controlling *X. fastidiosa* is complex and must be adapted to each case (region), attempting to understand the specific pathosystem involved (pathogen, vectors, host and environment)”.*

EIP-AGRI- Focus Group on Olive Tree Pests and Diseases

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EUROPEAN FOCUS GROUP

YEAR CREATED
2019

PROJECT COORDINATOR

European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI)

PARTNERS

Focus group members: Alarcon Roldan, Ricardo (public official, Spain); Alvarez, Belén (researcher, Spain); Bernardo, Umberto (researcher, Italy); Brito, António (farmer, Portugal); Canale, Marion (others, France); Couanon, Willy (consultant, France); Ferrara, Vincenza (farmer, Italy); Gkisakis, Vasileios (researcher, Greece); Gouveia, Ana (farmer, Portugal); Kabourakis, Emmanouil (researcher, Greece); Martinez Ferrer, Maria Teresa (researcher, Spain); Milonas, Panagiotis (researcher, Greece); Nigro, Franco (researcher, Italy); Nobre, Tania (researcher, Portugal); Olivares, Juan (consultant, Spain); Pascual, Susana (researcher, Spain); Santos, Sónia (researcher, Portugal); Tinelli Roncalli, Fabio (farmer, Italy); Warlop, François (researcher, France).



Description

Olive trees are grown around the world, though they largely predominate in the Mediterranean region. However, the production from olive trees is threatened by various insects, pathogens and nematodes. Trade and the movement of goods and people, variations in climate and changes in agricultural practices have all helped some pests and diseases to enter, spread and establish themselves in olive farms.

Although pesticides are often used to protect olive crops against pests and diseases, there is growing concern about the effects of pesticides on the environment, human health and product quality.

The Focus Group aims to build a bridge between agriculture and research so as to gather and summarise knowledge and best practices for pest and disease control in olive orchards.

Objectives

- An inventory of the main pests and diseases that affect olive trees in Europe, including their geographical distribution and economic impact.
- A summary of how expected climate changes are likely to affect the presence and distribution of such pests and diseases, as well as their impact on olive farming, taking into account farming practices, socio-economic results and environmental conditions.



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- Creation of an inventory of good agricultural practices in different regions of Europe regarding the complete cycle of diseases and pests in olive production.
- A discussion of these practices, pointing out the existing factors for success and failure in managing pests and diseases in olive farms, including the socio-economic side.

Expected results

- ▶ Harmonisation of pest or pathogen monitoring techniques.
- ▶ Optimisation of cover crops
- ▶ Quantification of the effect of agroecological principles in pest and disease management.
- ▶ Increased farmers' knowledge about the use of agroecological principles.
- ▶ Experimental and demonstration plots and nets in the field to test disease control.
- ▶ Use of big data and artificial intelligence.
- ▶ Locally collected olive germplasm to manage pests and disease.

"It is important for the working groups to be multidisciplinary".

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.

EsRuralEsVital



PLANT HEALTH



Unión Europea

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